SIMBA

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THE EFFECT OF LEVERAGE AND FIRM SIZE ON HEDGING DECISIONS WITH LIQUIDITY AS A MODERATING VARIABLE

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Abstrak

Tujuan penelitian ini adalah untuk mengetahui apakah terdapat pengaruh antara *leverage* dan *firm size* terhadap keputusan lindung nilai (*hedging*), serta apakah likuiditas dapat memoderasi pengaruh *leverage* dan *firm size* terhadap keputusan *hedging* pada perusahaan sektor energi yang terdaftar di Bursa Efek Indonesia periode 2020–2024. Penelitian ini merupakan penelitian kuantitatif dengan teknik analisis data menggunakan analisis regresi logistik dan *Moderated Regression Analysis* (MRA). Populasi dalam penelitian ini berjumlah 76 perusahaan sektor energi, dengan jumlah sampel sebanyak 61 perusahaan yang dipilih menggunakan metode *purposive sampling*. Hasil penelitian menunjukkan bahwa *leverage* dan *firm size* berpengaruh signifikan terhadap keputusan *hedging*. Namun, likuiditas tidak dapat memoderasi pengaruh *leverage* maupun *firm size* terhadap keputusan *hedging*.

Kata Kunci: *Leverage*, *Firm Size*, Likuiditas, Keputusan *Hedging*, Sektor Energi

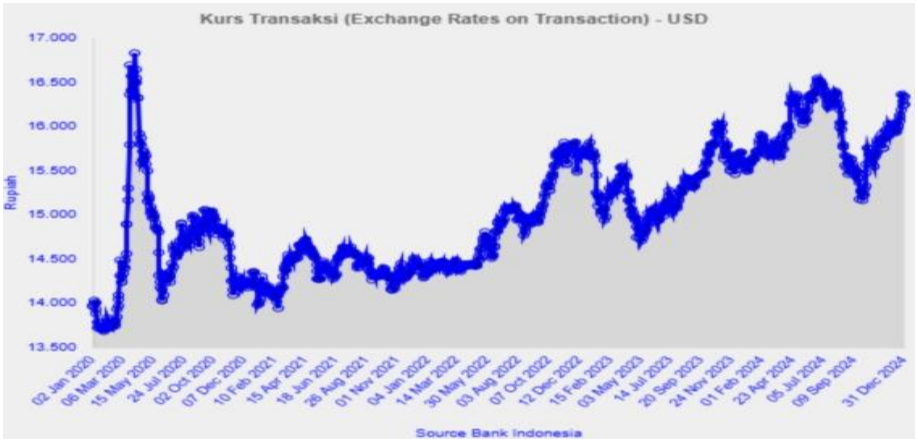
Abstract

The purpose of this study is to examine whether leverage and firm size influence hedging decisions, as well as whether liquidity moderates the relationship between leverage and firm size on hedging decisions in energy sector companies listed on the Indonesia Stock Exchange for the period 2020–2024. This research employs a quantitative approach, with data analysis conducted using logistic regression and Moderated Regression Analysis (MRA). The population of this study consists of 76 energy sector companies, with a total of 61 companies selected as the sample through purposive sampling. The results indicate that leverage and firm size have a significant effect on hedging decisions. However, liquidity does not moderate the effect of leverage or firm size on hedging decisions.

Keywords: *Leverage, Firm Size, Liquidity, Hedging Decisions, Energy Sector*

A. INTRODUCTION

International trade is an essential element of globalization that drives industrial transformation, modernization, and economic growth (Suhardi et al., 2022). It serves as an effective strategy for companies to expand their markets; however, such activities inevitably involve credit risks and foreign exchange fluctuations due to the use of multiple foreign currencies in transactions (Ramdani & Oktaviani, 2021). Risk management is therefore required to identify and mitigate potential losses, particularly those arising from exchange rate instability, which may affect revenue and profitability (Fadillah & Nurlita, 2023). Exchange rate fluctuations must be properly managed so that companies can minimize risks while also capitalizing on emerging opportunities (Situmeang & Wiagustini, 2018). Over the past five years, the Indonesian rupiah has tended to depreciate against the US dollar, reflecting significant exchange rate pressure. This condition can be illustrated in the following chart:



Source: www.bi.go.id (2025)

Figure 1. Exchange Rate of USD against Rupiah

Based on the transaction exchange rate chart in Figure 1, from January 2020 to December 2024, the rupiah experienced significant fluctuations. It sharply depreciated to IDR 16,500 per USD in March 2020 due to the pandemic, strengthened to the range of IDR 14,000–14,500 during 2021 to mid-2022, and then depreciated again to IDR 16,000 in 2023. Throughout 2024, the exchange rate continued to fluctuate, approaching IDR 16,500, driven by global uncertainties such as geopolitical and trade conflicts. For energy sector companies

engaged in export–import activities, such volatility requires anticipation through appropriate financial strategies, such as hedging, to minimize potential losses. Hedging is an important strategy to reduce financial risks arising from exchange rate movements, interest rates, and commodity prices, while also enabling companies to achieve financial gains (Febrianti & Cindiyasari, 2024).

Emerging economies, including Indonesia, face exchange rate pressures due to external factors such as geopolitical tensions, trade wars, and global economic uncertainty. The Russia–Ukraine war, the Iran–Israel conflict, and the escalation of US–China trade tensions in 2025 triggered capital outflows that weakened exchange rate stability. Under these circumstances, hedging serves as an appropriate risk management strategy (Putri & Nuraya, 2024). The energy sector plays a fundamental role in Indonesia's economy due to its abundant natural resources. Throughout 2024, global coal prices weakened, recorded at USD 107.5 per ton in March 2025, down by 2.93% due to declining demand from China and India. Meanwhile, domestic coal production rose from 614 million tons in 2021 to 775 million tons in 2023, before slightly decreasing to 766.95 million tons in 2024. This indicates an imbalance in Indonesia's energy sector. As a risk mitigation measure, PT Adaro Energy Indonesia Tbk (ADRO) implemented an interest rate swap hedging strategy in 2018, while PT Indo Tambangraya Megah Tbk (ITMG) employed coal swap contracts in 2022 (Aminah & Fiqararimmakin, 2023).

In addition to external factors, hedging strategies are also influenced by a company's internal financial position. Previous studies have identified several factors affecting hedging decisions, including leverage (Mahasari & Rahyuda, 2020), firm size (Krisdian & Badjra, 2017), and liquidity (Apriliani et al., 2024). However, the findings remain inconsistent. Based on these research gaps concerning the effect of leverage, firm size, and liquidity on hedging decisions, this study seeks to provide further evidence. The novelty of this research lies in incorporating liquidity as a moderating variable, whereas prior studies have generally examined liquidity as a direct factor influencing hedging decisions. Research on hedging decisions in Indonesia's energy sector remains limited, despite the sector's high exposure to foreign exchange risks and volatile energy prices. Therefore, this study is significant in

examining the role of leverage, firm size, and liquidity in influencing hedging decisions within the energy sector.

Literature Review

This study is grounded in signaling theory and agency theory. Signaling theory explains that companies convey messages or signals to external parties that contain sufficient information to influence their perception of the company's condition (Gumanti, 2012). Through the implementation of hedging policies, companies can provide positive signals in response to external uncertainties such as exchange rate fluctuations. This reflects that the company has adopted a protective strategy to maintain performance stability (Sukistini & Kristanti, 2024). In addition, agency theory discusses the relationship between owners (principals) and managers (agents) in the form of a contractual arrangement, whereby managers are granted decision-making authority but cannot be directly monitored by the owners (Affan & Prasetiono, 2022). This theory is relevant in explaining hedging decisions, which aim to optimize shareholder value and welfare while resolving conflicts of interest, particularly when managers prioritize personal goals over profit maximization (Verawaty et al., 2020).

Hedging is a strategy used by companies to mitigate potential risks that may suddenly arise in business activities, while still allowing opportunities to generate returns from investments (Zeinora, 2017). In this study, a company's decision to engage in hedging is measured using a dummy variable as a representation of the implementation of hedging strategies, assigning a value of "1" for companies that adopt hedging strategies and "0" for those that do not (Hadini & Desmiza, 2024).

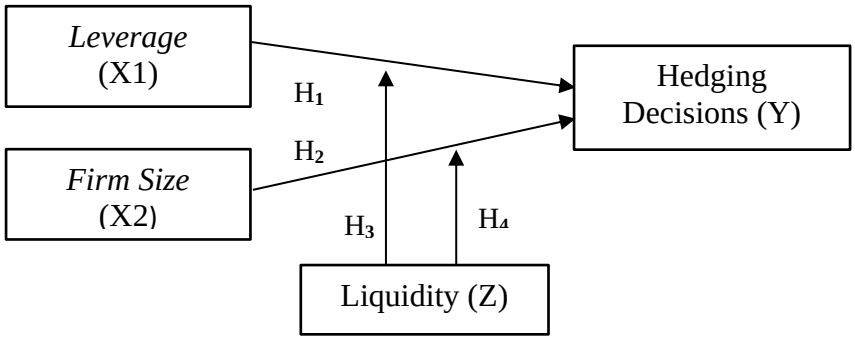
Leverage is a financial indicator that reflects the proportion of a company's funding derived from debt. It illustrates the extent to which borrowed funds are used to finance corporate activities through the capital structure (Mirdha et al., 2023). A high leverage ratio indicates that a company is more likely to face financial distress. In such circumstances, companies will attempt to avoid additional risks, particularly those arising from foreign currency debt with unstable exchange rates. This condition encourages companies to undertake hedging as a precautionary measure against financial uncertainty (Safitri et al., 2023). In this study, leverage is measured using the Debt to Equity Ratio (DER), calculated as: DER= Total

Debt / Total Equity. The role of leverage in influencing hedging decisions is supported by the findings of Apriliani et al. (2024), Purwanto & Putra (2022), and Maghfiroh (2020), which demonstrated that leverage significantly affects hedging decisions.

Firm size represents the scope of a company's operations, where larger firms generally conduct broader business activities (Daniati & Adiwibowo, 2024). Large firms are more likely to implement hedging strategies because their involvement in international transactions exposes them to greater risks from exchange rate fluctuations. Conversely, smaller firms have relatively lower risk exposure, and therefore their need for hedging is less urgent (Hadini & Desmiza, 2024). However, smaller firms may also adopt hedging as a preventive measure (Yulianingsih & Lastanti, 2024). In this study, firm size is measured using the natural logarithm of total assets, calculated as: Ln (total assets). The relationship between firm size and hedging decisions is supported by prior studies, including Mahasari & Rahyuda (2020), Purwanto & Putra (2022), Hadini & Desmiza (2024), Nanda et al. (2022), and Condronegoro & Hasibuan (2023), which found that firm size significantly influences hedging decisions.

Liquidity reflects the ratio between total current liabilities and current assets owned by a company to meet those obligations. It indicates the extent to which assets can be quickly and efficiently converted into cash (Arfianti et al., 2024). High leverage increases financial risk, which may encourage companies to engage in hedging (Nanda et al., 2022). However, this decision is moderated by liquidity. Companies with high liquidity typically have sufficient reserves to cover short-term obligations, thereby reducing the urgency to adopt costly hedging instruments (Safitri et al., 2023). Thus, higher liquidity can reduce the necessity of hedging, even in firms with high leverage. Large firm size tends to encourage hedging since broader operational scope exposes companies to greater risks from exchange rate and interest rate fluctuations (Condronegoro & Hasibuan, 2023). However, liquidity plays a moderating role in this relationship. Firms with high liquidity may not require hedging as urgently, as they possess sufficient internal resources to manage risks. Conversely, companies with low liquidity are more likely to perceive hedging as an essential alternative to maintaining financial stability (Yudha et al., 2023). Liquidity is calculated using the formula current ratio (CR) = Assets / Current Liabilities.

Conceptual Framework



Source: Modified framework of thought from the studies of Sari (2024), Amanda (2024), and Yulianingsih & Lastanti (2024).

Figure 2. Conceptual Framework

Based on the conceptual framework above, the hypotheses formulated in this study are as follows:

H_1: Leverage has an effect on hedging decisions.

H_2: Firm size has an effect on hedging decisions.

H_3: Liquidity moderates the effect of leverage on hedging decisions.

H_4: Liquidity moderates the effect of firm size on hedging decisions.

B. METHOD

This study employs a quantitative research approach, aimed at examining the selected sample in order to explain numerical findings based on data collected from secondary sources. The secondary data consist of annual financial reports of companies obtained from the official website of the Indonesia Stock Exchange (IDX) at www.idx.co.id. The population in this study includes all energy sector companies listed on the IDX over a five-year observation period, totaling 76 companies. The sampling technique applied is purposive sampling, resulting in a final sample of 61 companies that meet the following criteria:

1. Energy sector companies listed on the Indonesia Stock Exchange (IDX) that were not delisted during the 2020–2024 period.
2. Energy sector companies that published complete and consecutive annual financial reports during the 2020–2024 period.

The data analysis technique employed in this study is binary logistic regression, which is appropriate given the dichotomous nature of the dependent variable, coded as 1 (engaging in hedging) and 0 (not engaging in hedging). To analyze the moderating effect of variables, the Moderated Regression Analysis (MRA) approach is utilized. Data processing in this study is conducted with the assistance of IBM SPSS Statistics version 25.

C. RESULTS AND DISCUSSIONS

Descriptive Statistics

This study examines the hedging decisions of companies in the energy sector as the dependent variable (Y), with leverage (X1) and firm size (X2) as independent variables. Meanwhile, liquidity (Z) serves as the moderating variable. Based on the overall description, the summary of the variables from the results of the descriptive statistical test can be presented as follows:

Table 1. Results of Descriptive Statistical Test

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
LEVERAGE	290	.17	4.98	1.0895	.66362
FIRM SIZE	290	22.35	37.57	28.6501	2.39894
HEDGING	290	.00	1.00	.1552	.36269
LIQUIDITY	290	.19	3.77	1.3237	.59169
Valid N (listwise)	290				

Source: Processed data using IBM SPSS 25 (2025)

Based on the results of the descriptive statistical test in Table 1, the leverage variable shows a minimum value of 0.17 and a maximum of 4.98, with an average of 1.0895. This indicates that, in general, companies exhibit a reasonable level of debt usage, although there is considerable variation across firms. The firm size variable has a minimum value of 22.35 and a maximum of 37.57, with an average of 28.6501, reflecting the dominance of large-sized companies within the sample. For the hedging variable, the mean value of 0.1552 suggests that only about 15.5% of the companies engage in hedging practices. Lastly, the liquidity variable shows a minimum value of 0.19 and a maximum of 3.77, with an average

of 1.3237, indicating that, overall, companies possess an adequate ability to meet their short-term obligations.

Logistic Regression Analysis

Overall Model Fit Test

Table 2. Results of Overall Model Fit Test – Initial -2LL

Iteration History[a,b,c]			
			Coefficients
Iteration		-2 Log likelihood	Constant
Step 0	1	254.374	-1.379
	2	250.348	-1.665
	3	250.315	-1.694
	4	250.315	-1.695

Source: Processed data using IBM SPSS 25 (2025)

The overall model fit test is a comparison between the initial model without independent variables and the model that includes independent variables (Affan & Prasetiono, 2022). Based on the results of the initial -2LL test presented in Table 2, the logistic regression model initially contained only a constant without any independent variables. The initial -2LL (Log Likelihood) value of 254.374 decreased to 250.315 after four iterations. This final value serves as a reference point to assess how well the model can predict the dependent variable (hedging decision) in the absence of independent variables such as leverage and firm size.

Table 3. Results of Overall Model Fit Test – Final -2LL

Iteration History[a,b,c,d]					
				Coefficients	
Iteration		-2 Log likelihood	Constant	LEVERAGE	FIRM SIZE
Step 1	1	227.078	-5.172	.773	.103
	2	215.029	-8.359	1.173	.184
	3	214.327	-9.525	1.309	.215
	4	214.323	-9.624	1.320	.217
	5	214.323	-9.625	1.320	.217

Source: Processed data using IBM SPSS 25 (2025)

Based on Table 3, the results represent the final model after including leverage and firm size as predictors. The -2LL value decreased significantly from 250.315 in the initial model to 214.323 at the end of the fifth iteration. This reduction indicates that the model with these

two independent variables provides a better fit to the data and improves the predictive ability regarding hedging decisions. The coefficient for leverage increased to 1.320, indicating a positive effect. This means that the higher the level of debt (leverage), the greater the likelihood that a company will engage in hedging. Similarly, the positive coefficient of firm size, which increased to 0.217, suggests that larger companies tend to have a higher probability of adopting hedging practices.

Goodness of Fit Test

Table 4. Results of the Goodness of Fit Test

Hosmer and Lemeshow Test			
Step	Chi-square	df	Sig.
1	11.755	8	.162

Source: Processed data using IBM SPSS 25 (2025)

The goodness of fit test is used to examine whether the model is consistent with the available data. A model is considered fit if there is no significant difference between the predicted values and the actual data. The assessment criteria are as follows: (1) significance ≤ 0.05 → H_0 is rejected, indicating the model is not a good fit; (2) significance > 0.05 → H_0 is accepted, indicating the model fits the data (Mirdha et al., 2023). Based on the results of the Hosmer and Lemeshow test in Table 4, the significance value obtained is 0.162. Since this value is greater than 0.05, H_0 is accepted. This implies that the logistic regression model is appropriate or fit to be used. In other words, there is no significant difference between the model's predicted outcomes and the actual data. Accordingly, the independent variables, leverage and firm size, adequately explain the dependent variable, namely the hedging decision.

Coefficient of Determination Test (Nagelkerke's R Square)

Table 5. Results of the Coefficient of Determination Test

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	214.323[a]	.117	.202

Source: Processed data using IBM SPSS 25 (2025)

The Nagelkerke R Square coefficient indicates the extent to which the independent variables contribute to explaining the dependent variable in logistic regression. A value closer to 1 reflects a stronger model fit, while a value closer to 0 indicates weaker explanatory power (Maghfiroh, 2020). Based on Table 5, the Nagelkerke R Square value is 0.202, suggesting that the two independent variables collectively explain approximately 20.2% of the variation in corporate hedging decisions. Meanwhile, the remaining 79.8% of the variation is explained by other factors not included in this research model.

Classification Accuracy Test

Table 6. Results of the Classification Accuracy Test

Classification Table[a]					
			Predicted		
			HEDGING		
	Observed		No Hedging	Hedging	Percentage Correct
Step 1	HEDGING	No Hedging	238	7	97.1
		Hedging	39	6	13.3
	Overall Percentage				84.1

Source: Processed data using IBM SPSS 25 (2025)

The classification accuracy test evaluates the ability of the logistic regression model to correctly distinguish between companies that apply hedging and those that do not. A high accuracy percentage indicates good predictive performance, thereby ensuring the reliability of the research results (Mirdha et al., 2023). Based on the results of the classification accuracy test in Table 6, the logistic regression model achieved an overall prediction accuracy of 84.1%. The model performed very well in predicting companies that do not engage in hedging, with an accuracy rate of 97.1% (238 out of 245 companies correctly predicted). However, the model showed very weak performance in predicting companies that engage in hedging, with an accuracy rate of only 13.3% (6 out of 45 companies correctly predicted). This unbalanced predictive accuracy is most likely due to the extreme data imbalance, as the number of companies that do not engage in hedging (majority) is much higher than those that do (minority). Consequently, the model tends to capture patterns more effectively in the majority group.

Wald Test

Table 7. Results of the Wald Test

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	LEVERAGE	1.320	.257	26.309	1	.000	3.744
	FIRM SIZE	.217	.069	9.824	1	.002	1.243
	Constant	-9.625	2.172	19.643	1	.000	.000

a. Variable(s) entered on step 1: LEVERAGE, FIRM SIZE.

Source: Processed data using IBM SPSS 25 (2025)

The Wald test in logistic regression is used to assess the significance of each regression coefficient, serving as a substitute for the t-test in linear regression (Maghfiroh, 2020). The criteria are as follows: (1) sig > 0.05 → H_0 is accepted, indicating the coefficient is not significant; (2) sig ≤ 0.05 → H_0 is rejected, indicating the coefficient is significant and the independent variable affects the dependent variable. Based on the Wald test results in Table 7, both independent variables—leverage and firm size—are proven to significantly influence a company's decision to engage in hedging. This is confirmed by the significance values (Sig.), which are less than 0.05 for both variables: 0.000 for leverage and 0.002 for firm size. The Exp(B) value for leverage is 3.744, indicating that each one-unit increase in leverage increases the likelihood of a company engaging in hedging by 3.744 times. Meanwhile, the Exp(B) value for firm size is 1.243, suggesting that each one-unit increase in firm size raises the probability of hedging by 1.243 times. Therefore, both research hypotheses (H1 and H2) are accepted, as they are proven to have a significant effect.

Moderated Regression Analysis (MRA) Test

Table 8. Results of the MRA Test

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	LEVERAGE	.657	.547	1.440	1	.230	1.928
	FIRM SIZE	-.059	.224	.070	1	.792	.943
	LIQUIDITY	-8.073	6.033	1.790	1	.181	.000
	LEVERAGE by LIQUIDITY	.584	.519	1.264	1	.261	1.793
	FIRM SIZE by LIQUIDITY	.250	.204	1.500	1	.221	1.284
	Constant	-.655	6.650	.010	1	.921	.519

a. Variable(s) entered on step 1: LEVERAGE, FIRM SIZE, LIQUIDITY, LEVERAGE * LIQUIDITY, FIRM SIZE * LIQUIDITY.

Source: Processed data using IBM SPSS 25 (2025)

Moderated Regression Analysis (MRA) is used to examine the interactive effect of a moderating variable while maintaining the integrity of the sample (Ghozali, 2018). A moderation test determines whether the moderator strengthens, weakens, or explains the relationship between the independent and dependent variables (Affan & Prasetiono, 2022). Based on the results of the Moderated Regression Analysis (MRA) in Table 8, after including the interaction terms between liquidity with leverage and firm size into the model, the effects of the two main variables became insignificant. This is evident from the increase in the significance value of leverage to 0.230 (previously 0.000) and firm size to 0.792 (previously 0.002). In addition, the interaction between leverage and liquidity has a significance value of 0.261, and the interaction between firm size and liquidity has a significance value of 0.221. Since both values are greater than 0.05, it can be concluded that liquidity does not significantly moderate the relationship between leverage and firm size with hedging decisions. Therefore, hypotheses H3 and H4 are rejected.

D. CONCLUSIONS

Based on the results of the analysis, it can be concluded that leverage and firm size have a positive and significant effect on hedging decisions in energy sector companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. However, regarding the moderating effect of liquidity, the findings indicate that liquidity does not moderate the relationship between leverage and firm size on hedging decisions in energy sector companies listed on the IDX during the 2020–2024 period.

E. SUGGESTIONS

For future research, it is recommended to consider additional factors or variables such as exchange rate risk, commodity price volatility, or corporate governance, which may also influence hedging decisions. Furthermore, the scope of research could be expanded to other sectors to allow for cross-industry comparisons.

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