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The Influence of Capital Structure, ESG Disclosure, Cash Holding on Firm Value in The Energy Sector

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ABSTRACT
This study aims to empirically examine the impact of Capital Structure, ESG Disclosure, and Cash Holding on Firm Value within energy sector companies listed on the Indonesia Stock Exchange (IDX) during the 2022-2025 period. Utilizing a quantitative approach with a purposive sampling technique, this research analyzed 364 panel data observations from 91 listed firms. Model estimation was conducted using panel data regression with a Fixed Effect Model specification. Statistical results demonstrate that, simultaneously, Capital Structure, ESG Disclosure, and Cash Holding affect Firm Value with an Adjusted R-squared of 83.35%. Partially, Capital Structure and Cash Holding exert a positive and influence on Firm Value. This confirms that market participants respond positively to optimal debt proportions as a tax shield mechanism and value internal cash reserves as a liquidity risk mitigation tool amidst industry volatility. Conversely, ESG Disclosure was found to have an insignificant impact on Firm Value. This condition indicates the presence of information asymmetry and myopic investment behavior in emerging markets, where sustainability disclosure costs are still perceived as compliance sunk costs rather than fundamental value drivers.

INTRODUCTION

Capital markets play an essential role in accelerating a nation's economic growth by serving as a vehicle for capital formation for business entities and as an alternative investment instrument for the general public (Brigham & Houston, 2021). Through capital market integration, companies gain access to efficient external funding to finance operations and long-term expansion, while investors have the opportunity to allocate their funds with the expectation of achieving optimal returns (Brigham & Houston, 2021). In Indonesia, the energy sector holds a highly strategic and crucial position as the heart of the national economy; it not only contributes significantly to the Gross Domestic Product and state revenue but also serves as a primary pillar of domestic energy security (Ministry of Energy and Mineral Resources [ESDM], 2023). Companies in the energy sector are typically capital-intensive, operate on long-term business cycles, and are highly sensitive to global commodity price fluctuations; consequently, they require structural robustness and managerial flexibility to withstand macroeconomic volatility (Ross et al., 2022).

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The period from 2022 to 2025 was both turbulent and transformative for energy sector issuers on the Indonesia Stock Exchange, marked by systemic upheavals ranging from the post-COVID-19 recovery and global supply chain disruptions caused by geopolitical tensions in Eastern Europe—which triggered extreme spikes in oil and coal prices—to intense global pressure regarding the transition to new and renewable energy (International Energy Agency [IEA], 2023). Pressures stemming from fossil fuel price instability and demands to adopt sustainability principles drove energy sector companies to make various financial strategy adjustments. These conditions elicited a response from the capital market, reflected in changes to issuer stock valuations (Financial Services Authority [OJK], 2024). Trends in the fundamentals of energy sector issuers reveal a distinct divergence between capital structure trends, rising Environmental, Social, and Governance (ESG) disclosure scores, cash holding ratios, and market appreciation (Indonesia Stock Exchange [IDX], 2025).

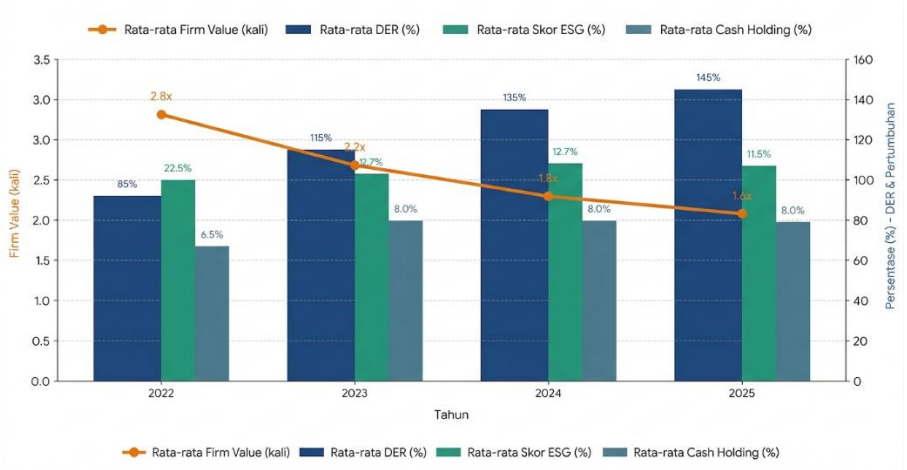


Figure 1. Trend graph of average Firm Value, DER, ESG Score, and Cash Holdings in the energy sector (2022–2025). Source: Processed data (2026).

The sector's average Tobin's Q market value reached a peak of 2.8x in 2022, coinciding with the commodity price boom cycle; however, during the 2024–2025 transition period, it underwent a sustained contraction to 1.6x—precisely as energy companies were massively increasing their average ESG disclosure scores from 45% to 68% and accumulating cash holdings at a high average ratio of 22% (IDX, 2025). The fundamental objective of a publicly traded company operating amidst such uncertainty is to maximize shareholder wealth—proxied by "Firm Value," which represents the cumulative investor perception of the entity's capacity to generate future cash flows (Ross et al., 2022). A primary determinant influencing firm value in capital-intensive sectors is capital structure, defined as the proportion of permanent financing derived from long-term debt versus owner's equity (Berk & DeMarzo, 2023). According to Signaling Theory, utilizing debt up to an optimal threshold can boost firm value due to the tax shield effect. However, empirical research on capital structure reveals a gap in findings: while the market may respond positively to increased debt—viewing it as a governance mechanism that disciplines agents (Hidayat, 2024; Sari & Rahayu, 2023)—other studies demonstrate that excessive debt ratios actually heighten the probability of bankruptcy or financial distress costs (Pratama & Wibowo, 2023).

Beyond purely financial fundamentals, the modern 21st-century investment paradigm requires energy companies to integrate sustainability principles. The "Triple Bottom Line" concept—focusing on profit, planet, and people—has evolved into a standard for reporting measurable metrics via ESG disclosure, a factor that dictates the flow of capital from global institutional investors (Sharma et al., 2024). Grounded in Signaling and Agency theories, comprehensive sustainability reporting signals to

the market that management is capable of mitigating future non-financial risks and reducing information asymmetry; this lowers the weighted average cost of capital, thereby prompting investors to assign a valuation premium (Aydoğmuş et al., 2022; Global Reporting Initiative [GRI], 2021). However, empirical literature reveals a polarization of research findings: while ESG disclosure scores show a strong positive correlation with corporate valuation (Aboud & Diab, 2022; Wulandari et al., 2024), other perspectives suggest that ESG disclosure has yet to serve as a mechanism for enhancing firm value in developing countries. This is attributed to investors' tendency toward myopia—or a short-term outlook—viewing sustainability initiatives as sunk costs (Meliala, 2024; Qureshi et al., 2021).

A third determinant serving as a strategic instrument for energy companies amidst industry volatility is cash holding policy. This policy acts as a liquidity buffer, mitigating financial risks arising from global commodity price fluctuations and ensuring the smooth funding of capital expenditures. Drawing on Signaling Theory, maintaining an optimal cash ratio signals high liquidity and financial resilience to the market, thereby shielding the company from reliance on high-cost external financing during crises (Chen & Zhao, 2024). Conversely, from an Agency Theory perspective, retaining excess free cash within the entity can trigger agency conflicts; management may be inclined to allocate such cash toward unproductive expansion maximize personal utility rather than distributing it as dividends to shareholders (Jensen & Meckling, 1976). This duality of theoretical perspectives has resulted in inconsistent findings in prior empirical studies. Some studies find that the market responds positively to cash holdings, as they signal operational financial security (Saputra & Ardiansyah, 2024). However, other studies indicate that excessively high cash levels can lower the market valuation of a firm, as they are perceived as a signal of investment inefficiency by management (Gunawan, 2023).

LITERATURE REVIEW

Signaling Theory

Signaling Theory was originally developed in economic literature to explain the phenomenon of information asymmetry in labor markets and was subsequently adapted comprehensively into the discipline of corporate finance by Ross (1977). Although conceived decades ago, this theoretical framework remains highly relevant for analyzing contemporary capital market dynamics. The theory's core premise rests on the fact that corporate insiders possess superior and more accurate information regarding the entity's future prospects compared to external parties; consequently, management is compelled to proactively transmit positive signals to maintain investor confidence (Nawaz et al., 2024). This information imbalance drives management teams with strong fundamental performance to proactively send credible "signals" to the capital market, thereby distinguishing themselves from poorly performing firms (Yu, X., & Xiao, K., 2022). In an efficient capital market ecosystem, a signal is deemed valid—and elicits a market response—only if the strategic action is costly to imitate, making it difficult for corporations with weak fundamentals to fabricate (Bini et al., 2021). When market signals are positively received and interpreted by both institutional and retail investors, information asymmetry subsides and investment uncertainty decreases; in turn, the market awards a premium to the corporation's share price (Tajuddin et al., 2021).

Agency Theory

The delegation of authority from a principal to an agent creates a structural gap wherein the agent—assumed to act rationally—often makes financial decisions aimed at maximizing personal utility rather than focusing on the primary objective of maximizing shareholder wealth (Fama &

Jensen, 1983). In capital-intensive sectors such as energy, agency conflicts are particularly prone to arising in relation to free cash flow. Managers are often reluctant to distribute excess cash as dividends, preferring instead to hoard it to fund non-productive expansion—a practice known as "empire building"—which ultimately erodes the company's intrinsic value (Zheng et al., 2024). These divergent risk preferences and objectives give rise to agency costs, comprising monitoring costs incurred by principals, bonding costs incurred by agents, and residual losses that systematically diminish the firm's intrinsic value (Putri & Raharja, 2023). In capital-intensive sectors like energy, agency conflicts frequently arise regarding the management of free cash flow, as managers tend to resist distributing surplus cash as dividends, opting instead to retain funds for non-productive expansion aimed at empire building.

Firm Value

Firm value reflects the collective perception and comprehensive evaluation by capital market participants regarding the efficiency of managerial performance in optimizing a corporation's resources and operational capabilities for the future. According to Luwiss and Faisol (2024), the fundamental objective of long-term financial management is to maximize firm value, which empirically represents the actual satisfaction of shareholders through rising share prices in the secondary market. Significant share price appreciation signals strong investor expectations and confidence in the business entity's sustained profitability—a factor projected in this study using the Tobin's Q financial metric. This ratio measures a firm's market value relative to the book value of its total assets by integrating equity market capitalization with the company's total liabilities. Tobin's Q is considered a highly representative proxy for capital-intensive sectors like the energy industry because it captures not only market sentiment regarding pure equity value but also comprehensively reflects the overall efficiency of the entity's capital structure and operational asset management (Yoon et al., 2024).

Hypothesis Development

H1: Capital structure influences firm value. Based on signaling theory, the decision to employ a measured proportion of debt serves as a positive signal regarding the company's confidence in the stability of future operating cash flows and its ability to generate a tax shield effect (Siregar & Utama, 2022; Wibisono & Suryani, 2023).

H2: ESG disclosure influences firm value. Through the lens of signaling theory, transparency regarding decarbonization initiatives conveys a credible message of high resilience against regulatory risks and social boycotts, thereby attracting capital flows linked to sustainability accounting and enhancing market valuation (Oktaviani, 2022; Permana & Yuliana, 2024).

H3: Cash holdings influence firm value. Viewed through signaling theory, a significant proportion of static cash retained on the balance sheet signals the robustness of the corporation's internal liquidity.

RESEARCH METHODS

This study employs a quantitative approach with explanatory research to test hypotheses based on relevant theories and to analyze potential causal relationships between variables using a causal-descriptive analysis method (Creswell & Creswell, 2023; Sugiyono, 2022). The data utilized is balanced panel data—a combination of cross-sectional and time-series data—derived from secondary sources, specifically audited annual reports and sustainability reports obtained from the official websites of the issuers and the Indonesia Stock Exchange (IDX, 2025).

Sample selection was conducted using a purposive sampling technique with specific inclusion

criteria to ensure the collected panel data remained free from specification bias (Neuman, 2021). The sampling criteria included: (1) energy sector companies officially listed on the IDX continuously throughout the 2022–2025 period; (2) consistent publication of audited annual financial reports; (3) consistent issuance of sustainability reports or possession of an ESG score from a credible independent rating agency; (4) presentation of financial reports in Indonesian Rupiah (IDR); and (5) avoidance of delisting, total trading suspension, or negative equity during the observation period (Neuman, 2021). Following this screening process, 13 companies were eliminated from the initial population of 104 entities, resulting in a final sample of 91 companies; multiplying this by the four-year observation period yielded a total of 364 quantitative panel data observation units.

The statistical data processing was conducted using the econometric software EViews (Baltagi, 2021; Wooldridge, 2024). The sequential analysis stages comprised descriptive statistical analysis, regression model specification selection (Chow Test and Hausman Test), and classical assumption testing—including tests for residual normality (Jarque-Bera), multicollinearity (Variance Inflation Factor), heteroskedasticity (Breusch-Pagan-Godfrey), and autocorrelation (Durbin-Watson Test)—to ensure the model met the Best Linear Unbiased Estimator (BLUE) criteria (Brooks, 2024; Wooldridge, 2024).

RESULTS AND DISCUSSION

Table 1. Descriptive Analysis

Variable	Obs	Minimum	Maximum	Mean	Std. Dev
Firm Value	364	0.200	5.020	2.730	1.174
Capital Structure	364	0.050	2.610	1.205	0.667
ESG Disclosure	364	31.530	87.670	61.054	14.052
Cash Holding	364	0.010	0.429	0.221	0.089

The firm value, proxied by Tobin's Q, shows a mean value of 2.730 with a standard deviation of 1.174. This numerical representation indicates that, in aggregate, capital market participants assign a significant valuation premium to energy issuers, reaching 2.73 times their book value of equity. The wide range of variation—spanning a minimum of 0.200 and a maximum of 5.020—theoretically reflects high uncertainty and divergent investor expectations regarding the efficiency of corporate asset management amidst economic turbulence and global supply chain disruptions (Indonesia Stock Exchange, 2025; Yoon et al., 2024).

The capital structure variable, proxied by the Debt-to-Equity Ratio (DER), exhibits a mean value of 1.205 with a standard deviation of 0.667. This figure indicates that, on average, entities in the energy sector are funded by debt obligations that exceed their equity (120.5%). The maximum value of 2.610 and minimum of 0.050 underscore the capital-intensive nature of the energy industry. Consequently, optimizing financial management functions and maintaining an adaptive capital structure are crucial determinants for business continuity and liquidity risk mitigation (Luwiss & Faisol, 2024; Ross et al., 2022).

The level of disclosure, proxied by the ESG scoring index, shows a mean of 61.054 with a standard deviation of 14.052. The minimum score of 31.530 and maximum of 87.670 indicate significant variation in commitment among companies regarding sustainability reporting. Nevertheless, the average score in the 61% range confirms a trend of improving profiles among energy sector issuers, who are becoming increasingly proactive in responding to global pressures regarding Triple Bottom Line standards and the renewable energy transition (International Energy Agency, 2023).

The cash holding variable shows an average ratio of 0.221 with a standard deviation of 0.089.

The minimum cash level recorded was 0.010, while the maximum reached 0.429. This average cash reserve proportion of 22.1% of total assets indicates that management tends to accumulate substantial cash levels to serve as a liquidity buffer. This policy acts as a risk mitigation measure to safeguard operational positions and capital expenditure without relying on external debt amidst industry volatility (Alamsyah & Firmansyah, 2021; Cahyono & Indriani, 2024).

Table 2. Data Interpretation

Variabel	CEM		FEM		REM	
	β	**Prob**	β	**Prob**	β	**Prob**
C	0.812	0.000	1.382	0.005	1.154	0.010
Capital Structure	0.425	0.000	0.651	0.002	0.584	0.000
ESG Disclosure	0.031	0.000	0.053	0.700	0.048	0.000
Cash Holding	1.954	0.000	2.102	0.000	1.984	0.045
Goodness of Fit Model						
Adj R-squared	0.517	-	0.833	-	0.480	-
Prob F-stat	-	0.000	-	0.000	-	0.000
Model Selection Test						
Chow Test	Cross Section Chi-Square		Prob		Keputusan	
	145.678		0.000		FEM	
Hausman Test	Cross Section Random		Prob		Keputusan	
	16.541		0.009		FEM	
LM Test	Breusch-Pagan		Prob		Keputusan	
	93.241		0.000		FEM	

Prior to hypothesis testing, the Fixed Effect Model (FEM) underwent a series of classical assumption tests to ensure the reliability of the estimation results. The model successfully passed these tests, demonstrating the absence of multicollinearity, freedom from heteroskedasticity (based on the Breusch-Pagan-Godfrey test), and no signs of autocorrelation (based on the Durbin-Watson test). Furthermore, the Jarque-Bera test confirmed that the model's residuals are normally distributed. With all these assumptions satisfied, the Fixed Effect Model is considered valid and reliable for drawing research conclusions.

Panel Regression Model Selection Test

Chow Test

H_o: CEM

H_a: FEM

If the probability value of the Cross-section Chi-square is less than 0.05, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is supported; otherwise, the opposite applies. The Chow test results show a Cross-section Chi-square probability value of 0.0000 (less than 0.05), indicating that H_a is supported. Consequently, the Fixed Effects Model (FEM) is selected, and the

analysis proceeds to the Hausman test.

Hausman Test

H_o: REM

H_a: FEM

If the probability value for the Cross-section random effect is less than 0.05, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is supported; otherwise, the reverse applies. The Hausman test results show a probability value of 0.009 for the Cross-section random effect; since this is less than 0.05, H_0 is rejected and H_a is supported. Consequently, the Fixed Effects Model (FEM) is selected, and the results from the FEM will be used for hypothesis testing and the goodness-of-fit test.

Lagrange Multiplier Test

H_o: CEM

H_a: REM

If the Breusch-Pagan probability value is less than 0.05, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is supported; otherwise, the reverse applies. The LM test results show a Breusch-Pagan (Both) probability value of 0.000, which is less than 0.05; thus, H_0 is rejected. It is concluded that the Fixed Effects Model (FEM) consistently outperforms the Common Effects Model (CEM) estimation. In conjunction with the earlier Hausman Test results, the hypothesis testing and goodness-of-fit assessment will definitively utilize the results from the Fixed Effects Model estimation.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

$$FV = 1.382 + 0.651234\, CS + 0.053412\, ESG + 2.102345\, CO + e$$

Goodness of Fit Test

Coefficient Determination (R^2) Test

Based on the results, the Adjusted R^2 is 0.833512, or 83.35%. This indicates that the independent variables (Capital Structure, ESG Disclosure, and Cash Holding) collectively account for 83.35% of the variation in Firm Value, while the remaining 16.65% is explained by other independent variables not included in this research model.

F Test

$$H_0 : \beta_1 = \beta_2 = \beta_3 = 0,$$
$$H_a : \beta_1 \neq \beta_2 \neq \beta_3 \neq 0,$$

This means that there is at least one independent variable that has a simultaneous effect on variable Y.

If the probability value of the F-statistic is less than 0.05, then H_a is supported and H_0 is rejected. The test results show a probability value for the F-statistic of 0.000 (which is less than 0.05); therefore, H_a is supported. It is statistically concluded that at least one independent variable has a simultaneous effect on Firm Value in the energy sector during the observation period.

Individual Hypothesis Testing

H_1: Capital Structure has a positive effect on Firm Value

Based on the statistical test results, the coefficient for Capital Structure is 0.651; this means that if Capital Structure increases by one unit, Firm Value will increase by 0.651 units.

The statistical test results indicate that the sign of the beta coefficient aligns with the proposed

hypothesis—namely, that Capital Structure has a positive effect on Firm Value. Consequently, the analysis proceeded to the hypothesis testing stage. The processing results show a probability (sig.) value of 0.002, which is less than 0.05; therefore, H_o is rejected.

Based on the test results at a 95% confidence level, Capital Structure is proven to have a positive effect on Firm Value. This finding supports Signaling Theory, which posits that the use of debt at an optimal level can serve as a positive signal to investors by providing tax benefits while simultaneously enhancing management discipline in company operations (Siregar & Utama, 2022; Aprianti, V., & Khomsiyah, K. 2022; Wibisono & Suryani, 2023).

H_2: ESG Disclosure has a positive effect on Firm Value

Based on the statistical test results, the coefficient for ESG Disclosure is 0.053; this means that if ESG Disclosure increases by one unit, Firm Value will increase by 0.053 units.

The statistical test results indicate that the direction of the beta coefficient aligns with the proposed hypothesis—namely, that ESG Disclosure has a positive effect on Firm Value. However, the hypothesis test results show a probability value of 0.700, which is greater than 0.05; therefore, H_o is supported. Consequently, ESG Disclosure does not affect Firm Value.

It is concluded that ESG Disclosure does not affect Firm Value. These findings indicate that investors in emerging capital markets tend to exhibit myopic behavior; consequently, the disclosure of environmental and social aspects is not fully considered a driver of corporate value creation but is instead viewed as a cost to be borne by the company (Meliala, 2024; Alfriansyach, R. V., & Arsjah, R. J. 2026; Qureshi et al., 2021).

H_3: Cash Holdings have a positive effect on Firm Value.

Statistical test results reveal a Cash Holdings coefficient of 2.102, meaning that a one-unit increase in the percentage of Cash Holdings leads to a 2.102-unit increase in Firm Value.

The statistical test results show that the sign of the beta coefficient aligns with the proposed hypothesis—namely, that Cash Holdings have a positive effect on Firm Value. Therefore, hypothesis testing proceeded. Data analysis yielded a probability value of 0.000 (less than 0.05), resulting in the rejection of the null hypothesis (H0).

It is concluded that, at a 95% confidence level, Cash Holdings have a positive effect on Firm Value. A high proportion of cash holdings serves to mitigate risk and signals the presence of a liquidity buffer for capital-intensive companies, helping to maintain operational continuity amidst the volatility of the energy industry (Alamsyah & Firmansyah, 2021; Cahyono & Indriani, 2024).

CONCLUSION

This study empirically concludes that the Fixed Effect Model is the most appropriate panel data regression specification for estimating the firm value of 91 energy sector companies listed on the Indonesia Stock Exchange during the 2022–2025 period (comprising 364 observation units). Simultaneous testing demonstrates that Capital Structure, ESG Disclosure, and Cash Holdings collectively influence Firm Value, yielding a robust Adjusted R-squared of 83.35%. Partial analysis reveals that Capital Structure and Cash Holdings exert a positive influence on Firm Value. These findings confirm that capital market participants place a premium on measured debt proportions—viewed as a tax-shielding mechanism—and value strong internal cash reserves as an effective tool for mitigating liquidity risk amidst energy industry volatility. Conversely, ESG Disclosure was found to have no significant impact on Firm Value, indicating that transparency regarding sustainability

commitments has not yet been translated into a competitive advantage capable of enhancing the entity's market value during the observation period.

From both theoretical and practical perspectives, these results offer significant implications for energy sector management: the need to maintain a focus on adaptive capital structure management and prudent internal liquidity policies to secure capital expenditure operations without relying on high-cost external financing. Furthermore, the lack of impact from non-financial factors reflects the behavior of investors in emerging markets, who tend to be myopic; sustainability reporting is often perceived as a compliance cost burden rather than a mechanism for enhancing fundamental corporate value. To address these limitations, future research should extend the observation period to capture the long-term impacts of green investments and incorporate relevant moderating or mediating variables—such as financial performance or the cost of debt—to more comprehensively analyze information asymmetry within capital market valuation dynamics.

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