

The Influence of Green Investment, Environmental Policy, Firm Size, and Leverage on Financial Performance of Energy Companies in Indonesia

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ARTICLE INFO

Keywords: Green Investment, Environmental Policy, Firm Size, Leverage, Financial Performance

Received : 10, September

Revised : 15, October

Accepted: 26, October

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ABSTRACT

In an era of global competition and increasing environmental concerns, a company's financial performance is influenced not only by internal factors such as company size and leverage, but also by its commitment to environmental and social management. This study aims to analyze the effect of green investment, environmental policies, company size, and leverage on financial performance. The method used is quantitative with secondary data from 9 energy sector companies listed on the IDX and obtained a PROPER rating during the 2020–2021 period, through purposive sampling. The analysis was conducted using multiple linear regression with a Fixed Effect Model. The results show that company size has a positive and significant effect on financial performance, while green investment, environmental policies, and leverage have no effect.

INTRODUCTION

Financial performance reflects a company's ability to manage assets, capital, and liabilities to obtain profits that increase the company's value (Sianturi, 2023). In a competitive and environmentally conscious global era, financial performance is not only influenced by internal factors such as firm size and leverage, but also by commitment to environmental and social aspects. Green investment plays an important role in improving a company's reputation, profitability, and sustainability, although it can reduce short-term profits due to high implementation costs (Chen & Ma, 2021; Novia & Candy, 2023).

Environmental policies such as the implementation of ISO 14001 reflect the company's environmental responsibility. This policy can improve reputations and managerial efficiency so that it has a positive impact on financial performance (Fitriaty et al., 2021; Jannah et al., 2020), but can also suppress profitability due to high compliance costs (Novia & Candy, 2023).

Firm size has a positive effect on profitability due to greater access to capital and resources (Aldboush et al., 2023), although large companies can also experience inefficiencies. Meanwhile, leverage has a variety of effects on financial performance: it can increase the value of a company through tax benefits, but it also poses financial risks if it is too high (Novia & Candy, 2023; Syafitri et al., 2023).

Previous research results show inconsistency in the relationship between green investment, environmental policy, firm size, and leverage on financial performance. Therefore, this study aims to re-examine the influence of these factors on energy companies in Indonesia for the 2020–2024 period.

THEORETICAL REVIEW

Porter Hypothesis

Porter's hypothesis explains that well-designed environmental regulations not only protect the environment, but can also improve the competitiveness and performance of the industry. Strict regulations encourage companies to innovate and adapt, resulting in higher efficiency and productivity.

Porter & Van Der Linde (2015) mention six main goals of effective environmental regulation:

1. Signal to companies about resource inefficiencies and opportunities for technology improvement.
2. Raising awareness through the collection and disclosure of environmental information.
3. Reduce investment uncertainty in environmental solutions.
4. Creating positive pressure that fuels innovation and organizational progress.
5. Equalizing competitive positions between companies during the transition to green technology.
6. Ensuring the improvement of environmental quality even though innovation has not fully covered the cost of compliance.

Legitimacy Theory

Legitimacy theory explains that companies try to act in accordance with social norms, values, and beliefs in order to be accepted by society (Suchman, 1995). Legitimacy reflects the perception that an organization's actions are considered appropriate and in accordance with the prevailing value system.

According to Dowling & Pfeffer (1975), organizational legitimacy is formed from two things: (1) the organization's own efforts to conform to social values, and (2) the influence of external groups that shape social norms. Companies need to demonstrate their legitimate presence in the social system in order to gain public support and trust.

The legitimacy process occurs at the institutional level, where the organization seeks to align its goals and activities with the expectations of the community. Management can influence public perception through communication and tangible actions (Wilmshurst & Frost, 2000).

Dowling & Pfeffer (1975) put forward three ways of acquiring legitimacy:

1. Adjust objectives, outputs, and methods of operation in accordance with applicable social values.
2. Changing social perceptions to align with organizational practices.
3. Associating oneself with symbols or institutions that already have legitimacy in society.

Signaling Theory

According to Spence (1973), *signaling theory* explains that the party that has the information (the company) gives signals to external parties (investors) to reduce information asymmetry. This signal helps the recipient of information in making more accurate decisions.

In the context of financial markets, companies use a variety of ways to provide positive signals to investors. **Firm size** can be a signal of trust because it indicates stronger resource capacity, easier access to funding, and lower risk of bankruptcy. These signals increase a positive perception of the company's financial performance.

Overall, signal theory emphasizes the importance of transparency and corporate communication in reducing investor uncertainty, increasing market confidence, and strengthening *financial performance* through positive perceptions formed.

Trade-Off Theory

Trade-off theory explains that companies must balance the benefits and risks of using debt (Brigham & Houston, 2019). The benefits of debt are in the form of tax savings (*tax shield*), while the risks are the possibility of default and bankruptcy costs (Litzenberger & Alan, 1973). An optimal capital structure is achieved when the two are balanced. Companies with strong financial conditions tend to take advantage of a combination of bank and market debt, while weak companies rely more on bank debt (Hackbarth et al., 2016).

Green Investment

Green Investment is the financing of environmentally friendly programs to encourage the green economy and reduce environmental risks and degradation (Hung, 2023). Climate change and public pressure are pushing companies to make green investments as a form of social and environmental responsibility (Liao & Shi, 2018). Factors influencing green investment include infrastructure, access to funding, corporate knowledge, government support, and special incentives (Tran et al., 2020).

In Indonesia, green investment is regulated through POJK No.51/POJK.03/2017 concerning sustainable finance. An assessment of the company's seriousness in green investment can be done through **PROPER**, a program from the Ministry of Environment and Forestry that assesses environmental management performance based on water, air, B3 waste, and environmental management (Chariri et al., 2018; KLHK, 2021). PROPER was chosen because it is public, credible, consistent, and standardized, and provides incentives or disincentives through the publication of company performance ratings.

Financial Performance

Financial performance shows the company's ability to manage resources to generate profits and increase company value (Trianto, 2018). Performance can be assessed through financial ratios such as liquidity, solvency, profitability, asset management, and market value (Brigham & Houston, 2019). In this study, **ROA** is used as an indicator because it measures the net profit of all assets without being affected by capital structure or leverage (Chariri et al., 2018; Novia & Candy, 2023).

Environmental Policy

Environmental policy is a framework and strategy to regulate human interaction with the environment, balancing ecological and socio-economic sustainability (Fiorino, 2001; Barde, 1994). In Indonesia, this policy is regulated through Law No. 32 of 2009 and Government Regulation No. 22 of 2021.

ISO 14001 certification is used as an environmental policy indicator because it helps companies manage waste, energy efficiency, resource use, and regulatory compliance (Novia & Candy, 2023). ISO 14001 indicates that the company has met international environmental management standards, improving its reputation, efficiency, and competitiveness. In this study, companies with ISO 14001 were given a score of 1, and those that did not have were given a score of 0.

Firm Size

Firm size indicates the size or size of a company, which can be measured through total assets, stock price, sales, or log size (Juhandi et al., 2019). Large companies tend to be more stable, have a wider market share, greater product diversification opportunities, and higher profitability (Laskar, 2018; Rosyid & Mulatsih, 2024; Prasetya et al., 2014).

Research shows that firm size has a positive effect on financial performance, meaning that larger companies tend to have better financial performance (Khalid et al., 2023). In Indonesia, the classification of company size is regulated in Government Regulation No. 7 of 2021, where medium-sized companies have a capital of 5-10 billion rupiah, and above 10 billion rupiah are categorized as large companies.

Leverage

Leverage is the use of debt by a company in its operational activities (Sutama & Lisa, 2018) and is measured through solvency ratios, such as DAR, DER, and TIE (Brigham & Houston, 2019). This study uses **the Debt to Equity Ratio (DER)** to assess the proportion of debt and capital funding itself and its effect on financial performance (Novia & Candy, 2023).

High leverage increases financial risk and interest expense, which can lower the company's ROA and profitability (Khalid et al., 2023; Sutama & Lisa, 2018). Studies show leverage is an important factor that negatively impacts financial performance if used excessively.

Conceptual Framework

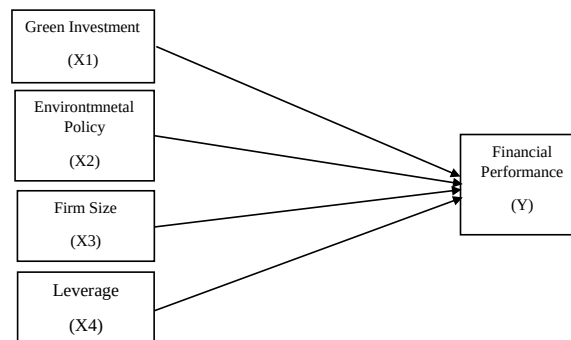


Figure. 1 Conceptual Framework

METHODOLOGY

Research Approach

This research uses a quantitative method, which is a positivism-based scientific method that examines a specific population or sample, collects data using research instruments, and analyzes data statistically to test hypotheses (Sugiyono, 2023).

Population and Sample

The research population is all energy companies listed on the Indonesia Stock Exchange (IDX) in 2020–2024, totaling 71 companies (Sugiyono, 2013). Samples were taken using **purposive sampling**, which is selection based on certain criteria according to the research objectives (Sugiyono, 2023).

Sample criteria include:

1. Listed on the IDX in 2020–2024.
2. Publish full financial statements for 2020–2024.

3. Received consecutive PROPER awards in 2020–2024.

Data is collected from secondary sources in the form of financial statements and OWN publications.

Table. 1 Sample Determination Process

No	Criterion	Sum
1.	Population of energy companies listed on the Indonesia Stock Exchange in 2020-2024	71
2.	Companies that do not fully publish financial statements to the Indonesia Stock Exchange from 2020 - 2024.	(14)
3.	Companies that have not consecutively received a PROPER award in 2020 - 2024	(48)
	Number of Samples	9
	Number of Observations (9x5)	45

Source: Researcher's Processed Results

Based on these criteria, this study took 9 energy companies on the IDX for the period 2020–2024, resulting in a total of 45 samples.

Data and Data Collection Methods

The research uses **secondary data** from the annual report, financial statements, and related reports for the 2020–2024 period, which are accessed through the official website of the IDX (www.idx.co.id) and the company's website. The data collected includes **PROPER rating, ISO 14001 certification, ROA, total assets, and DER**, obtained by downloading relevant public documents.

RESULTS

Descriptive Analysis

Descriptive analysis was conducted to obtain an overview of each variable, including **mean, highest value, lowest value, and standard deviation** of financial performance, green investment, environmental policy, firm size, and leverage. Full results are presented in Table 2.

Table 2. Descriptive Statistical Analysis

Date: 09/01/25 Time: 19:44					
Sample: 2020 2024					
	FINANCIAL...	GREEN_IN...	ENVRONM...	FIRM_SIZE	LEVERAGE
Mean	0.105800	3.711111	0.600000	30.51039	0.867065
Median	0.063531	4.000000	1.000000	30.87317	0.806916
Maximum	0.454542	5.000000	1.000000	32.75780	2.054698
Minimum	-0.002985	3.000000	0.000000	27.44955	0.059127
Std. Dev.	0.098998	0.786887	0.495434	1.690048	0.594410
Observations	45	45	45	45	45

Source: Secondary data processed with EViews 13

Based on Table 2, the company's financial performance (ROA) in the sample varies from -0.002985 to 0.454542 with an average of 10.58%, indicating a fairly high difference in financial performance. Green investment (PROPER) ranges from 3–5 with an average of 3.71, indicating that all companies are making green investments with relatively small variation. Around 60% of companies implement environmental policy (ISO 14001), while the average firm size (log total assets) is 30.51 with considerable variation between companies. Leverage (DER) shows significant differences in funding structure, from 0.059 to 2.055, reflecting varying levels of debt risk among companies.

Test Panel Data Model

1. Uji Chow

Table 3. Results of the Chow Test

Redundant Fixed Effects Tests			
Equation: Untitled			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	2.609077	(8,32)	0.0255
Cross-section Chi-square	22.596732	8	0.0039

Source: EViews 13 Software Processing Results

Based on Table 3, a probability value of 0.0039 (<0.05) indicates that the **Fixed Effect** model is more appropriately used, so H_0 is rejected.

2. Uji Hausman

Table 4. Results of the Hausman Test

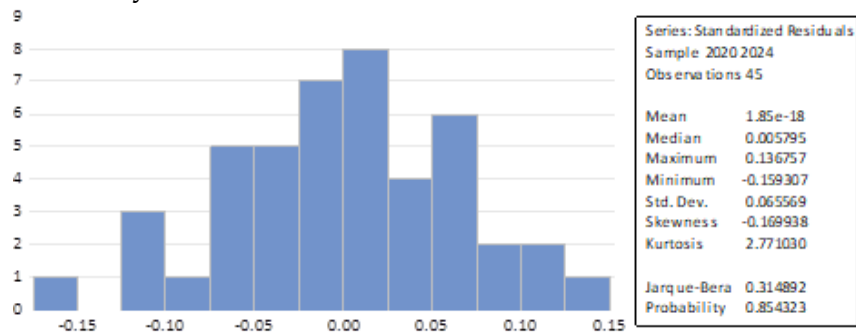
Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	13.100412	4	0.0108

Source: EViews 13 Software Processing Results

Based on Table 4, a probability value of 0.0108 (<0.05) indicates the Fixed Effect Model as the best model. Since the Chow and Hausman tests have determined the Fixed Effect, the Lagrange Multiplier test is not necessary.

Classic Assumption Test

1. Normality Test



Source: EViews 13 Software Processing Results

Figure 2. Normality Test Results

The normality test shows a normal distributed residual data with a probability of 0.854323 (>0.05), so that the classical assumption of normality is met.

2. Multicollinearity Test

Table 5. Multicollinearity test results

	GREEN_IN...	ENVIRONM...	FIRM_SIZE	LEVERAGE
GREE...	1.000000	0.104935	0.744196	-0.065869
ENVIR...	0.104935	1.000000	0.297681	0.310948
FIRM_S...	0.744196	0.297681	1.000000	0.359394
LEVER...	-0.065869	0.310948	0.359394	1.000000

Source: EViews 13 Software Processing Results

The correlation between independent variables is below 0.80, indicating no multicollinearity. The highest correlation between green investment and firm size (0.744) and the lowest between green investment and leverage (-0.066).

3. Heteroscedasticity Test

Table 6. Heteroschidasticity test results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001883	1.262395	-0.001491	0.9988
GREEN_INVESTMENT	-0.006637	0.027506	-0.241310	0.8109
ENVIRONMENTAL_PERFROMANCE	-0.034506	0.021018	-1.641722	0.1104
FIRM_SIZE	0.003862	0.042467	0.090943	0.9281
LEVERAGE	-0.012177	0.035200	-0.345951	0.7316

Source: EViews 13 Software Processing Results

The probability value of all independent variables in the study had a value above 0.05, which shows that there is no heteroschidasticity in the regression model.

4. Autocorrelation Test

Table 7. Autocorrelation Test

R-squared	0.561327	Mean dependent var	0.105800
Adjusted R-squared	0.396824	S.D. dependent var	0.098998
S.E. of regression	0.076886	Akaike info criterion	-2.056132
Sum squared resid	0.189167	Schwarz criterion	-1.534207
Log likelihood	59.26297	Hannan-Quinn criter.	-1.861564
F-statistic	3.412266	Durbin-Watson stat	1.439795
Prob(F-statistic)	0.002719		

Source: EViews 13 Software Processing Results

The result of the Durbin-Watson (DW) test is 1.439795. So the results are between -2 and 2, so it can be concluded that there is no autocorrelation in the regression model.

Analysis of the Regresi Linier Berganda

Table 8. Multiple Linear Regression test results

Dependent Variable: FINANCIAL_PERFORMANCE				
Method: Panel Least Squares				
Date: 09/01/25 Time: 17:48				
Sample: 2020 2024				
Periods included: 5				
Cross-sections included: 9				
Total panel (balanced) observations: 45				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.694968	1.893031	-2.480133	0.0186
GREEN_INVESTMENT	0.000655	0.041247	0.015874	0.9874
ENVIRONMENTAL_POLICY	-0.042953	0.031518	-1.362820	0.1825
FIRM_SIZE	0.159084	0.063681	2.498134	0.0178
LEVERAGE	-0.034160	0.052784	-0.647173	0.5221
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.561327	Mean dependent var	0.105800	
Adjusted R-squared	0.396824	S.D. dependent var	0.098998	
S.E. of regression	0.076886	Akaike info criterion	-2.056132	
Sum squared resid	0.189167	Schwarz criterion	-1.534207	
Log likelihood	59.26297	Hannan-Quinn criter.	-1.861564	
F-statistic	3.412266	Durbin-Watson stat	1.439795	
Prob(F-statistic)	0.002719			

Source: EViews 13 Software Processing Results

The Fixed Effect regression result shows a constant of -4.694968. Green investment and firm size have a positive effect on financial performance, while environmental policy and leverage have a negative effect.

Coefficient of Determination (Adjusted R²)

The results of the determination coefficient test showed an R² of 0.561, meaning that 56.13% of the variation in financial performance was explained by green investment, environmental policy, firm size, and leverage, while 43.87% was influenced by other factors. The Adjusted R² of 0.397 shows that independent

variables together explain 39.68% of financial performance, the remaining 60.32% is influenced by factors outside the model.

Hypothesis Testing

Hypothesis testing is carried out partially (T Test) and simultaneously (F Test). Partially, green investment (coefficient 0.000655; $p=0.9874$) and environmental policy (coefficient -0.042953; $p=0.1825$) did not have a significant effect on financial performance, so H_0 was accepted. Firm size (coefficient of 0.159084; $p=0.0178$) had a significant positive effect, so H_1 was accepted. Leverage (coefficient -0.034160; $p=0.5221$) had a negative effect not significantly, so H_0 was accepted. Simultaneously, the F test showed a probability value of 0.002719 (<0.05), which means that green investment, environmental policy, firm size, and leverage together have a significant effect on financial performance.

DISCUSSION

Green investment proxied with PROPER has a positive but insignificant effect on financial performance, possibly because the financial benefits are only felt in the long term and most companies only meet PROPER's basic standards. Environmental policy measured by ISO 14001 has a negative effect that is not significant, because the cost of compliance is greater than the benefits in the research period, exacerbated by the COVID-19 pandemic conditions. Firm size proxied with total assets has a significant positive effect, showing that large companies are more stable, able to manage risk, and are a signal of strength for investors and stakeholders. The leverage measured by DER has a negative effect that is not significant, because the company's capital structure in the sample is relatively stable and the leverage is at a safe level, so it does not significantly reduce financial performance.

CONCLUSIONS AND RECOMMENDATIONS

This study analyzes the influence of green investment, environmental policy, firm size, and leverage on the financial performance of energy companies for the 2021–2024 period. The results show that green investment has a positive but insignificant effect, indicating that its implementation has not fully generated financial value. Environmental policy has a negative effect that is not significant because the cost of initial implementation reduces profitability. Firm size has a significant positive effect, indicating that large companies are better able to access resources, funding, and technology to improve financial performance. Leverage has a negative effect not significantly, indicating that the use of debt tends to reduce financial performance but is not statistically significant.

Based on the results of the study, some suggestions for related parties are: for energy companies, it is recommended to integrate green investment in long-term business strategies to increase profitability and competitive advantage, as well as view regulations as an innovation opportunity; for management, maintaining a balance of the capital structure so that leverage does not degrade financial performance, and for investors, considering the size of the company as an indicator of investment prospects; For regulators, it is expected to provide clear policies or incentives to encourage company participation in sustainable

strategies; For future research, it is recommended to use a longer period, add other variables that affect financial performance, and expand the research sector to get a more comprehensive picture.

FURTHER STUDY

This study has several limitations, including that independent variables are only able to explain 39.68% of dependent variables financial performance, so that 60.32% are influenced by other factors that are not included in the model. In addition, the observation period is limited to five years (2020–2024), so the impact of variables on financial performance may not be fully visible. The research also only focused on energy sector companies, so the results could not be generalized to other sectors with different characteristics.

ACKNOWLEDGMENT

The author would like to thank all parties who have provided support, guidance, and facilities so that this research can be completed properly.

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