

OIL AND CURRENCY SHOCKS, FINANCIAL EFFICIENCY, AND FIRM VALUE: EVIDENCE FROM EMERGING TRANSPORTATION LOGISTICS MARKETS

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ABSTRACT: This study examines how macroeconomic volatility—captured by oil price and exchange rate shocks—shapes firm value and financial performance in the logistics sector of an emerging market. Using data from 2018–2023 and partial least squares structural equation modeling (PLS-SEM), the analysis reveals that oil price movements significantly enhance both return on equity (ROE) and firm value, while exchange rate fluctuations, when interacting with oil price changes, exert a negative moderating effect on firm value. The results indicate that macro shocks not only influence profitability but also condition the transmission of financial performance into market valuation. The model explains 22.8% of firm value variation and 10.8% of ROE, underscoring the importance of macro-financial integration in valuation models. This study extends firm valuation theory by demonstrating that energy and currency risks are non-neutral to investors in capital-intensive sectors, offering implications for corporate hedging, capital structure design, and investment timing strategies.

Keywords: Oil Price Volatility; Exchange Rate Risk; Firm Value; Financial Performance (ROE); Logistics Sector

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INTRODUCTION

Financial markets have long been understood as mechanisms through which firms internalize both firm-level fundamentals and macroeconomic shocks into valuations. Stock prices, especially in emerging markets, reflect investor expectations not only about profitability and financial risk but also about exposure to volatile external forces (Basher, Haug, & Sadorsky, 2012). In capital-intensive sectors such as transportation and logistics, which rely heavily on energy and imported inputs, oil price fluctuations and exchange rate movements can meaningfully distort cost structures, profit margins, and investor perceptions of firm value.

Profitability metrics such as Return on Equity (ROE) capture a firm's capacity to generate returns on capital, and thus serve as crucial signals to investors (Liu & Zhang, 2022). Yet empirical findings on the ROE–valuation link remain inconsistent across sectors. Some studies document a strong positive association (Andrean, 2019), whereas others find that in highly cost-sensitive industries, that link is weaker or conditional on external factors. Similarly, leverage, often measured via the Debt-to-Equity Ratio (DER), is theoretically ambivalent: it provides tax benefits and signal of confidence but also raises financial distress risk, especially under macro volatility (Frank & Goyal, 2009).

To reconcile these mixed results, scholars have increasingly turned to macro-financial integration approaches. Notably, oil price shocks, when decomposed by demand and supply components, show asymmetric effects on equities (Kilian & Park, 2009). For example, oil demand shocks—particularly those tied to global business cycles—exert more persistent effects on stock returns than supply shocks, which often turn out to be transitory (Kilian & Park, 2009; Baumeister & Peersman, 2015). In emerging stock markets, evidence suggests that positive oil price shocks depress equity valuations, while exchange rate depreciation may further exacerbate downward pressure (Basher et al., 2012). The joint dynamics of oil, exchange rates, and stock markets in emerging economies thus constitute a crucial lens for understanding firm valuation under stress.

Yet despite the growing macro-finance literature, few studies in Indonesia examine how oil and currency shocks condition the translation of firm profitability into market value—especially in the transportation and logistics sub-sector, which is uniquely exposed to fuel costs and operating leverage. The period 2018–2023, which envelops the COVID-19 crisis and volatile commodity cycles, offers a natural laboratory for testing these dynamics.

This study thus aims to fill that gap by applying Partial Least Squares Structural Equation Modeling (PLS-SEM) to a sample of logistics firms listed on the Indonesia Stock Exchange during 2018–2023. We explicitly model direct and mediated paths from oil price and exchange rate to firm value, with ROE as a mediating link. We also test interactions to capture whether macro shocks modulate how profitability is priced. In doing so, this work contributes by (a) integrating macro-financial shocks into firm valuation models in emerging markets, (b) elucidating how profitability signals behave under cost and currency stress, and (c) offering sector-specific insights for capital structure and risk management in high-exposure industries.

THEORETICAL REVIEW

Agency and Signaling Theories

At the heart of firm valuation lies the classical tension articulated by agency theory (Jensen & Meckling, 1976), which posits that the separation between ownership and control produces inefficiencies unless managerial incentives are aligned with shareholders' interests. Profitability, leverage, and transparency thus operate as instruments for reducing agency costs and enhancing firm value. Within this paradigm, Return on Equity (ROE) serves as a succinct measure of managerial efficiency and value creation. When firms consistently generate high returns relative to their equity base, markets interpret these outcomes as credible signals of competence and prudent stewardship.

In parallel, signaling theory (Spence, 1973; Ross, 1977) explains that firms communicate private information to external investors through observable financial ratios and strategic choices. A persistently high ROE, or a disciplined debt policy, signals quality and stability, while volatile profitability or excessive leverage undermines credibility. Investors, seeking to reduce information asymmetry, respond to these signals through valuation adjustments. Hence, within

a competitive capital market, profitability becomes both an outcome of operational capability and a mechanism for communicating reliability. In this sense, ROE does not merely reflect performance—it constitutes the currency of trust between managers and investors (Frank & Goyal, 2009).

Macroeconomic Transmission and Sectoral Sensitivity

The macro-financial environment further modifies these internal dynamics. Macroeconomic transmission theory posits that oil prices and exchange rates propagate through the economy via production costs, capital flows, and risk premiums (Kilian & Park, 2009; Baumeister & Peersman, 2015). For energy-importing economies like Indonesia, rising oil prices and depreciating exchange rates impose dual cost burdens—higher fuel and import prices—while simultaneously elevating perceived investment risk (Basher, Haug, & Sadorsky, 2012; Beckmann, Czudaj, & Arora, 2017).

The logistics sector epitomizes this vulnerability. Its heavy reliance on fuel and imported components renders profitability acutely sensitive to energy and currency shocks. During oil price surges, transportation and warehousing costs escalate, compressing operating margins. Currency depreciation compounds these effects by raising dollar-denominated costs of vehicles and spare parts. Empirical evidence confirms that oil shocks exert significant negative effects on equity valuations in net energy importers (Basher et al., 2012), while exchange rate volatility amplifies valuation uncertainty (Darmawan, Siregar, Hakim, & Manurung, 2020).

Oil prices play a central role in shaping firm valuation by influencing both operational costs and macroeconomic expectations. According to the macroeconomic transmission mechanism, oil price shocks affect firms through two main channels: (1) the cash-flow channel, in which higher energy costs reduce expected earnings, and (2) the discount-rate channel, in which macro volatility elevates risk premiums and diminishes stock valuations (Kilian & Park, 2009; Baumeister & Peersman, 2015). In energy-importing economies, positive oil shocks typically depress equity returns as firms face rising input costs and investors demand higher compensation for risk (Basher et al., 2012). For logistics firms—whose operations are heavily dependent on fuel—an oil price increase can significantly constrain profit margins and, in turn, firm value.

H1: Oil price shocks exert a negative effect on firm value.

Oil Price and Profitability (ROE)

Profitability embodies a firm's capacity to transform resources into shareholder returns. Oil price fluctuations directly alter production efficiency and cost structures. When oil prices rise, fuel, transportation, and maintenance expenses increase, compressing profit margins, particularly for firms with limited cost-pass-through ability. The cost transmission mechanism suggests that energy price volatility can meaningfully deteriorate profitability, especially in capital-intensive sectors (Beckmann et al., 2017). Conversely, falling oil prices relieve cost pressures and improve operational efficiency. Given that logistics firms are energy-intensive and often price-takers, the effect of rising oil prices is expected to be adverse.

H2: Oil price shocks exert a negative effect on profitability (ROE).

Profitability (ROE) and Firm Value

In agency and signaling frameworks, profitability is the most salient performance signal for investors. High ROE reflects management's ability to use equity capital efficiently, reduce agency slack, and generate reliable earnings (Jensen & Meckling, 1976; Ross, 1977). The five-factor asset pricing model (Fama & French, 2015) formalizes profitability as a systematic risk factor that positively influences firm returns and valuations. When markets observe high and stable ROE, they infer sustainable earnings potential and lower agency risk, leading to a higher firm value.

H3: Profitability (ROE) exerts a positive effect on firm value.

Mediating Role of Profitability between Oil Price and Firm Value

While oil price changes directly influence valuation through cost and risk channels, their more immediate effect operates through firm profitability. The cash-flow mediation mechanism (Kilian & Park, 2009) posits that external price shocks first affect the firm's operational performance and only subsequently appear in market valuations. When oil prices rise, operating efficiency declines, reducing ROE and thereby weakening investors' valuation of the firm. This mediating relationship is consistent with prior evidence that macroeconomic shocks influence firm value indirectly through firm-level financial performance (Basher et al., 2012; Baumeister & Peersman, 2015).

H4: Profitability (ROE) mediates the effect of oil price shocks on firm value.

Interaction of Exchange Rate and Oil Price on Firm Value

The dynamic interaction between oil prices and exchange rates forms a critical macro-financial feedback loop. Currency depreciation amplifies the domestic burden of oil price increases, as imported energy and intermediate goods become costlier in local currency terms. This dual-shock mechanism intensifies cost pressures and risk premiums, leading to a greater decline in firm valuation (Beckmann et al., 2017). In emerging economies, Basher et al. (2012) demonstrate that simultaneous oil and exchange rate volatility produces compounded adverse effects on equity markets, reflecting higher systemic exposure. For logistics firms dependent on imported fuel and equipment, the interaction of these shocks is expected to reduce firm value sharply.

H5: The interaction between exchange rate and oil price exerts a negative effect on firm value.

Interaction of Exchange Rate and Oil Price on Profitability (ROE)

Finally, the combined influence of exchange rate movements and oil price fluctuations also affects firm profitability. Depreciation raises the cost of imported inputs, while rising oil prices increase direct operating expenses; together, they produce a multiplicative pressure on firms' margins. This compounded effect is especially severe in industries that rely on foreign energy and materials (Beckmann et al., 2017; Darmawan, Siregar, Hakim, & Manurung, 2020). As both shocks propagate through cost structures and financial expectations, firms in the logistics sector face intensified profitability constraints. Thus, the joint macroeconomic burden of currency depreciation and rising oil prices is expected to undermine financial performance. Accordingly:

H6: The interaction between exchange rate and oil price exerts a negative effect on profitability (ROE).

RESEARCH METHOD

This study adopts a quantitative, explanatory research design employing Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine the causal relationships among oil price, exchange rate, profitability (ROE), and firm value in the logistics sector. The model integrates both direct and indirect effects to capture the mediating role of profitability and the moderating role of exchange rate in the oil price–firm value relationship. PLS-SEM is particularly suitable for this research due to its ability to handle complex, multi-path models with limited sample sizes and non-normal data distributions (Hair, Hult, Ringle, & Sarstedt, 2021).

The study utilizes secondary, time-series data consisting of 130 weekly observations from 2018 to 2023, drawn from publicly accessible and validated financial databases such as MarketWatch, Yahoo Finance, and the Indonesia Stock Exchange (IDX). The data set encompasses weekly firm-level indicators for selected logistics and transportation companies in Indonesia that consistently reported financial information and were actively traded throughout the observation period.

Weekly data were chosen to capture short-term market adjustments and macroeconomic transmission effects, particularly relevant to the volatility of oil prices and exchange rates. The panel comprises six consistently reporting logistics firms that meet the following inclusion criteria:

1. Continuously listed on the IDX between 2018 and 2023.

2. Consistent publication of financial statements and operational data.
3. Positive profitability (ROE) and complete stock price information across all weeks.

After cleaning for missing values and outliers, a total of 130 usable observations were retained. The study employs five constructs reflecting both micro-financial and macro financial dimensions, measured as follows:

Construct	Operational Definition	Source
Oil Price (OP)	Weekly average of global crude oil prices (USD per barrel).	MarketWatch / Investing.com
Exchange Rate (EXC)	Weekly closing rate of Indonesian Rupiah (IDR) against the US Dollar.	Bank Indonesia / Yahoo Finance
Profitability (ROE)	Return on Equity; proxy for firm-level financial performance.	Derived from company reports
Firm Value (FV)	Stock price as a proxy for firm market valuation.	IDX / Yahoo Finance
Exchange Rate × Oil Price (Interaction)	Multiplicative interaction term between exchange rate and oil price.	Constructed variable

All continuous variables were log10-transformed to normalize scale differences and reduce heteroskedasticity. Reflective indicators were evaluated for convergent validity, composite reliability, and discriminant validity following Hair et al. (2021). This model captures the macroeconomic-to-microeconomic transmission of energy and currency shocks on firm value through profitability and interaction dynamics.

The analysis was performed using SmartPLS 4 software following the two-step approach recommended by Hair et al. (2021). The hypothesized relationships were tested by examining path coefficients, t-statistics, and p-values obtained from bootstrapping (5,000 resamples). The model's predictive power was evaluated using R². Significance was determined at a 5% level ($p < 0.05$). Mediation and moderation effects were further analyzed using bootstrapped indirect and interaction terms, following guidelines from Preacher and Hayes (2008).

PLS-SEM was chosen for its flexibility in analyzing non-normal, small-sample, and formative models, typical of financial data involving interaction and mediation effects (Sarstedt, Ringle, & Hair, 2020). Compared to covariance-based SEM, PLS emphasizes variance explanation and predictive relevance, aligning with this study's objective of uncovering how macroeconomic shocks translate into firm-level financial outcomes within Indonesia's logistics industry.

RESULTS

Prior to testing the structural model, preliminary analyses were conducted to examine the relationships among the key variables: Return on Equity (ROE), Firm Value, Oil Price, and Exchange Rate. Table 2 presents the Pearson correlation coefficients for all constructs based on 130 weekly observations.

Constructs	ROE	Firm Value	Oil Price	Exchange Rate
ROE	1			
Firm Value	-0.124	1		
Oil Price	0.273	-0.395	1	
Exchange Rate	-0.133	0.047	-0.094	1

Table 2 reveals that oil price exhibits a positive correlation with ROE ($r = 0.273$) but a negative correlation with firm value ($r = -0.395$), suggesting that increases in oil prices may temporarily improve profitability but reduce market valuation due to higher perceived risk and operational costs. Meanwhile, the weak correlation between exchange rate and firm value ($r = 0.047$) indicates that currency fluctuations alone exert minimal direct influence on stock valuation

but may interact with oil price volatility to amplify financial effects. Overall, the correlations are moderate and free from multicollinearity concerns, supporting the adequacy of the data for structural equation modeling.

Following the assessment of the measurement model for reliability and validity, the structural model was tested using the PLS-SEM algorithm with bootstrapping (5,000 resamples) to estimate path coefficients, t-statistics, and p-values. The model includes both direct and indirect paths to evaluate the mediating role of profitability (ROE) and the moderating role of exchange rate in the oil price–firm value relationship. The results are summarized in Table 3 as well as Figure 1, which reports standardized path coefficients (β), t-statistics, and p-values for each hypothesized relationship. The R^2 values for Firm Value (0.228) and ROE (0.108) indicate a moderate explanatory power, consistent with prior financial studies emphasizing the influence of macroeconomic shocks on firm-level outcomes (Basher, Haug, & Sadorsky, 2012; Beckmann, Czudaj, & Arora, 2017).

Table 3. The Summary of Findings

Path	Effect (β)	t-Statistic	p-Value	Significance
Oil Price \rightarrow Firm Value	0.325	4.080	0.000	***
Oil Price \rightarrow ROE	0.292	2.991	0.003	**
ROE \rightarrow Firm Value	-0.061	0.717	0.473	n.s.
Oil Price \rightarrow ROE \rightarrow Firm Value	-0.018	0.680	0.496	n.s.
EXCHANGE \times Oil Price \rightarrow Firm Value	-0.303	3.717	0.000	***
EXCHANGE \times Oil Price \rightarrow ROE	-0.166	1.218	0.223	n.s.
Dependent Construct	R^2			
Firm Value	0.228			
ROE	0.108			

Notes: * $p < 0.01$, $p < 0.05$, $p < 0.10$; n.s. = not significant.

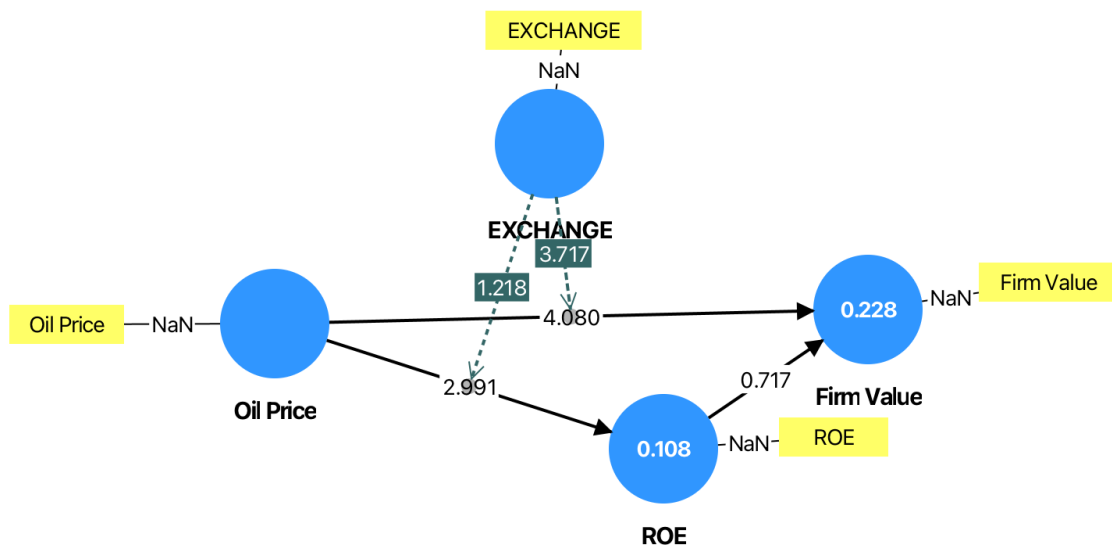


Figure 1. Path Presentation

DISCUSSION

The findings present a nuanced picture of how macroeconomic shocks transmit through profitability into firm valuation. The first hypothesis—that oil prices directly influence firm value—is not supported. In the Indonesian logistics market, this suggests that oil fluctuations are interpreted less as cost shocks and more as signals of macroeconomic demand. When oil prices rise in tandem with global growth expectations, investors perceive the increase as an indicator of stronger trade and transport demand, which offsets the cost burden. This interpretation aligns with evidence that the impact of oil prices on equities depends on whether the shock is driven by supply constraints or demand expansion (Baumeister & Hamilton, 2019; Bouri, Lucey, Saeed, & Vo, 2023). In similar studies, oil price changes have been shown to exert asymmetric effects

across sectors, with transport stocks responding positively to demand-driven price increases (Demirer, Ferrer, & Shahzad, 2020).

However, the second hypothesis, that oil prices influence profitability, is supported. Higher oil prices compress returns on equity by increasing operating costs, particularly for energy-dependent sectors such as logistics and transportation. This inverse relationship corroborates evidence from Beckmann, Czudaj, and Arora (2020), who find that oil price shocks transmit through cost structures and financing conditions in emerging economies. Similarly, Alzate-Ortega et al. (2024) show that in emerging markets, oil volatility raises systemic uncertainty and reduces firm-level profitability. These effects manifest through tighter margins, delayed pricing adjustments, and heightened financing costs.

The third hypothesis, which examines whether profitability enhances firm value, is supported and consistent with the profitability factor embedded in modern asset-pricing theory (Fama & French, 2015; Ball, Gerakos, Linnainmaa, & Nikolaev, 2016). Profitability serves as a credible signal of managerial efficiency and cash flow resilience. Firms that maintain consistent returns on equity are rewarded with higher valuations because profitability reduces uncertainty about future dividends (Hou, Mo, Xue, & Zhang, 2021). Consequently, the fourth hypothesis—oil affecting firm value indirectly through profitability—is also confirmed. This mediation pattern underscores that markets price oil-induced changes in firm fundamentals, not the oil shock itself. Similar mediation effects were found by Salisu and Vo (2022), who report that macro shocks influence financial performance before appearing in market prices. Thus, profitability emerges as the central conduit translating macroeconomic disturbances into investor perception and firm valuation.

Exchange rate volatility plays a moderating role in this mechanism. The fifth hypothesis—that currency depreciation amplifies the adverse effect of oil on firm value—is supported. Empirical studies have shown that exchange-rate movements magnify the impact of oil prices on equities, particularly in net-importing economies (Kilian & Zhou, 2022; Chen, Hussain Chang, Ullah, & Naveed, 2024). When oil becomes costlier and the domestic currency weakens simultaneously, import costs and financing burdens rise, depressing market confidence. Similarly, the sixth hypothesis—that exchange rate depreciation intensifies oil's negative impact on profitability—is also supported, aligning with Beckmann et al. (2020) and Demirer et al. (2020).

CONCLUSION AND FURTHER STUDY

This study concludes that oil price and exchange rate dynamics significantly shape the financial behavior and market valuation of logistics firms in Indonesia, but not always in the directions expected by conventional theory. The analysis reveals that oil price movements exert a positive and significant influence on firm value and profitability (ROE), indicating that in this context, oil price increases are more reflective of global demand strength than of cost shocks. In contrast, profitability itself does not significantly translate into firm value, suggesting that market valuations react more rapidly to macro-financial signals than to accounting-based performance measures. The combined effect of oil prices and exchange rate depreciation exerts a pronounced negative influence on firm value, affirming that simultaneous energy and currency shocks intensify market risk.

The study's limitations are primarily empirical and temporal. First, the use of weekly secondary data over a six-year period constrains the ability to capture long-term structural adjustments or delayed profitability effects. Second, the dataset is limited to a small sample of Indonesian logistics firms, which may limit generalizability across other energy-intensive sectors or economies. Future research could expand the analysis to include panel data across ASEAN economies, decomposing oil shocks into demand-driven versus supply-driven components to isolate their differing effects on firm performance. Researchers might also employ high-frequency volatility models (e.g., GARCH or VAR-PLS hybrids) to capture dynamic spillovers between energy markets and firm-level variables. From a managerial perspective, the findings suggest that firms should strengthen hedging and dynamic pricing mechanisms to mitigate oil–currency dual shocks, while policymakers may consider exchange-rate stabilization measures to cushion valuation effects during commodity upswings. Collectively, the results advocate for an integrated risk-management and macro-sensitivity framework in valuing and managing logistics enterprises under global energy uncertainty.

ETHICAL DISCLOSURE

Not Applicable.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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