

PROFITABILITY, CAPITAL STRUCTURE, AND FIRM SIZE ON FIRM VALUE: THE MODERATING ROLE OF SUSTAINABILITY REPORTING IN INDONESIA'S ENERGY SECTOR

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Abstract

This study investigates the influence of profitability, capital structure, and firm size on firm value, while also examining sustainability reporting as a moderating variable in energy sector companies listed on the Indonesia Stock Exchange during 2021–2024. The research employs a quantitative method using secondary panel data obtained from 39 companies with 156 observations. The Random Effect Model (REM) was selected as the most appropriate estimation model based on the Chow, Hausman, and Lagrange Multiplier tests. In this study, firm value is measured using Price to Book Value (PBV), profitability by Return on Equity (ROE), capital structure by Debt to Equity Ratio (DER), firm size by the natural logarithm of total assets, and sustainability reporting through the Sustainability Report Disclosure Index (SRDI) based on Global Reporting Initiative (GRI) standards. The findings reveal that profitability, capital structure, firm size, and sustainability reporting positively and significantly affect firm value. However, the moderation results indicate that sustainability reporting weakens the effect of profitability and firm size on firm value, while it does not significantly moderate the relationship between capital structure and firm value. These results imply that the impact of sustainability reporting on firm value depends on how investors perceive and evaluate each company within the energy sector.

Keywords: Firm Value, Profitability, Capital Structure, Firm Size, Sustainability Reporting

INTRODUCTION

The energy sector plays a vital role in Indonesia's economy, contributing approximately 12.5% of national GDP and attracting USD 30.3 billion in investment in 2023 alone (Kementerian ESDM, 2023). As the number of capital market investors in Indonesia has grown substantially surpassing 100% growth between 2020 and 2021 companies face increasing pressure to demonstrate not only short-term profitability but also long-term value creation. In this context, firm value has become one of the most critical indicators monitored by both management and investors, as it reflects the market's perception of a company's current performance and future prospects (Nursetya & Hidayati, 2021). Increasing firm value is not only aimed at maintaining business continuity, but also at providing optimal prosperity to shareholders, as higher firm value tends to be followed by increased investor confidence and easier access to external funding (Kusumaningrum & Iswara, 2022).

Despite its importance, firm value in the energy sector has shown considerable instability. The average Price to Book Value (PBV) of energy sector companies listed on the Indonesia Stock

Exchange rose from 1.57 in 2021 to 4.34 in 2024, yet this upward trend did not consistently align with financial performance. Return on Equity (ROE) peaked at 34.06% in 2022 before declining to 19.01% in 2024, while PBV continued to rise a divergence that signals the presence of non-financial factors shaping investor perception (Setiawanta et al., 2021). Profitability is one of the key parameters most widely considered by investors, as sectors with high profit levels are generally attractive to capital investors (Liza et al., 2022). ROE was selected as the profitability proxy because it indicates the company's capacity to generate net profit by utilizing funds owned by shareholders, reflecting management effectiveness in managing capital to provide optimal returns (Brigham & Houston, 2019).

Similarly, the relationship between capital structure, measured by Debt to Equity Ratio (DER), and firm value showed inconsistent patterns across individual companies. Capital structure describes the combination of equity and debt financing used by companies to add capital or finance their assets (Prasetyo & Hermawan, 2023). Prior research by Wahyuni & Gani (2022) and Murni, Sabijono & Tulung (2019) found that DER negatively influences firm value, as excessive debt increases financial risk and potentially reduces company profitability (Ansori & Laksmiwati, 2023). However, empirical data from energy sector companies such as GEMS and LEAD revealed contradictory patterns, where decreasing DER was followed by declining firm value and vice versa conditions inconsistent with prior theoretical expectations. The relationship between firm size and firm value also showed inconsistency, as increases in total assets were not always followed by proportional gains in market valuation (Husna & Satria, 2019), as evidenced by contrasting patterns observed between ADMR and DSSA during the 2022–2023 period.

These empirical gaps suggest that financial indicators alone are insufficient to explain variations in firm value within the energy sector. Investors no longer focus solely on financial information, but also require non-financial information that has relevance to value-creating activities and supports aspects of company sustainability (Setiawanta et al., 2021). In this context, sustainability reporting based on Global Reporting Initiative (GRI) standards has the potential to provide important insights (Mohammed & Younis, 2023). The adoption of GRI Standards has grown significantly in Indonesia, with approximately 80% of listed companies using GRI Standards in their sustainability reports by 2022, and 88% of listed companies submitting sustainability reports in the same year (PwC Indonesia, 2023). This practice has been further reinforced by mandatory disclosure requirements under POJK No. 51/2017, which shifted sustainability reporting from a voluntary practice to a mandatory obligation for public companies.

The novelty of this study lies in simultaneously positioning sustainability reporting as both an independent variable and a moderating variable within a single integrated model applied specifically to the energy sector a sector that is particularly sensitive to environmental scrutiny and ESG investor expectations. Prior studies have examined sustainability reporting either as a dependent variable (Nguyen et al., 2022; Mohamed & Younis, 2023), as an independent variable (Tarjo et al., 2022; Oware & Worae, 2023), or used SR as a moderating variable (Jihadi et al., 2021), but none have specifically positioned sustainability reporting as a moderator of the relationships between ROE, DER, and firm size against firm value in the Indonesian energy sector context. Theoretically, this study contributes to signaling theory, stakeholder theory, and trade-off theory by demonstrating that the valuation relevance of sustainability disclosure is conditional rather than universal.

LITERATURE REVIEW AND HYPOTHESIS FORMULATION

Signaling theory

Introduced by Spence (1973), holds that information asymmetry between management and external investors creates uncertainty in decision-making. Companies reduce this asymmetry by transmitting signals through financial disclosures profitability levels, capital structure choices, and

asset scale each of which carries interpretive weight for investors assessing future prospects (Brigham & Houston, 2019).

Stakeholder theory

Introduced by Freeman (1984), extends the accountability frame beyond shareholders. A company's survival and value are shaped not only by financial returns but by its relationships with employees, government, communities, and the environment. Management is obligated to consider these constituencies and report transparently on how their interests are being addressed (Tarjo et al., 2022). Sustainability reporting is the primary instrument through which this accountability is operationalized and according to Nguyen et al. (2022), its disclosure demonstrably builds investor confidence and contributes to rising firm value.

Trade-off theory

Trade-off theory addresses capital structure decisions specifically. Brigham & Houston (2019) establish that debt financing generates tax shield benefits, but excessive debt accumulates financial distress costs that erode value. The optimal capital structure is the point where these two forces balance, maximizing firm value (Kurniasari & Wibowo, 2018). When leverage crosses into extreme territory, the cost of debt overwhelms any operational benefit it finances, and firm value declines (Sudianto et al., 2022).

Firm Value

Firm value reflects the market's assessment of a company's current performance and future trajectory. Brigham & Houston (2019) define it as the level of prosperity perceived by investors, typically expressed through share price or market capitalization. For management, it is the benchmark of achieved performance; for investors, it is the basis for capital allocation decisions (Yanti & Setiawati, 2022). Value is not determined by financials alone intangible assets including managerial reputation, brand capital, and innovation contribute substantially to market valuation even when they do not appear on the balance sheet (Dancaková et al., 2022). This study uses Price to Book Value (PBV) as the firm value proxy, calculated as share price divided by book value per share. PBV is widely adopted in empirical research because it directly captures how much the market is willing to pay above the accounting value of equity an expression of future expectations, not just current conditions (Aryadita et al., 2024).

$$PBV = \frac{\text{Price per Share}}{\text{Book Value per Share (BVPS)}} \quad (1)$$

Return on Equity (ROE)

Profitability ratios measure a firm's capacity to generate earnings through the utilization of revenue, assets, and capital (Kasmir, 2014). Return on Equity (ROE) represents the level of net profit generated per unit of equity invested by shareholders, calculated as net income divided by total equity. ROE is selected for this study because it specifically captures the returns generated for shareholders rather than aggregate asset efficiency a distinction that matters in the energy sector, where asset-heavy balance sheets can dilute asset-based profitability ratios even when equity holders are receiving strong returns (Brigham & Houston, 2019).

$$ROE = \frac{\text{Net Income}}{\text{Total Equity}} \quad (2)$$

Debt to Equity Ratio (DER)

Capital structure describes the combination of debt and equity financing a company uses to fund its assets and operations (Brigham & Houston, 2019). This study uses Debt to Equity Ratio (DER), calculated as total liabilities divided by total equity, to measure a firm's capital structure

composition. DER directly represents the balance between external funding and internal equity, reflecting management's strategic decisions in financing operations while indicating the degree of reliance on debt relative to shareholders' own capital (Kasmir, 2014).

$$DER = \frac{Total\ Debt}{Total\ Equity} \quad (3)$$

Firm Size

Firm size captures the scale of a company's operations and resource base. Large companies are generally perceived to possess greater operational stability, broader access to capital markets at lower cost, stronger negotiating leverage with business partners, and a lower probability of bankruptcy than smaller peers (Al-Slehat, 2020). This study measures firm size using the natural logarithm of total assets, a standard transformation that normalizes the distribution across companies that differ dramatically in absolute scale (Meifari, 2023).

$$SIZE = Ln (Total\ Asset)$$

Sustainability Reporting

According to the Global Reporting Initiative (GRI, 2021), sustainability reporting refers to a company's practice of communicating its economic, environmental, and social impacts and performance to stakeholders based on the established GRI reporting standards. This study measures sustainability reporting using the Sustainability Report Disclosure Index (SRDI) based on GRI Standards applying a binary scoring method where each disclosed item receives a score of one and each undisclosed item receives zero, with the total divided by the number of applicable GRI items.

$$SRDI = \frac{Total\ disclosed\ score}{Total\ items\ that\ should\ be\ disclosed} \quad (4)$$

The Effect of Return on Equity on Firm Value

ROE measures the efficiency with which management converts shareholders' equity into net profit (Kasmir, 2014). A high ROE signals to the market that the company is generating strong returns from the capital entrusted to it, reducing informational uncertainty and raising investor confidence in future wealth creation (Listyawati & Kristiana, 2020). Based on signaling theory, an increase in ROE conveys positive information to the market, which may strengthen investor confidence and drive share price appreciation as a reflection of firm value (Brigham & Houston, 2019). The reverse applies equally declining ROE signals deteriorating management effectiveness and triggers negative market responses, suppressing valuation.

H1: Return on Equity (ROE) has a positive significant effect on firm value.

The Effect of Debt to Equity Ratio on Firm Value

DER reflects management's decisions in financing the firm's operations by comparing total debt to equity (Prasetyo & Hermawan, 2023). Based on signaling theory, a high DER tends to serve as a negative signal to investors due to increased financial risk elevated leverage raises the probability of financial distress and creates fixed obligations that must be met regardless of business conditions (Wahyuni & Gani, 2022). From the perspective of trade-off theory, beyond the optimal leverage point, the costs of financial distress begin to outweigh the tax shield benefit, and firm value declines (Brigham & Houston, 2019). Excessive debt not only reduces profitability through higher interest burdens but also constrains management's flexibility to pursue growth opportunities, further undermining investor confidence (Ansori & Laksmiwati, 2023).

H2: Debt to Equity Ratio (DER) has an negative significant effect on firm value.

The Effect of Firm Size on Firm Value

Firm size signals operational stability and resource depth to the market. Companies that have accumulated significant assets demonstrate sustained survival capability evidence of repeatedly navigating business cycles, regulatory environments, and competitive pressures (Brigham & Houston, 2019). Based on signaling theory, large firm size conveys a positive signal to investors: it reduces perceived bankruptcy risk, lowers the cost of external financing, and enables economies of scale that translate into more efficient value generation (Al-Slehat, 2020).

H3: Firm Size has an positive significant effect on firm value.

The Effect of Sustainability Report on Firm Value

Sustainability reports extend beyond financial achievements to encompass a firm's operational impacts on society and the environment, representing a form of corporate transparency that increasingly shapes investor perception (Mohammed & Younis, 2023). Based on signaling theory, sustainability reports convey positive signals to investors regarding sound governance, non-financial risk management, and long-term corporate sustainability prospects, thereby enhancing market confidence (Nguyen et al., 2022). From the perspective of stakeholder theory, comprehensive sustainability disclosure signals that the company takes seriously its obligations to constituencies beyond shareholders building trust across multiple stakeholder groups simultaneously, reducing reputational risk, and supporting the conditions under which long-term value creation becomes credible (Tarjo et al., 2022).

H4: Sustainability reporting has a positive significant effect on firm value.

The Moderating Role of Sustainability Reporting on the Relationship between ROE and Firm Value

ROE indicates the firm's ability to generate net profit from shareholders' equity, with high ROE reflecting efficient capital management that strengthens investor confidence (Kasmir, 2014; Listyawati & Kristiana, 2020). In the energy sector where high earnings are often associated with high production intensity and, by extension, significant environmental impact profitability without accompanying sustainability disclosure can raise questions about the long-term durability of those earnings. Based on signaling theory, when high ROE is paired with comprehensive sustainability disclosure, the combined signal tells the market that earnings are being generated within a governance framework that actively manages environmental and social risks rather than externalizing them as future liabilities. From the perspective of stakeholder theory, this alignment between financial performance and sustainability credibility builds investor confidence across both financial and non-financial dimensions simultaneously.

H5: Sustainability reporting moderates the relationship between ROE and firm value.

The Moderating Role of Sustainability Reporting on the Relationship between DER and Firm Value

DER reflects the proportion of a firm's financing between debt and equity, with high DER indicating substantial reliance on external funding and increased financial risk that tends to undermine investor confidence and firm value (Wahyuni & Gani, 2022). Based on signaling theory, a high DER conveys a negative signal regarding corporate risk. However, sustainability reports may provide additional signals concerning ESG commitment that partially reframe investor perception of that risk communicating that debt is being deployed in support of responsible, long-term activities rather than short-term financial engineering. From the perspective of stakeholder theory, sustainability reports reinforce the firm's social acceptance by demonstrating that leverage is accompanied by governance discipline and accountability to multiple constituencies. Through this mechanism, sustainability reporting is posited to moderate and attenuate the negative influence of DER on firm value.

H6: Sustainability reporting moderates the relationship between DER and firm value.

The Moderating Role of Sustainability Reporting on the Relationship between Firm Size and Firm Value

Large companies already carry a structural valuation premium scale signals stability, resource depth, and lower financial risk (Husna & Satria, 2019). Companies with high asset ownership are considered to be at a stage of maturity, with more stable prospects and greater capacity to generate profits compared to smaller companies (Dewi & Ekadjaja, 2020). When large firms also engage in sustainability reporting, they reinforce what stakeholders already expect that companies of significant operational scale and societal footprint should be transparent about their environmental and social impacts. Companies are obligated to maintain harmonious relationships with all stakeholders through transparent, accountable, and sustainability-oriented business practice disclosures (Mohammed & Younis, 2023). By demonstrating that asset scale is accompanied by responsible governance and comprehensive sustainability disclosure, companies strengthen the positive signal that firm size already sends to the market, further elevating investor confidence and firm value.

H7: Sustainability reporting moderates the relationship between firm size and firm value.

RESEARCH METHODS

This inquiry utilizes a quantitative methodology built upon an inferential empirical design to examine the structural relationships among profitability, capital structure, firm size, sustainability reporting, and firm value through rigorous hypothesis testing. The empirical focus is directed toward energy sector corporations actively listed on the Indonesia Stock Exchange (IDX) throughout the 2021–2024 fiscal period. The analytical architecture isolates five distinct operational metrics: Return on Equity (ROE), Debt to Equity Ratio (DER), firm size, firm value, and sustainability reporting. Within this framework, ROE, DER, and firm size are operationalized as the exogenous (independent) predictors; overall corporate valuation indexed via the Price to Book Value (PBV) ratio functions as the endogenous (dependent) criterion; and sustainability reporting serves as both an independent variable and an intervening moderating variable, quantified through the Sustainability Report Disclosure Index (SRDI) calibrated against the Global Reporting Initiative (GRI) directives.

The primary unit of analysis focuses on individual energy sector companies, with the population comprising 91 companies listed on the IDX. This study employs non-probability purposive sampling governed by four criteria: continuously listed from 2021 to 2024; not included in the special monitoring board; published complete audited financial statements alongside sustainability reports consecutively throughout the observation period; and free from outlier data. Of 91 companies, 39 met all criteria, yielding 156 observations. All data were retrieved from the IDX's official archive through systematic documentation, supplemented by an extensive review of institutional reports and pertinent academic sources, thus ensuring the reliability and validity of the data utilized in the analysis.

The econometric processing of the assembled data involves descriptive statistics, panel data regression modeling, and a battery of classical assumption diagnostics specifically checking for normality and multicollinearity all computed using the EViews 12 statistical software suite. Selecting the appropriate panel regression model involves conducting the Chow, Hausman, and Lagrange Multiplier tests to determine the most suitable estimator among CEM, FEM, and REM. Hypothesis testing is then performed using multiple regression and Moderated Regression Analysis (MRA), with t-tests assessing variable significance and R^2 measuring the model's explanatory capability.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 1 presents the descriptive statistics of each research variable, namely profitability (ROE), capital structure (DER), firm size (SIZE), firm value (PBV), and sustainability reporting (SR).

Table 1. Descriptive Statistics

Variable	Minimum	Maximum	Median	Mean	Sd
PBV	0.207798	2.393704	0.667762	0.723292	0.370278
ROE	-0.077111	0.682782	0.113696	0.142541	0.144696
DER	0.050454	6.427554	0.827042	1.114943	1.158393
SIZE	26.57321	32.76456	29.38401	29.58461	1.593157
SR	0.102564	1.000000	0.615385	0.602089	0.226732
Sample	156	156	156	156	156

Source: Data processed from EViews 12

Selection of Estimation Method

Table 2. Recapitulation of Model Test Results

Test Name	Model Testing	Probability Value	Selected Models
Chow Test	CEM or FEM	0,0284	FEM
Hausman Test	REM or FEM	0,0805	REM
Lagrange Multiplier Test	CEM or REM	0,0116	REM

Source: Data processed from EViews 12

To identify the most appropriate panel data estimation approach, several model selection tests were conducted sequentially. The Chow test, comparing CEM and FEM, generated a probability value of 0.0284 ($p < 0.05$), indicating that FEM provided a better statistical fit than CEM. The Hausman test was subsequently performed to evaluate the suitability between FEM and REM, producing a probability value of 0.0805 ($p > 0.05$), suggesting that REM was more appropriate for the analysis.

Since the Chow test supported FEM while the Hausman test indicated REM, an additional Breusch-Pagan Lagrange Multiplier test was performed to compare REM with CEM. The LM test produced a probability value of 0.0116 ($p < 0.05$), confirming that REM was statistically superior to CEM. Based on the overall results of these specification tests, the Random Effect Model (REM) was ultimately determined to be the most suitable and efficient estimation model for this study.

Classic Assumption Test

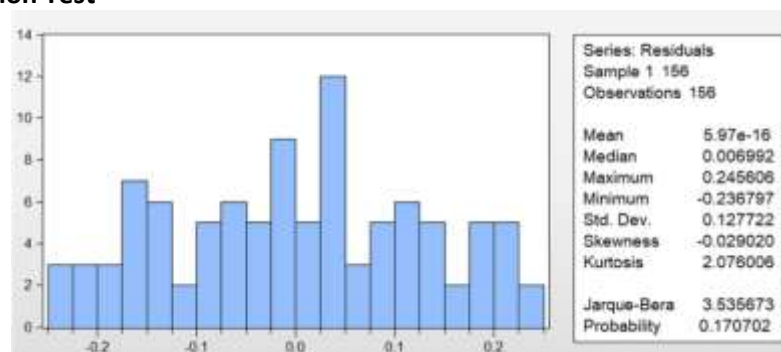


Figure 1. Normality Test (REM) Results

According to the Jarque–Bera test all variables yield probability value exceeding 0,05 (0.577), indicating that the residuals are normally distributed. Thus, the normality assumption is satisfied, and the regression model is appropriate for further estimation procedures.

Table 3. Multicollinearity (REM) Test Results

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
ROE	0.016885	2.272158	1.147357
DER	0.000281	2.369584	1.224059
SIZE	0.000266	765.1945	2.190296
SR	0.011693	15.84938	1.951014

Source: Data processed from EViews 12

The Variance Inflation Factor (VIF) results show that all independent variables possess Centered VIF values below the threshold of 10, specifically ROE (1.147), DER (1.224), SIZE (2.190), and SR (1.951). These findings indicate the absence of multicollinearity among the independent variables, so the panel regression specification is suitable for further analysis.

Data Test Results

Table 4. Multiple Regression (REM) Analysis Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.012404	0.509142	0.024362	0.9806
DER	0.047969	0.017937	2.674381	0.0088
ROE	2.119811	0.124736	16.99439	0.0000
SIZE	0.022758	0.018865	1.206407	0.2307
SR	0.478293	0.109235	4.378588	0.0000

Source: Data processed from EViews 12

The multiple regression results show that profitability (ROE) has a positive and significant effect on firm value (PBV), indicated by a coefficient of 2.119 and a significance value of 0.000. Capital structure (DER) also positively affects firm value, with a coefficient of 0.047 and a significance level of 0.008. However, firm size (SIZE) does not significantly influence firm value, as reflected by a significance value of 0.230. Meanwhile, sustainability reporting (SR) demonstrates a positive and significant impact on firm value, with a coefficient of 0.478 and a significance value of 0.000.

Table 5. Moderation Regression (REM) Analysis Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.411717	0.672592	-3.585707	0.0005
ROE	3.515664	0.063545	55.32555	0.0000
DER	0.045972	0.016558	2.776344	0.0067
SIZE	0.095827	0.025372	3.776860	0.0003
SR	3.708536	0.838367	4.423521	0.0000
MOD_ROE	-2.424069	0.175295	-13.82849	0.0000
MOD_DER	-0.022553	0.032301	-0.698221	0.4868
MOD_SIZE	-0.124768	0.032400	-3.850906	0.0002

Source: Data processed from EViews 12

The moderated regression analysis shows that profitability (ROE) has a positive and significant effect on firm value (PBV), with a coefficient of 3.515 and a significance of 0.000. Capital structure (DER) also has a positive and significant effect, with a coefficient of 0.045 and a significance of 0.006, while firm size (SIZE) similarly shows a positive and significant influence, with

a coefficient of 0.095 and a significance of 0.000. Sustainability reporting (SR) has a positive and significant impact on firm value, indicated by a coefficient of 3.708 and a significance of 0.000. For the interaction effects, MOD_ROE is negative and significant (coefficient -2.424; 0.000), suggesting that sustainability reporting weakens the relationship between profitability and firm value. MOD_DER is not significant (0.486), indicating no moderating effect on the relationship between capital structure and firm value. Meanwhile, MOD_SIZE is negative and significant (coefficient - 0.124; 0.000), showing that sustainability reporting weakens the effect of firm size on firm value.

Table 6. Determination Coefficient (REM) Test Results

Weighted Statistics			
R-squared	0.864467	Mean dependent var	0.540908
Adjusted R-squared	0.854042	S.D. dependent var	0.328481
S.E. of regression	0.119433	Sum squared resid	1.298039
F-statistic	82.91788	Durbin-Watson stat	2.073740
Prob(F-statistic)	0.000000		

Source: Data processed from EViews 12

The adjusted R-squared value of 0.854 indicates that ROE, DER, SIZE, and SR, along with their interaction terms (MOD_ROE, MOD_DER, and MOD_SIZE), collectively explain 85.4% of the variation in firm value (PBV) throughout the 2021–2024 observation period. The remaining 14.6% is attributed to other variables outside the scope of this study.

Discussion

The Effect of Return on Equity on Firm Value

The empirical assessment indicates that Return on Equity (ROE) carries a positive and statistically significant influence on firm value (PBV) ($\beta = 3.515$; $p = 0.000$), thereby supporting the acceptance of H1. This outcome implies that the firm's ability to generate earnings from shareholders' equity is a dominant factor in shaping investor valuation within the energy sector. From a signaling theory perspective, high profitability transmits favorable signals to the market, indicating that management is effectively and efficiently utilizing shareholder capital, which ultimately drives investor confidence and pushes firm value upward (Listyawati & Kristiana, 2020). Market participants interpret rising ROE as evidence of managerial competence and operational resilience particularly meaningful in a sector where profitability is heavily exposed to global commodity price cycles. These findings are consistent with the studies conducted by Wahyuni & Gani (2022), Linawati et al. (2022), and Jihadi et al. (2021), which similarly documented the positive and significant role of ROE in explaining firm value.

The Effect of Debt to Equity Ratio on Firm Value

The statistical findings demonstrate that Debt to Equity Ratio (DER) positively and significantly affects firm value (PBV) ($\beta = 0.045$; $p = 0.006$), resulting in the rejection of H2 because the observed direction contradicts the proposed hypothesis. This evidence suggests that investors in the energy sector perceive leverage not as a financial risk indicator, but as a strategic financing instrument supporting expansion, infrastructure development, and capacity growth. In line with trade-off theory, debt financing at manageable levels enhances firm value through tax shield benefits that still outweigh financial distress costs (Brigham & Houston, 2019). From the viewpoint of signaling theory, rising leverage in fundamentally strong companies can reflect managerial confidence regarding future cash flow stability, thereby transmitting a positive market signal (Linawati et al., 2022). These findings reinforce the conclusions reported by Jihadi et al. (2021), Ansori & Laksmiwati (2023), and Suyanto & Bilang (2023), who also identified a positive association between leverage and corporate valuation.

The Effect of Firm Size on Firm Value

The empirical results reveal that firm size (SIZE) exerts a positive and statistically significant effect on firm value (PBV) ($\beta = 0.095$; $p = 0.000$), supporting the acceptance of H3. This finding highlights the importance of asset scale in strengthening investor confidence and market valuation. Large-scale companies in the energy sector are perceived as having more certain going concern, broader access to external financing at lower cost, and greater operational efficiency through economies of scale (Dewi & Ekadjaja, 2020). Viewed through signaling theory, firm size communicates stability and resource depth to the market a signal that becomes particularly persuasive in capital-intensive industries where operational continuity requires substantial and sustained asset bases. Consequently, firms with larger total assets tend to receive more favorable market valuation. This evidence aligns with prior findings from Husna & Satria (2019), Listyawati & Kristiana (2020), and Suyanto & Bilang (2023), all of whom confirmed the positive contribution of firm size to firm value.

The Effect of Sustainability Reporting on Firm Value

The empirical investigation confirms that sustainability reporting (SR) has a positive and statistically significant impact on firm value (PBV) ($\beta = 3.708$; $p = 0.000$), thereby validating H4. This result indicates that investors increasingly value firms that disclose comprehensive sustainability information, reflecting growing market awareness of ESG-related considerations. From the perspective of stakeholder theory, sustainability reporting enables companies to strengthen relationships with all stakeholders investors, employees, communities, and regulators by demonstrating responsibility toward environmental and social issues (Tarjo et al., 2022). At the same time, signaling theory explains that sustainability disclosure acts as a strategic signal communicating transparency, ethical commitment, and long-term business sustainability, particularly under the mandatory disclosure framework of POJK No. 51/2017. Companies with stronger sustainability reporting practices are perceived as more credible and better prepared for future regulatory and reputational challenges, which ultimately enhances market valuation. These findings are consistent with the empirical evidence reported by Nguyen et al. (2022) and Mohamed & Younis (2023), who likewise found a significant positive relationship between sustainability disclosure and firm value.

The Moderating Role of Sustainability Reporting on the Relationship between ROE and Firm Value

The moderation analysis demonstrates that sustainability reporting (SR) significantly weakens the relationship between Return on Equity (ROE) and firm value (PBV), as indicated by the negative interaction coefficient ($\beta = -2.424$; $p = 0.000$), resulting in the rejection of H5. This finding suggests that when sustainability disclosure is already comprehensive, the incremental contribution of profitability signals to investor valuation diminishes. From a signaling theory perspective, SR and ROE appear to operate as information substitutes rather than complements once investors receive strong sustainability signals, the marginal informational value of earnings performance is reduced. Furthermore, from a stakeholder theory perspective, ESG-oriented investors who prioritize sustainability disclosure tend to evaluate firms more holistically, placing relatively less weight on short-term profitability metrics when long-term sustainability commitment is already credibly established. Consequently, sustainability reporting in this context reframes rather than reinforces the market interpretation of profitability, weakening its direct effect on firm value.

The Moderating Role of Sustainability Reporting on the Relationship between DER and Firm Value

The empirical evidence indicates that sustainability reporting (SR) does not significantly moderate the relationship between Debt to Equity Ratio (DER) and firm value (PBV) ($\beta = -0.022$; $p = 0.486$), thereby resulting in the rejection of H6. This outcome implies that sustainability disclosure lacks sufficient power to alter how investors evaluate financial risk embedded in capital structure

decisions. As established in the discussion of H2, the energy sector's capital-intensive nature has conditioned investors to view leverage as a structural necessity rather than a risk signal a baseline perception that sustainability information does not materially shift. From the perspective of signaling theory, sustainability reporting conveys information about environmental and social commitment, which occupies a fundamentally different informational domain from credit risk assessment, liquidity ratios, and debt serviceability the metrics investors rely on when evaluating. Consequently, sustainability reporting in this context carries limited moderating influence on the leverage–firm value relationship.

The Moderating Role of Sustainability Reporting on the Relationship between Firm Size and Firm Value

The empirical analysis confirms that sustainability reporting (SR) significantly weakens the relationship between firm size (SIZE) and firm value (PBV), as demonstrated by the negative interaction coefficient ($\beta = -0.124$; $p = 0.000$), resulting in the rejection of H7. This finding suggests that for large companies in the energy sector, sustainability disclosure no longer functions as a value-adding signal but is instead treated by the market as a minimum expectation a baseline obligation rather than a differentiating factor. From a stakeholder theory perspective, large energy companies face more intense scrutiny from regulators, environmental NGOs, and institutional investors, meaning that sustainability reporting is read as a reactive compliance response rather than a proactive strategic commitment. As a result, sustainability disclosure does not amplify the valuation premium that firm size already commands it merely meets an expectation the market has already priced in. This dynamic implies that for large companies, the quality and depth of sustainability disclosure matters far more than its mere presence.

CONCLUSION

Profitability measured by ROE proves to be the most dominant financial determinant of firm value in Indonesia's energy sector, with its positive and significant effect confirming that markets continue to reward efficient equity utilization with higher valuations. Capital structure tells a different story than theory predicts DER exerts a positive rather than negative effect on PBV, reflecting the energy sector's structural reality where leverage signals expansion capacity rather than financial fragility. Firm size similarly contributes positively and significantly to firm value, as asset scale communicates stability and operational resilience to investors navigating a capital-intensive industry. Sustainability reporting independently strengthens firm value, confirming that ESG transparency has crossed the threshold from voluntary virtue to a material valuation input in the Indonesian energy market.

The moderating results complicate this picture in instructive ways. Sustainability reporting weakens the ROE–PBV relationship, suggesting that comprehensive ESG disclosure shifts investor attention away from short-term earnings metrics toward a broader evaluation framework effectively substituting rather than complementing profitability signals. The absence of significant moderation on the DER–PBV relationship reveals the boundaries of what sustainability disclosure can accomplish: it cannot meaningfully reframe how investors assess leverage risk in a sector where high debt is already normalized. The weakening of the SIZE–PBV relationship under sustainability reporting moderation points to an expectation gap large companies receive no valuation premium for disclosing what the market already assumes they should.

Taken together, these findings establish that sustainability reporting's contribution to firm value is neither uniform nor additive it is conditional on what the market already expects from a given company. Management should therefore treat sustainability disclosure as a strategic instrument requiring continuous quality improvement rather than a compliance checkbox, as its valuation relevance depends on whether it genuinely exceeds market expectations. Investors integrating ESG criteria into fundamental analysis should account for these conditional dynamics,

particularly in sectors where leverage and scale already carry embedded market interpretations. Future research is encouraged to extend the observation period, incorporate additional governance variables such as ownership structure and board composition, and explore qualitative dimensions of sustainability disclosure quality to further unpack the conditions under which ESG transparency translates into measurable firm value.

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