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**THE EFFECTS OF PROFITABILITY, LEVERAGE, LIQUIDITY, AND
CARBON EMISSIONS DISCLOSURE ON FIRM VALUE IN COAL
COMPANIES: THE ROLE OF CORPORATE GOVERNANCE**

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Abstract: This study examines the effects of profitability, leverage, liquidity, and carbon emissions disclosure on firm value and tests corporate governance as a moderating variable among coal subsector companies listed on the Indonesia Stock Exchange during 2022-2025. Firm value is proxied by Price to Book Value (PBV), profitability by return on assets (ROA), leverage by the debt-to-equity ratio (DER), liquidity by the current ratio (CR), carbon emissions disclosure by the Carbon Emissions Disclosure Index (CEDI), and corporate governance by the proportion of independent commissioners. Using a quantitative panel-data design and purposive sampling, the study obtained 108 observations. The analysis employed a random effects model with robust standard errors to address heteroskedasticity. The results show that leverage has a positive and significant effect on firm value, whereas profitability, liquidity, and carbon emissions disclosure have no significant direct effects. Corporate governance has a negative and significant direct effect but strengthens the influence of carbon emissions disclosure on firm value. Conversely, corporate governance weakens the effects of leverage and liquidity and does not moderate the effect of profitability. These findings demonstrate that corporate governance plays an important role in shaping market responses to financial and nonfinancial information in the coal industry.

Keywords: Corporate Governance, Leverage, Liquidity, Firm Value, Profitability

INTRODUCTION

Firm value reflects investors' perceptions of a company's performance and future prospects. It is commonly proxied by Price to Book Value (PBV), which indicates how the market values the company's book equity relative to its share price. A higher PBV suggests that investors view the company's ability to create value favorably, whereas a lower PBV signals declining confidence in its prospects (Brigham & Houston, 2019). Firm value is therefore widely used to assess corporate success and serves as an important consideration in investment decisions (Larasati & Gantino, 2024; Thanh et al., 2024). In the coal subsector, however, firm value is shaped by a more complex set of conditions than in many other industries. Although coal makes a substantial contribution to the national economy, the industry is capital intensive, highly exposed to commodity-price volatility, and under growing pressure to adopt sustainable business practices. The Ministry of Energy and Mineral Resources reported that the mining and quarrying sector contributed IDR 2.198 trillion, or approximately 10.5% of Indonesia's gross domestic product in 2023, with coal remaining one of its principal commodities (Kementrian ESDM, 2024). During 2025, several listed coal companies recorded share-price declines, including AADI by 11.21%, ITMG by 17.79%, and PTBA by 16.36%, while UNTR was the only company among them to post an increase (Bisnis.com, 2025). These movements were associated with weaker global coal prices, higher supply from major producing countries, and adjustments to national production policy through the annual Work Plan and Budget



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mechanism (RKAB) (Bareksa.com, 2025; Kontan.co.id, 2025). Several issuers nevertheless continued to distribute dividends with relatively high yields despite pressure on their share prices. This divergence suggests that changes in the market value of coal companies do not always move in line with their underlying fundamentals, leaving the factors that shape investor assessments open to further investigation.

Research on the determinants of firm value has gradually moved beyond financial indicators to incorporate nonfinancial factors and corporate governance. Profitability is generally expected to enhance firm value because it reflects operating efficiency and earnings capacity, while the effects of leverage and liquidity vary depending on industry characteristics, financing structures, and market conditions (Bui et al., 2023; Jihadi et al., 2021; Uddin et al., 2022). Growing attention to sustainability has also made carbon emissions disclosure increasingly relevant to investors, particularly in emissions-intensive industries (Budiman et al., 2024; Jin et al., 2025; Kurnia et al., 2021). At the same time, corporate governance is viewed as a mechanism that strengthens transparency, oversight, and information credibility, thereby supporting investor confidence and firm value (Bagh et al., 2025; Larasati & Gantino, 2024; Thanh et al., 2024). Firm valuation is therefore no longer based solely on financial performance but also on governance quality and a company's commitment to sustainability. Empirical findings, however, remain inconclusive. Some studies report a positive relationship between profitability and firm value, whereas others identify negative or statistically insignificant effects (Budiman et al., 2024; Jihadi et al., 2021; Juliana & Sembiring, 2025). Similar inconsistencies appear in the evidence on leverage, liquidity, and carbon emissions disclosure, partly because of differences in industry context, observation period, and variable measurement (Bahraini et al., 2021; Budiman et al., 2024; Bui et al., 2023). Moreover, many previous studies examine financial and nonfinancial determinants separately or focus on different research settings, leaving limited evidence for Indonesian coal companies. Studies that integrate profitability, leverage, liquidity, carbon emissions disclosure, and corporate governance within a single model are still relatively scarce, particularly for 2022-2025, a period marked by intensifying energy-transition pressures and shifting commodity-market conditions.

Hypothesis development is grounded in signaling theory, agency theory, and legitimacy theory, which together explain how financial information, corporate governance, and environmental responsibility influence investors' assessments of firm value. Signaling theory suggests that financial and nonfinancial performance information provides signals that investors use to evaluate a company's prospects and value (Spence, 1973). Agency theory positions corporate governance as an oversight mechanism that can reduce conflicts of interest between managers and shareholders while improving the credibility of corporate information (Jensen & Meckling, 1976). Legitimacy theory views carbon emissions disclosure as a form of corporate accountability through which companies respond to stakeholder expectations and reinforce their public legitimacy (Dowling & Pfeffer, 1975). Against this background, the study makes two contributions to literature on firm value. First, it combines financial factors – profitability, leverage, and liquidity – with the nonfinancial dimension of carbon emissions disclosure in a single empirical model for Indonesian coal companies. Second, it treats corporate governance as a moderating variable to examine whether governance quality changes the relationships between financial factors, carbon emissions disclosure, and firm value. This approach offers a more comprehensive view of firm-value determinants in a coal industry facing energy-transition pressures, growing demands for environmental transparency, and changing investor preferences toward sustainable practices. The study is expected to extend empirical evidence on the role of corporate governance in sustaining market confidence in companies operating in sectors characterized by substantial environmental risk and business

uncertainty. Accordingly, this study examines the effects of profitability, leverage, liquidity, and carbon emissions disclosure on the value of coal companies listed on the Indonesia Stock Exchange during 2022-2025. It also assesses the moderating role of corporate governance in the relationship between financial factors, carbon emissions disclosure, and firm value. The findings are expected to deepen understanding of firm-value determinants in the coal industry and clarify how governance can strengthen market responses to financial and nonfinancial information.

METHODS

This study employed a quantitative approach with a causal-associative design to test the effects of profitability, leverage, liquidity, and carbon emissions disclosure on firm value, together with the moderating role of corporate governance. The population comprised all coal subsector companies listed on the Indonesia Stock Exchange (IDX) during 2022-2025. Carbon-emission disclosure is measured using a Carbon Emission Disclosure Index (CEDI) based on the GRI 305: Emissions standard. CEDI is the number of emission items disclosed by the firm divided by the total number of GRI 305 items—covering direct greenhouse-gas emissions (Scope 1), energy indirect emissions (Scope 2), other indirect emissions (Scope 3), emission intensity, emission reduction, and ozone-depleting substances and other gases—yielding a score between 0 and 1. We expanded the hypothesis development so that every relationship is now justified with theory and prior empirical evidence: profitability (signaling theory), leverage (trade-off theory), liquidity (signaling theory), carbon-emission disclosure (legitimacy theory), and the four moderation paths (agency theory). We also strengthened the Method section to describe the research design, secondary data sources, the reconciliation of the sample (112 potential firm-year observations reduced to 108 used, forming an unbalanced panel), the operational measurement of all variables (Table 2), the two regression models, the panel-model selection procedure (Chow, Hausman, and Lagrange Multiplier tests leading to the Random Effect Model), the classical-assumption tests, the use of robust standard errors to address heteroskedasticity, and Moderated Regression Analysis.

Table 1. Variable Measurement

No.	Variable	Operational Definition	Indicator / Measurement
1.	Firm Value (Y)	The market's assessment of the company's success in creating value for shareholders.	PBV = Market price per share / Book value per share
2.	Profitability (X1)	The ability of a company to generate earnings from its total assets.	ROA = Net income / Total assets
3.	Leverage (X2)	The extent to which debt is used in the company's financing structure.	DER = Total debt / Total equity
4.	Liquidity (X3)	The company's ability to meet its short-term obligations.	CR = Current assets / Current liabilities
5.	Carbon Emissions Disclosure (X4)	The extent of carbon emissions information disclosed in corporate reports.	CEDI = Number of items disclosed / Total GRI 305 items
6.	Corporate Governance (Z)	A corporate oversight mechanism that reflects board independence.	Independent commissioners = Number of independent commissioners / Total board of commissioners

The baseline regression model is specified as follows:

$$PBV_it = \alpha + \beta_1ROA_it + \beta_2DER_it + \beta_3CR_it + \beta_4CEDI_it + \varepsilon_it$$

The moderated regression model is specified as follows:

$$PBV_it = \alpha + \beta_1ROA_it + \beta_2DER_it + \beta_3CR_it + \beta_4CEDI_it + \beta_5CG_it + \beta_6(ROA_it \times CG_it) + \beta_7(DER_it \times CG_it) + \beta_8(CR_it \times CG_it) + \beta_9(CEDI_it \times CG_it) + \varepsilon_it$$

RESULT AND DISCUSSION

Panel regression using the random effects model indicated that the full moderation model was appropriate for explaining firm value in the coal subsector. The R-squared value of 0.4882 and adjusted R-squared value of 0.4412 show that profitability, leverage, liquidity, carbon emissions disclosure, corporate governance, and their interaction terms explained 44.12% of the variation in firm value after adjustment for the number of variables in the model. The probability of the F-statistic was 4.04E-11, confirming that the model was jointly significant and that the independent and moderating variables were collectively associated with firm value.

Effects of Profitability, Leverage, Liquidity, and Carbon Emissions Disclosure on Firm Value. Profitability, proxied by ROA, produced a positive coefficient of 0.004611 with a probability of 0.121. The positive coefficient indicates that stronger earnings-generating capacity tended to coincide with higher firm value. However, the effect was not significant at the 5% level; therefore, H1 was not supported. This suggests that profitability alone was not a sufficiently strong signal for investors evaluating coal companies during the observation period. Coal-company earnings are highly sensitive to commodity-price fluctuations, which may lead investors to consider not only current profits but also earnings sustainability, energy-transition risk, and the industry's longer-term prospects. The result does not support signaling theory's proposition that profitability necessarily provides a positive signal to investors. It is consistent with Budiman et al. (2024) but differs from Jihadi et al. (2021). The difference may reflect variations in sample characteristics and industry conditions across the respective study periods.

Leverage, proxied by DER, had a positive and significant effect on firm value ($\beta = 0.003299$; $p < 0.001$), supporting H2. This result indicates that debt-based financing can enhance firm value when the funds are used productively for expansion, operations, or income-generating assets. In the capital-intensive coal industry, debt may signal that a company has the capacity to finance production and investment activities. The finding supports trade-off theory, which holds that debt can increase firm value when maintained at an optimal level. It is consistent with Hermuningsih et al. (2022) and Bui et al. (2023), but differs from Budiman et al. (2024). These contrasting results may arise from sectoral differences and from the tendency of coal companies to use debt to finance long-term investment.

Liquidity did not have a significant effect on firm value ($\beta = 0.002540$; $p = 0.1310$); therefore, H3 was not supported. The ability to meet short-term obligations did not appear to be a primary consideration for investors when valuing the sampled companies. In other words, liquidity information did not provide a sufficiently strong signal to increase firm value. This result is consistent with Jihadi et al. (2021), who also found no significant effect of liquidity on firm value, but differs from Bahraini et al. (2021), who reported a positive relationship. The discrepancy may be attributable to differences in industry characteristics, research periods, and market conditions.



Carbon emissions disclosure did not have a significant direct effect on firm value ($\beta = -0.003131$; $p = 0.3187$); therefore, H4 was not supported. The finding indicates that carbon information did not elicit a favorable investor response when presented without support from other factors. Legitimacy theory was therefore not fully confirmed in the coal subsector, as the legitimacy obtained through environmental disclosure was insufficient to increase firm value. This result is consistent with Budiman et al. (2024) but differs from Jin et al., (2025). The contrast suggests that the value relevance of carbon emissions disclosure depends on market characteristics, governance quality, and the extent to which investors pay attention to sustainability issues.

The Moderating Role of Corporate Governance. The interaction between carbon emissions disclosure and corporate governance had a positive and significant effect on firm value ($\beta = 0.200570$; $p = 0.0058$), showing that corporate governance strengthened the relationship between carbon emissions disclosure and firm value. Although carbon disclosure had no significant direct effect, investors appeared to regard the information as more credible when it was supported by sound governance. This finding supports agency theory, under which corporate governance reduces information asymmetry by improving transparency and the effectiveness of oversight (Jensen & Meckling, 1976). It is also consistent with Jin et al. (2025), who found that carbon transparency enhances firm value when governance quality is strong, and with Bagh et al. (2025) and Thanh et al. (2024), who argue that corporate governance increases the credibility of sustainability information and encourages a favorable market response.

By contrast, the interaction between leverage and corporate governance had a negative and significant effect on firm value ($\beta = -0.060335$; $p = 0.0004$). Corporate governance therefore weakened the positive relationship between leverage and firm value. Companies with stronger governance may rely less on high debt levels to build investor confidence because financing decisions are made more cautiously and with greater attention to risk. This finding supports agency theory, which explains how governance mechanisms can constrain managerial decisions and reduce the risks associated with excessive borrowing. It is consistent with Hermuningsih et al. (2022) and Bagh et al. (2025), who show that governance quality improves financial decision-making and can alter the relationship between capital structure and firm value.

The interaction between liquidity and corporate governance was also negative and significant ($\beta = -0.073662$; $p = 0.0486$), indicating that corporate governance weakened the relationship between liquidity and firm value. Strong governance encourages more efficient management of current assets, reducing investors' reliance on liquidity ratios as a principal indicator of company value. This result supports agency theory, which holds that effective oversight can strengthen investor confidence in corporate operating policies. It is in line with Thanh et al. (2024) and Bagh et al. (2025), who show that governance quality can reduce investors' dependence on traditional financial indicators when assessing corporate prospects.

The interaction between profitability and corporate governance was not significant ($\beta = -0.051440$; $p = 0.3113$). Corporate governance therefore did not moderate the relationship between profitability and firm value. This suggests that investors interpreted earnings information directly, without requiring governance to provide an additional signal in the valuation process. The role of corporate governance was thus more evident in strengthening the credibility of nonfinancial information and controlling financing policies than in reinforcing the profitability-firm value relationship. This finding is consistent with Abigail & Dharmastuti (2022) and Thanh et al. (2024), who argue that the moderating effectiveness of corporate governance depends on the nature of the information received by investors.

Table 2. Full Moderation Random Effects Model Results

Variable	Coefficient	Standard Error	t-statistic	Probability
Constant (C)	0.009366	0.002299	4.073703	0.0001
CED	-0.003131	0.003124	-1.002149	0.3187
CG	-0.132831	0.053301	-2.492074	0.0144
CED*CG	0.20057	0.071126	2.819913	0.0058
ROA	0.004611	0.002948	1.564175	0.121
ROA*CG	-0.05144	0.050546	-1.017694	0.3113
DER	0.003299	0.00066	4.894966	0.000004
DER*CG	-0.060335	0.016566	-3.642062	0.0004
CR	0.00254	0.001668	1.522805	0.131
CR*CG	-0.073662	0.036882	-1.997234	0.0486
R ²	0.4882			
Adjusted R ²	0.4412			
Prob. (F-statistic)	4.04E-11			
N (Observations)	108			

Source: Data Processed, 2026

CONCLUSION

This study concludes that not all financial and nonfinancial factors directly affected the value of coal companies. Profitability, liquidity, and carbon emissions disclosure had no significant direct effect on firm value, whereas leverage had a positive and significant effect. This pattern suggests that investors in the coal subsector continued to place considerable weight on financing structure, particularly when debt was perceived as supporting operations and investment. Corporate governance played an important but nonuniform role across the relationships examined. It strengthened the effect of carbon emissions disclosure on firm value, indicating that sound governance can improve the credibility of environmental information. Conversely, corporate governance weakened the effects of leverage and liquidity on firm value and did not moderate the effect of profitability. In this study, governance therefore functioned primarily as a mechanism for enhancing trust in nonfinancial information and controlling financial risk, rather than as a factor that consistently amplified every relationship between financial performance and firm value.

The findings imply that coal companies need to strengthen governance in substantive, rather than merely formal, terms. Beyond complying with requirements for independent commissioners, companies should improve transparency, oversight, and the quality of sustainability disclosure. For investors, the results indicate that coal-company valuation should consider the combined implications of financing structure, governance quality, and environmental information. Future research should employ more comprehensive proxies for corporate governance, including audit committees, institutional ownership, audit quality, and board size, and should extend the observation period to produce more stable and broadly applicable findings.

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