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The Influence of Financial Performance and ESG on Firm Value with Firm Size as Moderator

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ABSTRACT

Firm value illustrates how investors and the market view the company's ability to effectively manage its resources effectively. There are several factors that influence firm value, including financial performance, ESG, and firm size. This research aims to assess the impact of financial performance, ESG, and firm size on firm value, along with the role of firm size in influencing the relationship between financial performance and ESG on firm value. The analytical approach employed in this research is moderated regression analysis (MRA). The sample for this research includes firms engaged in the coal sector that are listed on the Indonesian Stock Exchange (IDX) from 2021 to 2023. Based on purposive sampling, 16 companies were selected. The results of the research indicate that there is a significant partial influence of financial performance, as measured by ROA, CR, and DER, on firm value. ESG disclosure also significantly influences firm value, and firm size also significantly influences firm value. Additionally, firm size, which is also used as a moderating variable, moderates the relationship between liquidity and firm value, as well as leverage and firm value. Through simultaneous testing, the independent variables and interaction variables significantly influence firm value.

Keywords: ESG; Financial Performance; Firm Size; Firm Value; Moderated Regression Analysis

INTRODUCTION

Coal from Indonesia plays a significant role in the global market. According to the Indonesian Ministry of Energy and Mineral Resources, around 70% of global coal-fired power plants in the Asia Pacific region are supplied with coal from Indonesia (Wuryandani, 2024). Additionally, coal remains the primary energy source in the domestic market and is expected to continue dominating national energy needs for the next 10–20 years. This is due to the abundant availability of coal and its relatively lower cost compared to other energy sources (Muliawati, 2024). However, coal is considered the most environmentally polluting fossil fuel compared to other fossil fuels (Wuryandani, 2024). Therefore, coal industry companies strive to continuously improve their performance, not only in terms of financial performance but also by paying more attention to sustainability aspects, particularly those related to the environment, social issues, and corporate governance.

Before deciding to invest, one of the things investors do is assess the firm's value. The worth of a firm reflects the investor's viewpoint on the organization's achievements, often linked with share prices. According to Brigham and Houston in Nur'aeni and Sari (2023), firm value is the value assigned by the market to the company's performance in the form of potential investors' perceptions. According to Battilana et al. (2022), a principal objective of the company is the maximization of its value. In order to preserve and enhance firm value, it is essential for companies to consider various determinants that may affect it. Key influencing factors include financial performance, ESG practices, and firm size.

Financial performance can be measured by looking at financial analysis through ratio, which explains the company's financial condition (Nurbany, Hidayat, & Yunani, 2025). Financial performance can be measured using different financial ratios. In this analysis, the financial ratios looked at include profitability ratios indicated by Return on Assets (ROA), liquidity ratios indicated by Current Ratio (CR), and leverage ratios indicated by Debt-to-Equity Ratio (DER). Profitability is an important factor that affects a firm's value, as highlighted in many studies. ROA is used to assess how well a company is at making profits from its assets. Research by Talunohi and Bertuah (2022) found a strong positive relation between profitability and firm value. In simpler words, when the profitability increases, firm value tends to increase as well. This is supported by the findings of Dang and Do (2021). However, some other studies show different results about the relationship between profitability and firm value. Research by Fernando et al. (2024), Singla & Prakash (2023), and Sulistiyani & Noor (2022) found that profitability does not have a major effect on firm value. Additionally, Hapsoro and Falih (2020) found in their research that profitability does not significantly impact firm value in the oil, gas, and coal industries.

In this research, the liquidity ratio is represented by the CR, which is selected for its capacity to indicate a firm's ability to meet short-term liabilities through the utilization of its current assets. An increase in liquidity, as long as it is manageable, can improve investor confidence, which may help increase the firm's value (Migliaccio & De Palma, 2024). Several studies look at the relationship between liquidity ratios and firm value. Research by Hapsoro and Falih (2020) also explained that the liquidity ratio has a significant positive effect on firm value in firms in the oil, gas, and coal industries. Meanwhile, research by Khalifaturofi'ah and Setiawan (2025) shows that the liquidity ratio, represented by CR, does not have a meaningful impact on firm value.

In this research, the leverage ratio is proxied by the DER. A higher leverage ratio, within prudent limits, suggests a greater potential for enhancing firm value. Elevated leverage reflects the firm's ability to strategically utilize debt to finance its expansion and

operational activities effectively (Sharma, 2018). There are quite a lot of studies that discuss the relationship between the leverage ratio and firm value. According to research conducted by Ibrahim and Falkenbach (2023), the leverage ratio has a positive and significant effect on firm value. Meanwhile, according to research conducted by Purnamasari and Baskara (2019), leverage has no effect on firm value.

Apart from financial performance, ESG disclosure can also be a factor that affects firm value. ESG practices in the coal industry aim to reduce negative environmental and social impacts and improve corporate governance. In recent years, according to the Indonesian Stock Exchange (IDX), there has been a growing trend of investment based on ESG aspects in the financial market. ESG practices in companies are considered to be able to increase investment due to increased firm value and competitiveness of companies in national or global markets. Companies that implement ESG practices properly tend to attract more investors.

Aydoğmuş et al. (2022) explored the influence of ESG on firm value. Their findings indicated that the aggregate ESG composite score positively & significantly influenced firm value. Siwei and Chalermkiat (2023) similarly argued in their research that ESG positively impacts firm value for firms in the energy sector, including those in the coal industry. Conversely, other research presents contrasting outcomes. According to Chen and Zhang (2024), their research reveals that in the coal industry, ESG scores negatively affect firm value significantly.

The size of a firm is also believed to impact firm value. Larger companies tend to have clearer objectives and strategies, making them more appealing to investors, which can subsequently influence firm value. Various investigations have addressed the correlation between firm size and firm value. Firm size can exert direct or indirect effects on firm value. This assertion aligns with Apriyani (2021), who posited that firm size can moderate the interaction between financial performance and firm value. Abdi et al. (2022) noted in their research that firm size serves as an effective moderator linking sustainability disclosures (ESG) with firm value. Hapsoro and Falih (2020) indicated that firm size positively influences firm value significantly within oil, gas, and coal industry companies.

Based on the previous discussion, there are notable occurrences within coal industry firms registered on the IDX during the years 2021-2023. The first occurrence pertains to the contradictory outcomes of prior studies regarding the link between financial performance, ESG, and firm size concerning firm value. The second occurrence highlights the inconsistency between the theoretical frameworks employed as references and the real-world observations present in coal industry firms. Most existing research has concentrated on the overall financial performance or ESG impacts on firm value. This investigation aspires to bridge that gap by empirically analyzing the mediating role of firm size in the effects of financial performance and ESG on firm value. Consequently, this research was designed to assess the influence of financial performance, ESG, and firm size on firm value, as well as how firm size can act as a moderator between financial performance and firm value variables.

Therefore, the contribution of this research is anticipated to enhance understanding and provide further empirical insights related to financial performance, ESG & firm size, serving as a valuable reference in the exploration of firm value science. Additionally, the results of this research are likely to be advantageous for a range of stakeholders. For investors, the findings can serve as a guideline and consideration when making investment choices concerning coal-related firms listed on the IDX. For companies, the results of this research can act as a foundation for corporate management decision-making, alongside supplementary information to bolster management strategies.

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LITERATURE REVIEW

Stakeholder Theory

Stakeholders are individuals or groups that hold a vested interest in the company. Companies must understand the diverse interests of stakeholders, as each stakeholder holds a range of different concerns. Companies may offer a range of pertinent information, including both financial and non-financial details, regarding their operations to their stakeholders. If the company can provide positive information regarding both financial performance (like financial statements) and non-financial aspects (such as details about implementing sustainability or ESG factors), this can greatly influence stakeholders. Individuals with an interest in the company will feel more assured and content with the company's overall performance. The company's success depends on how well it meets the needs of all its stakeholders, not just shareholders.

Agency Theory

Agency theory examines the contractual dynamics that exist between the principal (owner/shareholder/investor) and the agent (management/company director) in managing corporate functions. Management that is able to manage company activities well, in terms of financial/financial (such as financial performance) or non-financial (such as sustainability/ESG aspects), has the potential to reduce agency conflicts. This is because there is accountability and transparency in the provision of information between agents and principals, and management also acts based on mutual interests.

Efficient Market Hypothesis

The Efficient Market Hypothesis (EMH) serves as a fundamental theoretical framework underpinning investors' decision-making processes. According to this theory, a company's financial information—such as its financial performance—is fully reflected in its stock price, which in turn represents the firm’s value. A strong financial performance is expected to be positively associated with higher firm value. Consequently, investors tend to perceive companies with robust financial indicators and firm value more favorably, using such information as a key basis for making investment decisions.

Hypotheses Development

Signaling Theory

Signaling theory is a theory that reveals how parties who have more information can provide or send signals to parties who have less information. Companies can make effective strategies with the aim of maximizing signals through firm value. Factors that can affect firm value (such as financial performance, ESG disclosure, and firm size) can be given more attention to increase firm value. If the company has a high value, this will form a positive signal in the eyes of investors and the capital market. This signal can increase investor confidence regarding the company's prospects, thus encouraging interest in investing. In addition, the company's reputation in the capital market will also increase. Therefore, the hypothesis that can be formed to find out how financial performance, ESG, and firm size can simultaneously affect firm value is as follows:

H1: Financial performance, ESG disclosure, firm size, the interaction between liquidity (CR) and firm size, and the interaction between leverage (DER) and firm size simultaneously affect firm value.

Profitability

Companies with good profitability tend to provide more complete financial information compared to companies with poor profitability. Companies with high profitability values

show improved efficiency in resource deployment, which can increase firm value (Khalifaturofi'ah & Setiawan, 2024). In this research, profitability is proxied by Return on Asset (ROA). ROA is a measure that shows a company's performance in gaining profits by using the assets it owns (Oscario & Hidayat, 2023).

The relationship between profitability and signaling theory is that when profitability increases, it means that the company can utilize its assets productively to generate large profits (Gunadi et al., 2020). Information related to this matter can send a positive signal to investors, thereby increasing the firm's value. Profitability has a causal relationship with a company. This relationship shows that if the company's performance, measured by the profitability ratio, is strong, it will positively influence investors' choices to buy the company's shares in the stock market. Therefore, the hypothesis that can be developed is as follows:

H2: Profitability ratio proxied by ROA affects firm value.

Liquidity

A key factor affecting firm value is financial ratios, one of which is the liquidity ratio (Ibrahim & Falkenbach, 2023). The liquidity ratio indicates the firm's capacity to fulfill its immediate liabilities utilizing the current assets it possesses. An adequate level of liquidity indicates that the company can manage its liquidity risk effectively, so that the company's operational continuity can run stably. In addition, well-maintained liquidity not only increases investor confidence but can also strengthen the company's image, which in turn will contribute to an increase in firm value (Migliaccio & De Palma, 2024). If the financial information concerning the liquidity ratio is favorable, the firm value will also be positive. Therefore, the hypothesis that can be formed is as follows:

H3: Liquidity ratio proxied by CR affects firm value.

Leverage

The leverage ratio stands as a critical measure employed by investors to evaluate a firm's potential and associated risks. The correlation between firm value and leverage can be a bit complex, depending on the way capital is organized (Dang & Do, 2021). Leverage can influence a firm's value. This assertion aligns with the findings of Sharma (2018), who indicates that the leverage, represented by the DER, has a significant positive correlation with firm value. This suggests that an increase in leverage (within acceptable limits) enhances a company's potential for value growth. Elevated leverage signifies that the firm can effectively utilize debt to finance its growth and operations. If effectively managed, with access to additional funding avenues, the firm can undertake more projects, thereby expanding its opportunities. This approach can bolster profitability, subsequently enhancing the firm's value. The conclusions of this research resonate with research by Harasheh & De Vincenzo (2023), Ibrahim & Falkenbach (2023), and Razali et al. (2023), which assert that leverage positively and significantly impacts firm value. Conversely, research by Fernando et al. (2024) indicates that leverage may negatively and significantly influence firm value. Thus, the hypothesis that emerges is as follows:

H4: The leverage ratio proxied by DER affects firm value.

Environmental, Social, and Governance (ESG)

A good company is not only focused on increasing its profit but also takes care of the environment and the community around it (Apriano & Kartawinata, 2024). The revelation of sustainability reports or ESG disclosures presents non-financial insights that can convey a favorable signal. Aydoğmuş et al. (2022) assert that the significance of ESG

can positively and notably influence firm value. Meanwhile, according to Sadiq et al. (2020), ESG disclosures and concerns about ESG issues can contribute to a decrease in firm value. This is due to the perception that higher ESG disclosure is interpreted as an attempt by the company to justify the high costs incurred in ESG activities. According to investors, this condition can create a negative impression, especially if the costs incurred are not proportional to the benefits generated. From this discussion, a hypothesis can be formulated as follows:

H5: ESG disclosure affects firm value.

Firm Size

As a company increases in size, its potential worth also tends to rise, as larger firms often possess enhanced abilities to generate profits and manage assets, thereby boosting investor confidence. The greater the company's scale, the higher the overall value. Research by Khalifaturofi'ah and Setiawan (2025) highlights a significant inverse relationship between firm size and firm value. Similarly, findings support this notion that larger corporations often exhibit diminished firm values. This occurrence is associated with agency conflicts, where larger organizations frequently face divergent interests between managers (agents) and shareholders (principals). The goals of these groups can differ substantially. Managers might opt for less effective growth and diversification tactics, ultimately neglecting the primary aim of maximizing profits from core operations, which leads to inefficient resource distribution. This misalignment certainly contradicts shareholder expectations (Małkowska & Uhruska, 2022). From this discussion, a hypothesis can be formulated as follows:

H6: Firm size affects firm value.

Liquidity ratio is proxied by the CR. This ratio is used to assess capital in the company by measuring current assets against current liabilities (Migliaccio & De Palma, 2024). Companies with larger sizes tend to have easier access to various sources of external funding, because large companies are better known when compared to small companies. With a more flexible funding structure, large companies tend to be able to maintain their financial stability, which can increase firm value. Therefore, the hypothesis that can be formed is as follows:

H7: Liquidity ratio proxied by CR affects firm value after being moderated by firm size.

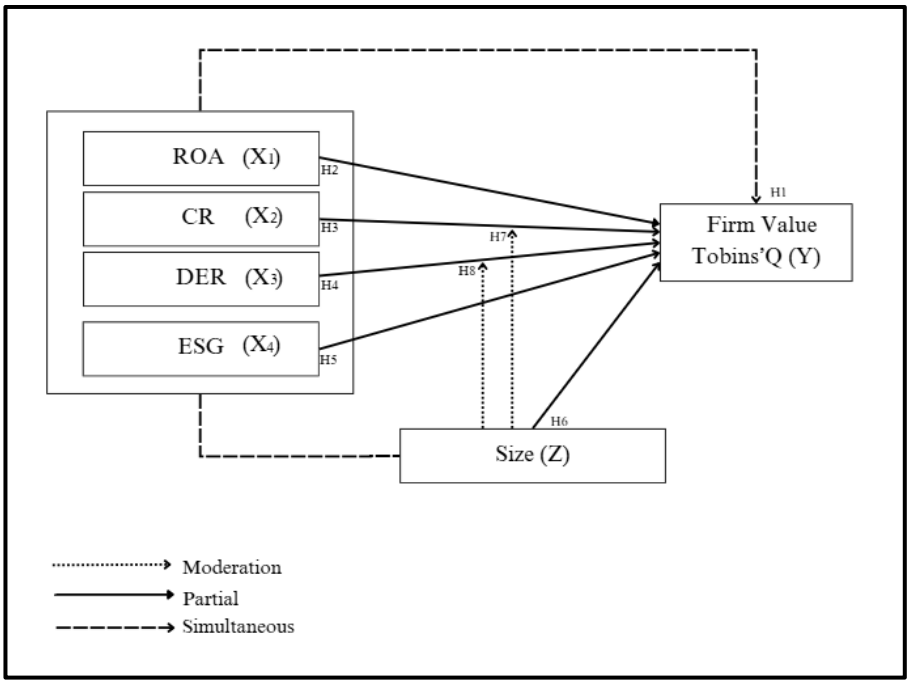
Organizations with a larger scale typically require additional capital or financial support. In simpler terms, as the company's size increases, so too do the capital demands that need to be fulfilled. This financial backing can be sourced from various avenues, one of which is the debt mechanism. An elevation in capital sourced through debt may influence the value of the firm. From this discussion, we can deduce a connection among leverage, firm value, and firm size. The hypothesis that can be articulated is as follows:

H8: The leverage ratio proxied by DER affects firm value after being moderated by firm size.

Conceptual Framework

Systematically, the framework of thought based on the theoretical basis that has been explained is as follows in Figure 1.

Figure 1. Research Framework



RESEARCH METHOD

The approach utilized in this research is moderated regression analysis (MRA). This technique was selected due to the presence of moderating variables within the research. The equation for moderation regression in this research can be expressed as follows:

$$Y = \alpha + b_1ROA_{it} + b_2CR_{it} + b_3DER_{it} + b_4ESG_{it} + b_5Size_{it} + b_7CR_{it}*Size_{it} + b_8DER_{it}*Size_{it} + e$$

The subjects of this research comprise firms involved in the coal industry that were listed on the IDX in 2021-2023. In this investigation, the sampling approach utilized is purposive sampling, which involves selecting a sample from the population based on specific criteria established by the researchers. This method is subjective, as the selection of samples hinges on the researcher's assessment of what is deemed most suitable for fulfilling the research goals. With this technique, researchers can obtain more specific and in-depth data, so that the results obtained are able to answer research questions effectively.

The sampling criteria used in this research are based on several specific considerations to ensure the relevance and availability of data. First, the sample includes companies in the coal industry that were listed on the IDX during the period 2021 to 2023. Second, the selected companies must consistently operate within the energy sector, specifically in the oil, gas, and coal subsectors, throughout the same period. Third, only companies that provide complete and accessible data relevant to the research, namely financial reports and sustainability reports, are included. These criteria were established to ensure that the analysis focuses on consistent industry participants with reliable reporting practices over the three-year period.

Table 1. Research Sample

No	Company name	Company code
1	PT Adaro Energy Tbk	Code-ADRO
2	PT Atlas Resources Tbk	Code-ARII
3	PT Transcoal Pacific Tbk	Code-TCPI

4	PT Baramulti Suksessarana Tbk	Code-BSSR
5	PT Bumi Resources Tbk	Code-BUMI
6	PT Bayan Resources Tbk	Code-BYAN
7	PT Dian Swastatika Sentosa Tbk	Code-DSSA
8	PT Golden Energy Mines Tbk	Code-GEMS
9	PT Harum Energy Tbk	Code-HRUM
10	PT Indika Energy Tbk	Code-INDY
11	PT Indo Tambangraya Megah Tbk	Code-ITMG
12	PT Resource Alam Indonesia Tbk	Code-KKGI
13	PT Mitrabara Adiperdana Tbk	Code-MBAP
14	PT Bukit Asam Tbk	Code-PTBA
15	PT Golden Eagle Energy Tbk	Code-SMMT
16	PT TBS Energi Utama Tbk	Code-TOBA

Based on purposive sampling, 16 companies (Table 1) in the coal industry that were listed on the IDX were selected for the research period 2021-2023. The total sample studied consisted of 48 companies (16 companies x 3 periods).

Table 2. Variable Measurement

No	Variable	Definition	Indicator
1	ROA (X1)	ROA represents a metric that illustrates how effectively the value of assets aids in generating net revenue.	ROA: $\frac{Net\ income}{Total\ assets}$
2	CR (X2)	CR signifies a measure that indicates the firm's capability to settle its short-term liabilities by juxtaposing the quantity of current assets with current debts.	CR: $\frac{Current\ assets}{Current\ liabilities}$
3	DER (X3)	DER reflects a proportion that demonstrates the organization's capacity to fulfill its long-term liabilities by comparing total debts to the overall capital held.	DER: $\frac{Total\ debt}{Total\ equity}$
4	ESG (X4)	ESG is explained as follows: • The environmental aspect evaluates a company's performance in terms of its impact on the natural environment; • The social aspect refers to how the company can foster and maintain good relationships with various externa stakeholders, such as local communities, the general public, customers, suppliers and the media; • The governance aspect assesses the extent to which the company has strong. transparent, and accountable governance in managing its operations.	SRDI: $\frac{Number\ of\ items\ disclosed}{Total\ item}$

No	Variable	Definition	Indicator
5	Firm Value (Y)	Tobin's Q evaluates performance by comparing two values of the same asset.	Tobin's Q: $\frac{Market\ value}{Total\ assets}$
6	Firm Sizes (Z)	The size of a business refers to the extent or dimension of an organization concerning the worth of overall resources or other pertinent indicators.	Size: $Ln(total\ assets)$

Table 2 shows the details of each variable measurement. There are three kinds of variables used in this research: the dependent variable (firm value), the independent variables (financial performance and ESG), and the moderating variable (firm size).

RESULTS

Statistical Results

Descriptive Statistics

Table 3. Descriptive Statistics

	LOG_TOBIN	ROA	CR	DER	ESG	SIZE
Mean	-0.6036	0.2265	1.8762	1.2051	0.7285	30.3673
Maximum	3.2548	0.6163	5.3579	8.4535	1.0000	32.7578
Minimum	-7.2978	0.0014	0.2696	0.1632	0.4124	27.6389
Std. Dev.	2.0417	0.1780	1.0399	1.7163	0.1522	1.38579
Observations	48	48	48	48	48	48

The variable representing firm value, denoted as LOG_TOBIN in the descriptive statistics (Table 3), is expressed in logarithmic form to normalize the data distribution. The average LOG_TOBIN value is -0.60 with a standard deviation of 2.04. Since the mean is smaller than the standard deviation, this indicates that the firm value data in the sample is quite varied.

The ROA variable has a mean of 0.22 and a standard deviation of 0.18. As the mean exceeds the standard deviation, the ROA data is considered relatively homogeneous. The highest ROA, 0.62, was recorded by PT Golden Energy Mines Tbk in 2022, while the lowest ROA, 0.001, was observed in PT Atlas Resources Tbk in 2023.

The CR variable shows a mean of 1.88 with a standard deviation of 1.04. Similar to ROA, the higher mean compared to the standard deviation suggests that the CR data in the research sample do not vary. The maximum CR value of 5.36 was held by PT Mitrabara Adiperdana Tbk in 2022, whereas the minimum value of 0.27 belonged to PT Bumi Resources Tbk in 2021.

For the DER, the mean value is 1.20 and the standard deviation is 1.72. Because the standard deviation is bigger than the mean, the DER data shows a significant variation. The highest DER value was 8.45, reported by PT Atlas Resources Tbk in 2021, while the lowest value of 0.16 was noted by PT Golden Eagle Energy Tbk in 2022.

The ESG disclosure variable has a mean of 0.73 and a standard deviation of 0.15. As the mean is higher than the standard deviation, the ESG data is relatively consistent. The highest ESG disclosure score of 1.00 was achieved by PT Indo Tambangraya Megah Tbk in 2023, and the lowest score of 0.41 was recorded by PT Atlas Resources Tbk in 2022.

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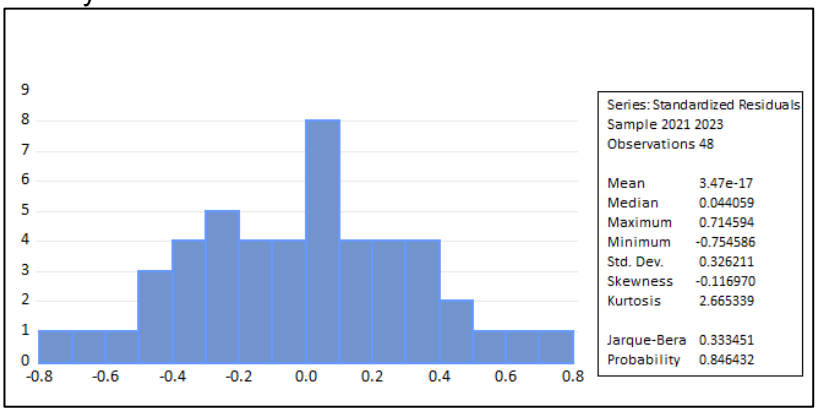
Lastly, the firm size variable has a mean of 30.37 with a standard deviation of 1.38, indicating a relatively homogeneous distribution across the sample. The largest firm size value, 32.76, was reported by PT Adaro Energy Tbk in 2022, while the smallest value of 27.64 belonged to PT Golden Eagle Energy Tbk in 2023.

Classical Assumption Testing

This research utilizes panel data, which integrates both cross-sectional and time-series information. Consequently, selecting the appropriate regression model is imperative, which involves performing the Hausman test, Chow test, and LM test. Upon evaluating the results of these tests, the Fixed Effects Model (FEM) is determined to be the most suitable.

Figure 2. Normality Test



The purpose of the normality test is to find out if the gathered data fits a normal distribution. In this analysis, the Jarque-Bera test is employed, focusing on the resulting probability value. According to the normality assessment illustrated in Figure 2, the resultant probability value is 0.846. This value exceeds the 0.05 (5%) significance level, leading to the conclusion that the data from the sample under investigation is normally distributed.

Table 4. Multicollinearity Test

	ROA	CR	DER	ESG	SIZE
ROA	1.000000	0.341899	-0.381890	0.138174	-0.016434
CR	0.341899	1.000000	-0.469402	0.114654	-0.031259
DER	-0.381890	-0.469402	1.000000	-0.394086	0.007229
ESG	0.138174	0.114654	-0.394086	1.000000	0.265745
SIZE	-0.016434	-0.031259	0.007229	0.265745	1.000000

The goal of the multicollinearity test is to evaluate the degree of interdependence among independent variables within the regression framework. In this analysis, a multicollinearity evaluation was performed by examining the correlation matrix that includes independent variables. If the correlation coefficient for each independent variable exceeds 0.90, it suggests the presence of multicollinearity. On the other hand, if the correlation coefficient for each independent variable falls below 0.90, it indicates that multicollinearity symptoms are absent. According to the findings from the multicollinearity assessments shown in Table 4, the correlation coefficients for all independent variables are below 0.90. Thus, it can be concluded that the dataset is devoid of multicollinearity, implying no connection among these variables.

Table 5. Heteroscedasticity Test

Variable	Prob.	Conclusion
ROA	0.8179	There is no heteroscedasticity
CR	0.0468	There is heteroscedasticity
DER	0.0029	There is heteroscedasticity
ESG	0.0393	There is heteroscedasticity
SIZE	0.3623	There is no heteroscedasticity

The goal of the heteroscedasticity test is to identify if there is a difference in variance between the residuals of different observations in a regression analysis. In this research, the Glejser test was utilized to conduct a heteroscedasticity evaluation. When the probability value for each variable is > 5%, it indicates that there are no signs of heteroskedasticity. On the other hand, if the probability value for each variable < 5%, it indicates that there are no signs of heteroskedasticity. If there is a heteroscedasticity symptom in the panel data model (FEM) then the model can be improved by using the Generalized Least Squares (GLS) cross-section weights method.

See Table 5 for CR, DER & ESG; the probability values are less than 5% significance, meaning that there are symptoms of heteroscedasticity in these variables. Meanwhile, the ROA and firm size have probability values greater than 5% significance, meaning that there are no symptoms of heteroscedasticity in these variables.

Hypothesis Testing

Table 6. Simultaneous test (F-test)

Variable	Prob (F statistic)	Conclusion
ROA	0.000000	H1 is accepted
CR		
DER		
ESG		
SIZE		
CR_SIZE		
DER_SIZE		

According to Table 6, the probability value (F-statistic) from the results of the simultaneous testing (F-test) concerning moderation regression (MRA) is 0.000000. This figure is lower than the significance level of 0.05 (5%). Therefore, it can be inferred that the independent variable or the moderating variable (which is considered as an independent variable in this instance) collectively have a notable impact on the dependent variable.

Table 7. Partial Test (t-test)

Variable	Coefficient	t-Statistic	Prob.	Conclusion
C	33.82189	4.758841	0.0001	
ROA	1.116270	3.058411	0.0052	H2 is accepted
CR	-11.89777	-4.583144	0.0001	H4 is accepted
DER	2.830770	3.328535	0.0027	H4 is accepted
ESG	-1.112393	-2.206497	0.0368	H5 is accepted
SIZE	-1.093838	-4.657121	0.0001	H6 is accepted
CR*SIZE	0.386067	4.625424	0.0001	H7 is accepted
DER*SIZE	-0.101575	-3.598953	0.0014	H8 is accepted

According to the partial test results in this research, conducted through MRA, the variables ROA, CR, DER, ESG, and firm size exhibit probability values below the 0.05 significance level (see Table 7), suggesting that each of these variables significantly

influences firm value. Moreover, the interaction terms CR*firm size and DER*firm size also yield probability values under 0.05, indicating that firm size significantly moderates the relationship between both CR and DER with firm value.

DISCUSSION

The Effect of Financial Performance, ESG, Firm Size, the Interaction Between Liquidity and Firm Size, and the Interaction Between Leverage and Firm Size on Firm Value Simultaneously

The findings from the concurrent examination conducted indicate that financial performance, ESG, firm size, the interaction between liquidity and firm size, as well as the interaction between leverage and firm size, exhibit a probability value (F-statistic) of 0.000000<0.05 (5%) significance. From these findings, it can be concluded that these variables collectively influence firm value. Consequently, H1 is accepted.

The Effect of Profitability Ratio on Firm Value

Based on the partial test results in this research, it is stated that the profitability ratio proxied by ROA (X1) has a probability value of 0.0052<0.05 (5%) significance. In addition, the regression coefficient value is positive 1.116270. That can be interpreted that profitability has a significant positive effect on firm value in coal industry companies listed on the IDX in 2021-2023. Therefore, H2 is accepted.

A high profitability ratio is an indication of good performance. When evaluating investment choices in firms involved in the coal industry, investors assess not only the broader industry prospects but also conduct a thorough evaluation of a firm's financial performance, with the ROA ratio serving as a key performance indicator. A higher ROA signifies that the firm is more adept at utilizing its assets to generate earnings. Consequently, ROA emerges as a crucial factor for investors when determining the viability and prospective profitability of an investment. The findings of this analysis align with studies conducted by Dang & Do (2021) and Khalifaturofi'ah & Setiawan (2025).

The Effect of Liquidity Ratio on Firm Value

According to the partial test results in this research, the liquidity ratio represented by CR (X2) has a probability value of 0.0001, which is less than 0.05 (5%) significance. Additionally, the regression coefficient value is -11.89777. This means that liquidity has a significant negative impact on firm value. Therefore, H3 is accepted.

High liquidity levels can lead to a decline in a firm's value (Khalifaturofi'ah & Setiawan, 2025). An elevated CR suggests that the business is not making effective use of its short-term assets. According to signaling theory, this may send a discouraging message to investors and the market, which could trigger a drop in the firm's value. In this research, the interaction between the liquidity ratio and firm value matches the results from Hapsoro and Falih (2020).

The Effect of Leverage Ratio on Firm Value

The test results reveal that the leverage ratio, as measured by DER (X3), yields a probability value of 0.0027, which is below the 0.05 (5%) significance threshold. Furthermore, the positive regression coefficient of 2.830770 suggests that leverage exerts a significant positive influence on firm value. Consequently, H4 is accepted.

The DER reflects the extent to which debt contributes to a company's overall capital structure. An increase in the DER indicates a rising proportion of debt in the firm's financing composition. Debt in the company can increase profit potential (Ibrahim &

Falkenbach, 2023). High debt (but still within reasonable limits) has the potential to generate higher operating income (Aryantini & Jumono, 2021; Cyril & Singla, 2020).

According to signaling theory, a rise in the value of DER is usually seen as a good signal by investors and the market, which can boost the firm's value. Suppose it is accompanied by an effective debt management strategy (for example, by utilizing debt optimally and allocating it in productive activities). This illustrates that the company has the courage to take risks to expand its business through external financing (debt). This means the company's ability to grow earnings and profits is also increasing. The findings of this research match the research done by Harasheh & De Vincenzo (2023), Ibrahim & Falkenbach (2023), and Razali et al. (2023).

The Effect of ESG on Firm Value

The test results show that ESG (X4) has a probability value of 0.0368, which is below the significance level of 0.05 (5%). Additionally, the regression coefficient is -1.112393. This indicates that ESG has a significant negative impact on firm value; thus, H5 is accepted.

Coal industry companies have many challenges of their own, so a special budget or cost is needed related to ESG practices (Chen & Zhang, 2024). This is because companies engaged in the coal industry tend to have destructive and significant environmental impacts. Social conflicts between communities and companies are also common, especially related to human rights. In addition, the governance of coal companies is also full of challenges, for example, related to mining licenses and corruption. Therefore, a large budget is needed to improve or minimize these risks.

However, in practice, not all established programs related to ESG practices can be implemented thoroughly by companies. Even when ESG programs are implemented, the implementation is not necessarily in accordance with the guidelines set by the regulation. This reflects inefficiency in the use of the budget that has been allocated, so that the objectives of ESG practices are not achieved optimally. This statement is in line with the statement from Sadiq et al. (2020), which states that there are investor and market perceptions of companies with higher ESG disclosures, which are interpreted as the company's efforts to justify the high costs incurred in ESG activities. In addition, the practice of greenwashing in ESG reports is quite common; ESG reports are often used to enhance the company's image. According to signaling theory, the events mentioned above can send bad signals to investors and the market, which will lower the firm's value. This is especially true if the expenses involved are not equal to the benefits produced by the company.

The Effect of Firm Size on Firm Value

According to the test results that have been conducted. The Firm Size (Z) has a probability value of 0.0001, which is lower than the significance level of 0.05 (5%). Furthermore, the value of the regression coefficient is -1.093838. From this, it can be understood that firm size has a noteworthy negative impact on firm value. Consequently, H6 is accepted.

As a company grows in size, its operational activities tend to become more extensive and complex. This results in large companies tending to have greater risks when compared to small companies. In addition, according to Małkowska and Uhruska (2022), companies that are bigger usually have lower values. This situation can be understood through agency theory, which says that as a company's size increases, the chance of disagreement between management (agent) and shareholders (principal) also increases. The conflict is generally caused by differences in objectives between

company management and shareholders. Management tends to pursue growth and diversification strategies to expand business coverage, even though these strategies are not always efficient (Ramadan & Hassan, 2022). The result is that the focus on the main business that is actually more profitable is neglected, so that the allocation of resources is not optimal. This is certainly contrary to the main interests of shareholders, who want to maximize profits from company operations. According to Signaling Theory, the event will send an unfavorable message to investors and will decrease the firm's value. The results of this research match the research done by Khalifaturofi'ah & Setiawan (2025) and Singla & Prakash (2023).

The Effect of Liquidity Ratio on Firm Value After Being Moderated by Firm Size
According to the test results that have been conducted on CR*firm size. The probability value on this variable is 0.0001<0.05 (5%) significance, with a regression coefficient value of positive 0.386067. This indicates that the firm size influences and amplifies the impact of CR on the firm value. As a result, H7 is accepted.

Large companies are often assumed to have better management systems than small companies; besides that, large-scale companies are also considered to have clearer strategies. This makes large companies considered more capable of managing their short-term liabilities by utilizing their current assets more optimally. In addition, large companies usually have wider access to external resources, including hiring financial consulting services, which can assist in developing more efficient financial management strategies. Through this, large companies have a higher capacity to maintain liquidity stability and manage their current debt effectively. This, of course, can provide a positive signal to investors and the market.

The Effect of Leverage Ratio on Firm Value After Moderation by Firm Size
Based on the findings from the test regarding the DER*firm size, the probability associated with this variable stands at 0.0014<0.05 (5%) significance, with a regression coefficient of -0.101575. This indicates that firm size influences and diminishes the impact of DER on firm value. Thus, H8 is accepted.

Large-scale companies generally tend to have higher debt when compared to small companies (this is due to the large financing needs to support operations and business expansion). Using too much debt in the company can raise financial risk (Abbas & Nainggolan, 2023). This happens because there is a higher chance of going bankrupt, especially if the amount of debt becomes too large (Khalifaturofi'ah & Setiawan, 2025). In the concept of diseconomies of scale, growth in large companies can cause more problems, and it can negatively impact the company's ability to create value for its shareholders (Ibrahim & Falkenbach, 2023; Miah & Uddin, 2017; Vigren et al., 2022). An elevated risk is frequently regarded as a negative indicator by investors and the market, which may consequently weaken their trust in the company's capability to handle its debt. Certainly, this will decrease the worth of the company.

CONCLUSION

Based on simultaneous testing done at the same time, factors like financial performance, ESG, firm size, CR*firm size, and DER*firm size have a strong effect on firm value. Then, based on partial testing, there is a strong effect on financial performance shown by the ROA, CR, and DER on firm value. ESG and firm size also have a significant effect on a firm's value. Additionally, firm size can affect the relationship between CR and firm value, as well as between DER and firm value.

Companies in the coal industry that want to optimize their firm value must evaluate a variety of parameters that can influence it, such as ROA, CR, DER, ESG, and firm size. Future studies can make additional changes to this research, such as extending the research period or employing different sector or industry groupings. Furthermore, researchers can change the proxies for the research variables or introduce new ones.

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DECLARATION OF CONFLICTING INTERESTS
Differences in the year of research and the industry of research may result in differences in results.

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