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Oil Price Uncertainty, Market Fluctuations, and ESG on Energy Investment in ASEAN and East Asia

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Abstract

Background: The energy sector is highly vulnerable to oil price uncertainty, financial market fluctuations, and sustainability demands, making investment decisions increasingly dependent on both economic factors and ESG performance.
Objective: This study aims to examine the effects of oil price uncertainty, financial market fluctuations, and ESG performance on the investment policies of oil and gas companies in ASEAN and East Asia.
Methods: This study employs a quantitative approach using panel data regression. The sample comprises 35 oil and gas companies listed on stock exchanges in Indonesia, Malaysia, Singapore, Thailand, Vietnam, Japan, China, and South Korea from 2016 to 2024, yielding 315 firm-year observations, of which 260 are available for models including ESG. Investment policy is measured using the ratio of capital expenditure to total assets.
Results: Oil price uncertainty has a negative and statistically significant effect on investment policy, both partially (coefficient = −0.1602, p = 0.009) and in the full model (coefficient = −0.1464, p = 0.025). Financial market fluctuations are negative and significant when estimated separately (coefficient = −1.2011, p = 0.035) but become insignificant in the full model once oil price uncertainty is controlled for (coefficient = −0.2546, p = 0.679). ESG performance shows a positive but statistically insignificant coefficient across all specifications (full model: coefficient = 0.0003, p = 0.286). The full model yields a Wald χ^2 of 13.84 (p = 0.032) with an overall R^2 of 0.074.
Conclusion: Oil price uncertainty is the most dominant and consistent factor constraining corporate investment among energy companies in ASEAN and East Asia, consistent with real options theory.

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INTRODUCTION

The energy sector is a strategic sector that plays an important role in supporting global economic growth. Oil and natural gas continue to dominate global energy consumption and contribute more than 50% of the world's primary energy supply, according to the International Energy Agency (Cook, 2021). However, this sector is highly vulnerable to global uncertainty due to fluctuations in international oil prices, financial market conditions, and increasing demands for the implementation of Environmental, Social, and Governance (ESG) principles (Belcaid, 2024). These conditions create challenges for energy companies in determining long-term investment policies amid increasingly complex global market dynamics (Dixit & Pindyck, 1994).

Global oil price uncertainty is one of the primary factors influencing energy companies' investment policies (Cao et al., 2020). Oil prices are affected by geopolitical conflicts, changes in global demand, production policies of OPEC member countries, and disruptions in international energy supply chains (Patidar et al., 2024). The COVID-19 pandemic significantly affected global oil markets, causing oil demand to decline by more than 9 million barrels per day (Hanieh, 2021).

Under investment theory in conditions of uncertainty, these circumstances encourage companies to delay investment decisions until greater market certainty is achieved because investments in the energy sector are typically capital-intensive, irreversible, and associated with substantial sunk costs (Dixit & Pindyck, 1994; Pindyck, 1990). Research by Baumeister (2016) also demonstrates that oil price uncertainty significantly influences investment decisions among energy companies.

Furthermore, financial market fluctuations also affect energy companies' investment activities. Stock market volatility increases investment risk and uncertainty, causing investors to become more risk-averse. These conditions increase the cost of capital and restrict access to external financing for energy companies that require large-scale and long-term investments. Gilchrist (2014) explain that financial market uncertainty can reduce corporate investment, while Sadorsky (1999) identifies a strong relationship between oil price volatility and stock market volatility in the energy sector.

Oil price uncertainty and financial market fluctuations can result in reduced capital expenditure, delayed investment projects, increased operational risks, and decreased competitiveness among energy companies. In addition to economic and financial challenges, energy companies face increasing global pressure regarding environmental sustainability and the transition toward low-carbon energy systems. Therefore, Environmental, Social, and Governance (ESG) factors have become important indicators for assessing the resilience and long-term prospects of energy companies (Khan et al., 2016).

ESG is a framework used to evaluate corporate sustainability performance based on environmental, social, and governance dimensions. In the energy industry, ESG has become increasingly relevant because the oil and gas sector remains one of the largest contributors to global carbon emissions. Investors now consider not only financial profitability but also how companies manage environmental impacts, stakeholder relationships, and corporate governance practices. Companies with strong ESG performance tend to demonstrate greater transparency, stronger reputations, and improved access to financing (Friede et al., 2015).

Albuquerque et al. (2020) further explain that companies with strong ESG performance experience lower stock price volatility and demonstrate greater resilience during market shocks. Building on *stakeholder theory* and *signaling theory*, this study positions ESG as a direct determinant of investment policy, that is, as an internal capability and sustainability signal that stands on its own, rather than as a moderating variable. Its effect on investment policy is therefore tested directly rather than as an interaction with market uncertainty (Zhang et al., 2024).

This research contributes novelty by integrating oil price uncertainty, financial market fluctuations, and ESG factors into a unified analytical framework to explain energy companies' investment policies. Most previous studies have examined the relationship between oil prices and investment decisions or ESG and corporate performance separately. This study addresses this research gap by simultaneously examining these three factors among energy companies in the ASEAN region, Japan, China, and South Korea. Unlike previous studies, such as Baumeister (2016), which investigated oil price uncertainty independently, and Friede (2015), which primarily focused on ESG–performance relationships, this study jointly models these three determinants within a single panel data framework for the ASEAN and East Asian energy sectors.

The urgency of this research lies in the need to understand the determinants of energy investment decisions amid increasing global uncertainty and the acceleration of the energy transition. The ASEAN and East Asian regions have experienced substantial energy demand growth and remain significantly dependent on oil and natural gas resources. Consequently, energy companies require investment strategies that are resilient and adaptive to oil price uncertainty, financial market fluctuations, and evolving ESG requirements.

Based on this background, this study aims to examine the effects of global oil price uncertainty, financial market fluctuations, and ESG performance on the investment policies of energy companies in the ASEAN region, Japan, China, and South Korea. This study employs a quantitative approach using panel data regression to provide empirical evidence regarding the factors influencing energy investment decisions in the Asia-Pacific region. Academically, this research is expected to contribute to the literature on energy economics, corporate investment, and investment decision-making under uncertainty. Practically, the findings are expected to provide valuable insights for energy companies, investors, and policymakers in developing more adaptive, resilient, and sustainable investment strategies.

METHOD

This study employs a quantitative approach with an empirical design to analyze the effects of oil price uncertainty, financial market fluctuations, and Environmental, Social, and Governance (ESG) performance on the investment policies of energy companies. The unit of analysis is oil and gas companies operating and listed on stock exchanges in the ASEAN and East Asia regions. The data are panel data, combining time-series and cross-sectional dimensions. Panel data regression is used as the main analytical method because it is more efficient and reduces bias arising from unobserved individual heterogeneity (Wooldridge, 2010; Baltagi, 2021).

The population comprises all oil and gas companies listed on the stock exchanges of Indonesia, Malaysia, Singapore, Thailand, Vietnam, Japan, China, and South Korea. Sampling was conducted using purposive sampling based on the following criteria: (1) the company belongs to the oil and gas sector according to the industry classification of its respective exchange; (2) the company published complete and consistent annual financial reports throughout the research period; (3) data on capital expenditure, total assets, total debt, and equity are available; and (4) an ESG score from an international data provider such as Refinitiv is available. From 87 initial candidates identified through S&P Capital IQ, curation based on industry classification and core oil and gas activity, excluding firms whose principal activities lie outside core oil and gas such as coal, power generation, renewables, pure petrochemicals, non-oil mining, and public transportation, produced a final sample of 35 companies. The observation period spans 2016–2024, yielding 315 firm-year observations.

Corporate financial data were obtained from S&P Capital IQ. Oil price uncertainty (OPU) is measured as the annualized standard deviation of daily oil price returns, using the Dubai Crude Oil Price benchmark from the Federal Reserve Economic Data (FRED), following Ilyas et al. (2021). Dubai Crude was selected because it is a relevant pricing benchmark for the Asian region. Financial market fluctuations (MV) are measured as the annual standard deviation of daily returns on each country's principal domestic stock index, obtained from Refinitiv, following Mohn and Misund (2009). The indices used are IHSG (Indonesia), KLCI (Malaysia), SGX (Singapore), SET (Thailand), HNX (Vietnam), Nikkei 225 (Japan), SSE Composite (China), and KOSPI (South Korea), so that each firm is paired with the market risk conditions it actually faces. ESG performance is measured using the composite Refinitiv ESG Score, which reflects corporate performance across environmental, social, and governance dimensions.

The dependent variable is corporate investment policy (CINV), measured as the ratio of capital expenditure to total assets. The independent variables are OPU, MV, and ESG, while the control variables are firm size (the natural logarithm of total assets), leverage (the ratio of total debt to total assets), and return on assets (the ratio of net income to total assets). These control variables are commonly used in corporate investment research to ensure that the relationships among the main variables are not confounded by general firm characteristics (Fazzari et al., 1988; Aivazian et al., 2005). All independent and control variables enter with a one-period lag ($t-1$) to reflect that investment decisions respond to conditions realized in the preceding period.

To test the three hypotheses, the models were estimated in stages through four regression equations. Model 1 tests the effect of oil price uncertainty (H1), Model 2 tests financial market fluctuations (H2), Model 3 tests ESG performance (H3), and Model 4 is the full model estimating all three main variables simultaneously while retaining the control variables. This staged estimation strategy assesses the stability and robustness of each effect to changes in specification, while diagnosing potential omitted variable bias and multicollinearity among the main variables (Ilyas et al., 2021; Zhang et al., 2024). The full model is specified as follows:

$$CINV(i,c,t) = \alpha + \beta_1 OPU(t-1) + \beta_2 MV(c,t-1) + \beta_3 ESG(i,t-1) + \Sigma\gamma X(i,c,t-1) + \mu(i) + \lambda(t) + \varepsilon(i,c,t)$$

In which, CINV is the investment policy of firm *i* in country *c* at period *t*; OPU is global oil price uncertainty; MV is financial market fluctuation in country *c*; ESG is the firm's sustainability score; X is the vector of control variables (firm size, leverage, ROA); μ(i) denotes firm individual effects; λ(t) denotes time effects; and ε is the error term.

Model selection was carried out through the Chow test (Pooled OLS versus FEM), the Hausman test (FEM versus REM), and the Breusch-Pagan Lagrange Multiplier test (Pooled OLS versus REM). To improve the reliability of inference, the models were estimated using cluster-robust standard errors at the firm level to accommodate heteroscedasticity across firms and serial correlation of residuals within firms, and time effects were included to capture global macroeconomic shocks such as the COVID-19 pandemic. Classical assumption checks covering multicollinearity and residual normality were conducted prior to interpretation. All analyses were performed using Stata. As a robustness check, the dependent variable was replaced with an alternative investment proxy, INV_1 (capital expenditure over lagged property, plant, and equipment), following Ilyas et al. (2021) and Chen et al. (2024).

RESULTS AND DISCUSSION

Results

This study analyzes the effects of global oil price uncertainty, financial market fluctuations, and Environmental, Social, and Governance (ESG) performance on the investment policies of energy companies in the ASEAN region, Japan, China, and South Korea. The analysis focuses on oil and gas companies listed on the capital markets of each country over the 2016–2024 period. The selection of the ASEAN and East Asia regions is based on their high levels of energy consumption, strong integration with global energy markets, and increasing energy transition pressures.

The dependent variable is corporate investment policy (CINV), proxied by the ratio of capital expenditure to total assets. The independent variables are global oil price uncertainty (OPU), financial market fluctuations (MV), and ESG scores, while firm size, leverage, and return on assets (ROA) serve as control variables. All explanatory variables enter with a one-period lag.

Table 1

Research Sample Profile

No	Country	Number of Companies	Observation Period	Total Observations
1	Indonesia	6	2016–2024	54
2	Malaysia	5	2016–2024	45
3	Singapore	2	2016–2024	18
4	Thailand	4	2016–2024	36
5	Vietnam	3	2016–2024	27
6	Japan	5	2016–2024	45
7	China	5	2016–2024	45
8	South Korea	5	2016–2024	45
	Total	35		315

Source: Researcher's data processing (2026)

Based on Table 1, the final sample consists of 35 oil and gas companies drawn from 87 initial candidates identified through S&P Capital IQ, yielding 315 firm-year observations over 2016–2024. Because ESG scores are not available for every firm-year, models that include ESG are estimated on a common subsample of 260 firm-year observations, making the panel unbalanced for those specifications.

Descriptive Statistics

Descriptive statistics summarize the characteristics of the research data and are presented in Table 2.

Table 2
Descriptive Statistics of Research Variables

Variable	N	Mean	Median	Std. Dev.	Min	Max
CINV	315	0.0589	0.0473	0.0431	0.0026	0.2393
L_OPU	315	0.0978	0.0907	0.0377	0.0504	0.1574
L_MV	315	0.0098	0.0087	0.0038	0.0036	0.0189
L_ESG	260	59.880	61.094	15.596	22.469	87.003
L_SIZE	315	22.991	22.647	1.814	19.092	26.699
L_LEV	315	0.2529	0.2595	0.1221	0.0004	0.4884
L_ROA	315	0.0399	0.0400	0.0527	−0.1259	0.1914

Source: Researcher's data processing (2026)

The dependent variable CINV has a mean of 0.0589 with a standard deviation of 0.0431, indicating that on average firms allocate approximately 5.9% of their total assets to capital investment. The range from 0.0026 to 0.2393 reflects considerable heterogeneity in investment strategies across the sample. OPU has a mean of 0.0978, with its highest value corresponding to the lagged 2021 observation, reflecting the uncertainty generated by the COVID-19 pandemic. Because OPU is a global measure, its value is identical for all firms in a given year, so the variation identified in the panel estimation is purely time-series variation. MV, measured at the country level, varies both over time and across countries. ESG scores average 59.880 with a range from 22.469 to 87.003, reflecting substantial heterogeneity in sustainability disclosure quality across firms.

Classical Assumption Tests

Multicollinearity was assessed using the Variance Inflation Factor (VIF). As shown in Table 3, L_MV records the highest VIF (1.604), followed by L_OPU (1.547) and L_ROA (1.453), with a mean VIF of 1.349, confirming that collinearity is low. Although the bivariate correlation between L_OPU and L_MV is moderately high ($r \approx 0.56$), the two variables still carry sufficiently distinct information to be estimated simultaneously without material inflation of standard errors.

Table 3
Variance Inflation Factor (VIF) Test Results

Variable	VIF	1/VIF (Tolerance)
L_MV	1.604	0.6235
L_OPU	1.547	0.6463
L_ROA	1.453	0.6881
L_LEV	1.365	0.7328
L_SIZE	1.091	0.9166
L_ESG	1.033	0.9685
Mean VIF	1.349	

Source: Researcher's data processing (2026)

Normality was assessed on the residuals of the full model. The Jarque-Bera statistic of 68.39 ($p < 0.001$) and the Shapiro-Wilk statistic of W = 0.933 ($p < 0.001$) both reject the null hypothesis of normality, driven primarily by positive residual skewness (1.09) and excess kurtosis (2.32), consistent with the right-skewed distribution of CINV. This departure does not invalidate inference in this study for two reasons. First, with a sufficiently large sample, the Random Effects estimator remains consistent and its distribution is asymptotically normal by the central limit theorem, so residual normality is not a strict prerequisite for significance testing (Wooldridge, 2010). Second, all models are estimated using cluster-robust standard errors, which keep inference valid in the presence of distributional departures and heteroscedasticity (Baltagi, 2021).

Panel Model Specification Tests

The choice of panel estimator was determined through the Chow test and the Hausman test, confirmed by the Breusch-Pagan Lagrange Multiplier test. The Chow test yields F(34, 219) = 10.85 (p < 0.001), rejecting Pooled OLS in favour of the Fixed Effects Model. The Hausman test yields $\chi^2(6) = 5.07$ (p = 0.5355), failing to reject the null hypothesis that the differences between the FE and RE coefficients are not systematic; the Random Effects estimator is therefore consistent and more efficient than Fixed Effects. The Breusch-Pagan LM test (chibar^2 = 112.01; p < 0.001) confirms the superiority of Random Effects over Pooled OLS. Accordingly, the main estimator adopted in this study is the Random Effects Model with cluster-robust standard errors at the firm level.

Table 4

Summary of Panel Model Specification Tests

Test	Statistic	p-value	Decision
Chow test (F)	F(34, 219) = 10.85	< 0.001	FE > Pooled OLS
Breusch-Pagan LM	chibar^2 = 112.01	< 0.001	RE > Pooled OLS
Hausman test	$\chi^2(6) = 5.07$	0.5355	RE > FE

Source: Researcher's data processing (2026)

Panel Data Regression Results

Four models were estimated to test each hypothesis separately and jointly. Model 1 tests oil price uncertainty (H1), Model 2 tests financial market fluctuations (H2), Model 3 tests ESG performance (H3), and Model 4 is the full model estimating all three main variables simultaneously while controlling for firm size, leverage, and ROA. Models 1 and 2 use 315 firm-year observations, whereas Models 3 and 4 use the common ESG subsample of 260 firm-year observations. Results are presented in Table 5.

Table 5

Panel Data Regression Results (Random Effects Model)

Variable	Model 1	Model 2	Model 3	Model 4 (Full)
L_OPU	−0.1602***			−0.1464**
	(0.0617)			(0.0657)
L_MV		−1.2011**		−0.2546
		(0.5689)		(0.6139)
L_ESG			0.0002	0.0003
			(0.0003)	(0.0003)
L_SIZE	−0.0036	−0.0031	−0.0039	−0.0039
	(0.0057)	(0.0059)	(0.0059)	(0.0058)
L_LEV	0.0427	0.0547	0.0598	0.0549
	(0.0510)	(0.0503)	(0.0538)	(0.0536)
L_ROA	−0.0415	−0.0745	−0.0735	−0.0363
	(0.1025)	(0.0967)	(0.1040)	(0.1019)
Constant	0.1499	0.1333	0.1228	0.1356
	(0.1359)	(0.1405)	(0.1300)	(0.1292)
Observations (N)	315	315	260	260
Wald χ^2	11.09**	4.45	3.10	13.84**
Prob > χ^2	0.0256	0.0358	0.5412	0.0315
R^2 (overall)	0.0732	0.0723	0.0754	0.0735

Note: *** p < 0.01; ** p < 0.05; * p < 0.10. Cluster-robust standard errors in parentheses, clustered at the firm level.

Source: Researcher's data processing (2026)

As Table 5 shows, L_OPU is consistently negative and significant in both the partial model (Model 1) and the full model (Model 4). L_MV is negative and significant in Model 2 but loses significance when estimated jointly with L_OPU in Model 4. L_ESG carries the hypothesized positive sign but is not statistically significant in any specification. None of the three control variables is significant in any model. The full model records a Wald χ^2 of 13.84, significant at the 5% level, indicating that the model as a whole explains variation in CINV meaningfully, even though the overall R^2 is low — a pattern consistent with firm-year panel data dominated by idiosyncratic variation.

The control variables warrant cautious interpretation because none is statistically significant. SIZE is consistently negative (approximately −0.003 to −0.004), in the same direction as Zhang et al. (2024), who link the negative relationship between firm size and investment to diminishing returns. LEV is positive (0.043–0.060), also consistent with Zhang et al. (2024), who explain the positive effect of debt through the leverage channel. ROA is consistently negative, which does not fully align with the prediction of pecking order theory (Myers & Majluf, 1984) that higher profitability expands internal funding capacity for investment, and may indicate that in the energy sector capital expenditure decisions are governed more by long-term project cycles than by prior-period profitability.

Table 6

Summary of Hypothesis Testing

Hypothesis	Predicted Sign	Decision
H1: Oil price uncertainty (OPU) negatively affects investment policy	Negative	Supported (partial and simultaneous)
H2: Financial market fluctuations (MV) negatively affect investment policy	Negative	Partially supported
H3: ESG performance positively affects investment policy	Positive	Not supported

Source: Researcher's data processing (2026)

Robustness Check

To test the consistency of the main findings against the choice of investment measure, a robustness check was conducted by replacing the dependent variable CINV (capital expenditure over total assets) with INV_1 (capital expenditure over lagged property, plant, and equipment). PPE was chosen as the alternative denominator because it more specifically captures investment intensity relative to the core productive asset base, following Ilyas et al. (2021) and Chen et al. (2024). The model specification and estimation procedure follow Models 1–4 using the Random Effects Model with cluster-robust standard errors.

Table 7

Robustness Check Results (Dependent Variable: INV_1 = Capex / PPE)

Variable	Model 1	Model 2	Model 3	Model 4 (Full)
L_OPU	−0.0621***			−0.0675**
	(0.0234)			(0.0305)
L_MV		−0.0854*		−0.0368
		(0.0448)		(0.1038)
L_ESG			0.0005	0.0002
			(0.0003)	(0.0003)
Observations (N)	315	315	260	260
Wald χ^2	38.91	34.86	28.93	28.85
Prob > χ^2	0.0000	0.0000	0.0000	0.0001
R^2 (overall)	0.0916	0.0897	0.1020	0.1031

Note: *** p < 0.01; ** p < 0.05; * p < 0.10. Control variables (L_SIZE, L_LEV, L_ROA) are included in all models.

Source: Researcher's data processing (2026)

The robustness results in Table 7 show that using the alternative investment proxy produces a pattern of findings consistent with the main models. L_OPU remains negative and significant, at −0.0621 (1% level) in the partial model and −0.0675 (5% level) in the full model. L_MV is negative and marginally significant at the 10% level in the partial model but again insignificant in the full model once L_OPU and L_ESG are entered simultaneously. L_ESG remains positive but insignificant in both the partial and full models. Overall, replacing CINV with INV_1 does not alter the study's main conclusion: oil price uncertainty is the most consistent factor constraining energy companies' investment policies, financial market fluctuations exert a weaker and only partial effect, and ESG has not been evidenced as a direct determinant of investment volume.

Discussion

Effect of Oil Price Uncertainty on Investment Policy

The results indicate that oil price uncertainty has a negative and statistically significant effect on the investment policies of energy companies in ASEAN and East Asian countries. Model 1 produces an L_OPU coefficient of −0.1602, significant at the 1% level ($z = -2.60$; $p = 0.009$), and this result persists in the full model, where the coefficient of −0.1464 remains significant at the 5% level ($z = -2.23$; $p = 0.025$) even after L_MV and L_ESG are controlled for. Hypothesis 1 is thus empirically supported. The coefficient of −0.1464 indicates that, holding other variables constant, a one-unit increase in oil price uncertainty is associated with a 0.1464-unit decrease in the investment ratio.

This negative direction is consistent with *real options theory* (Dixit & Pindyck, 1994), which holds that uncertainty creates an option value of waiting, so that rational firms tend to postpone irreversible investment commitments when uncertainty is high. Bernanke (1983) explains this through the *bad news principle*, whereby difficult-to-reverse investment decisions create incentives to defer capital commitments while awaiting new information. Pindyck (1990) and McDonald and Siegel (1986) reinforce this argument by showing that the value of waiting rises with uncertainty, raising the profitability threshold that must be exceeded before investment proceeds. In the energy sector, where exploration and development projects require large capital outlays that are effectively sunk, oil price uncertainty directly increases the uncertainty of prospective cash flows, making this deferral mechanism highly relevant.

These findings are consistent with a range of empirical studies across contexts. In global samples, Ilyas et al. (2021) and Phan et al. (2019) find that oil price uncertainty suppresses corporate investment, while Guo (2019) documents a similar pattern among United States firms. In the Asian context, Rong and Qamruzzaman (2022) show that oil price uncertainty shapes energy investment dynamics, Zhan (2024) finds that international oil price uncertainty reduces the investment efficiency of listed Chinese firms, and Cao et al. (2020) confirm a negative effect among Chinese renewable energy companies. Industry-level evidence is also aligned: Kellogg (2014) shows that oil drilling activity in Texas declines significantly when price volatility rises, and Sun et al. (2022) document the effect of oil price fluctuations on investment in Chinese industrial sectors. This study therefore reinforces and extends that empirical consensus to energy companies in ASEAN and East Asia, a context that has previously received limited attention.

Effect of Financial Market Fluctuations on Investment Policy

The results indicate that financial market fluctuations have a negative and significant effect on investment policy when tested in isolation, but the effect does not survive in the full model. Model 2 yields an L_MV coefficient of −1.2011, significant at the 5% level ($z = -2.11$; $p = 0.035$), so Hypothesis 2 is supported in the partial specification. In the full model, however, the coefficient falls to −0.2546 and is no longer statistically significant. Hypothesis 2 is therefore supported only partially.

The loss of significance is explained by the relationship between the two uncertainty measures: oil price uncertainty and financial market fluctuations tend to co-move ($r \approx 0.56$). Consequently, when both are entered into a single model, most of the information carried by L_MV is already represented by L_OPU, so that L_MV no longer provides meaningful additional explanatory power for investment decisions. This is consistent with Mohn and Misund (2009), who position commodity risk and financial market risk as two interrelated sources of external uncertainty, and with Akron et al. (2022), who show that uncertainty affects corporate investment behaviour through overlapping channels.

The dominance of commodity risk over aggregate market risk can also be understood from the fundamental characteristics of the energy sector. Unlike stock market volatility, which reflects systemic risk sentiment in general, oil price uncertainty bears directly on cash flow projections, project feasibility, and the value of company reserves. Sadorsky (1999) shows that oil price shocks constitute a risk factor that is specifically priced in stock returns, while Henriques and Sadorsky (2008) confirm the close link between oil price movements and the market performance of energy firms. Antonakakis et al. (2017) further document strong dynamic connectedness between oil price shocks and stock markets, particularly during periods of economic stress. Gilchrist et al. (2014) explain that market uncertainty raises the cost of capital and dampens investment, an effect that in this sample appears to be absorbed by the oil price channel. The appropriate interpretation is therefore not that financial markets are irrelevant, but that their effect on investment cannot be identified separately from oil price uncertainty among energy firms in ASEAN and East Asia (Phan et al., 2019; Ilyas et al., 2021).

Effect of ESG on Investment Policy

The results indicate that ESG performance has a positive but statistically insignificant effect on the investment policies of energy companies in ASEAN and East Asian countries. Model 3 produces an L_ESG coefficient of 0.0002 (z = 0.90; p = 0.369), and the full model produces a coefficient of 0.0003 (z = 1.07; p = 0.286). The positive sign is consistent with theoretical predictions drawn from *stakeholder theory* and *signaling theory*, but the coefficient is not statistically significant in any specification. Hypothesis 3 is therefore not empirically supported. This finding does not align with the expectation, based on Friede et al. (2015), Albuquerque et al. (2020), and Bolton and Kacperczyk (2021), that stronger ESG performance translates into greater investment flexibility.

Several explanations may account for this. First, an improvement in ESG scores does not necessarily translate directly into real capital allocation decisions; better sustainability disclosure may first affect reputation, cost of capital, or access to financing before influencing investment volume. Liu et al. (2025) similarly associate ESG performance with corporate resilience rather than with investment volume as such, and Cai et al. (2025) find that ESG initiatives improve investment efficiency among Chinese energy firms, suggesting that the relevant channel may concern the quality rather than the quantity of investment. Second, amid energy transition pressures, firms with high ESG scores may in fact restrain investment in conventional fossil fuel assets, while investment in renewables is not yet fully captured by a capital expenditure measure still dominated by conventional outlays; these two opposing effects may offset one another, driving the ESG coefficient toward zero.

Third, the use of an aggregate ESG score risks conflating dimensions that are financially material for the energy sector with those that are not. Khan et al. (2016) show that only industry-specific material sustainability issues correlate with corporate performance, so aggregation may weaken the detection of any ESG effect. Fourth, the limited availability of ESG data yields a common subsample of 260 firm-year observations and raises the possibility of selection bias, since firms that report ESG data tend to differ in character from the wider population.

These results are consistent with a literature showing that the influence of ESG on investment decisions is contextual rather than universal. Park and Jang (2021) find that the relevance of ESG criteria to institutional investors' decisions depends heavily on country-specific institutional characteristics, so the weight of each ESG dimension is not uniform across contexts. Singhania et al. (2024) likewise demonstrate that ESG regulatory frameworks differ substantially between developed and developing nations, while Tlaty et al. (2024) note that the effect of ESG ratings on energy sector investment fluctuates and is more pronounced during periods of high uncertainty. Within the Asian regional context, the effectiveness of ESG also faces challenges arising from relatively short-term investor preferences, which may cause ESG implementation to be perceived as an additional cost burden (Garefalakis et al., 2026). Structural features of the ASEAN and East Asian energy sectors, including reliance on state-linked financing, less mature ESG disclosure regimes outside Japan and South Korea, and long capital-intensive investment cycles, plausibly explain why a direct ESG–investment link is not yet detectable in this region.

CONCLUSION

This study analyzed the effects of world oil price uncertainty, financial market fluctuations, and Environmental, Social, and Governance (ESG) performance on the investment policies of energy companies in the ASEAN region, Japan, China, and South Korea. Based on the analysis, oil price uncertainty has a negative and statistically significant effect on investment policy, both when estimated separately (coefficient = −0.1602, p = 0.009) and in the full model (coefficient = −0.1464, p = 0.025). Hypothesis 1 is therefore supported. This finding confirms that when oil price uncertainty rises, energy companies tend to withhold or reduce their capital expenditure in the following period, consistent with the logic of *real options theory*.

Financial market fluctuations negatively affect investment policy only when tested in isolation (coefficient = −1.2011, p = 0.035); the effect does not persist once oil price uncertainty is controlled for in the full model (coefficient = −0.2546, p = 0.679). Hypothesis 2 is therefore supported only partially. This indicates that financial market fluctuations and oil price uncertainty tend to co-move, so that the effect of financial markets cannot be identified separately from oil price uncertainty in this sample. Risk originating from the commodity market appears to be the more dominant channel of uncertainty than aggregate stock market volatility.

ESG performance does not significantly affect investment policy, although the sign of its coefficient is positive as predicted (full model: coefficient = 0.0003, p = 0.286). Hypothesis 3 is therefore not supported. Within the sample and observation period, higher ESG scores have not translated directly into higher capital expenditure intensity. The influence of ESG may instead operate through other channels, such as reputation, cost of capital, or access to financing, which are not yet reflected in investment volume still dominated by conventional capital expenditure. Overall, of the three determinants tested, only oil price uncertainty is evidenced as a significant driver of energy companies' investment policies in ASEAN and East Asia.

This study contributes to the literature on energy economics and corporate finance by integrating oil price uncertainty, financial market fluctuations, and ESG performance into a single analytical framework, and by extending empirical evidence to the ASEAN and East Asian energy sectors, which remain relatively underexamined. The study also demonstrates the importance of distinguishing between sources of external uncertainty: industry-specific uncertainty (oil prices) is more relevant to energy investment decisions than general financial market uncertainty.

Several limitations should be noted. The availability of ESG data is uneven across sample countries, restricting the common sample to 260 firm-year observations and raising the possibility of selection bias. The oil price uncertainty proxy is global, with a single value per year, so its variation is purely temporal and cannot capture differences in firm-level exposure. The dependent variable does not distinguish between conventional and green capital expenditure, which may obscure the effect of ESG on the composition rather than the volume of investment. Future research is therefore encouraged to expand country and period coverage, separate conventional from green investment, test indirect channels of ESG influence such as cost of capital and investment efficiency, and examine whether ESG moderates the effect of external uncertainty on investment.

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AUTHOR CONTRIBUTION STATEMENT

All authors contributed to the conception and design of the study. Author 1 was responsible for data curation, formal analysis, and drafting the original manuscript. Author 2 contributed to the methodology, supervision, and critical revision of the manuscript for important intellectual content. All authors read, revised, and approved the final version of the manuscript in accordance with the CRediT (Contributor Roles Taxonomy) framework

REFERENCES

Aivazian, V. A., Ge, Y., & Qiu, J. (2005). The impact of leverage on firm investment: Canadian evidence. *Journal of Corporate Finance*, *11*(1–2), 277–291. https://doi.org/10.1016/S0929-1199(03)00062-2

Akron, S., Demir, E., Díez-Esteban, J. M., & García-Gómez, C. D. (2022). How does uncertainty affect corporate investment inefficiency? Evidence from Europe. *Research in International Business and Finance*, *62*, 101752. https://doi.org/10.1016/j.ribaf.2022.101752

Albuquerque, R., Koskinen, Y., Yang, S., & Zhang, C. (2020). Resiliency of environmental and social stocks: An analysis of the exogenous COVID-19 market crash. *The Review of Corporate Finance Studies*, *9*(3), 593–621. https://doi.org/10.1093/rcfs/cfaa011

Antonakakis, N., Chatziantoniou, I., & Filis, G. (2017). Oil shocks and stock markets: Dynamic connectedness under the prism of economic policy uncertainty. *Energy Economics*, *65*, 492–520. https://doi.org/10.1016/j.eneco.2017.05.028

Baltagi, B. H. (2021). *Econometric analysis of panel data* (6th ed.). Springer.

Baumeister, C., & Kilian, L. (2016). Understanding the Decline in the Price of Oil since June 2014. *Journal of the Association of Environmental and Resource Economists*, *3*(1), 131–158. https://doi.org/10.1086/684160

Belcaid, K. (2024). Morocco's green shield: ESG stock performance under global climate, economic, geopolitical and oil uncertainties. *Sustainable Futures*, *8*, 100250. https://doi.org/10.1016/j.sftr.2024.100250

Bernanke, B. S. (1983). Irreversibility, uncertainty, and cyclical investment. *The Quarterly Journal of Economics*, *98*(1), 85–106. https://doi.org/10.2307/1885568

Bolton, P., & Kacperczyk, M. (2021). Do investors care about carbon risk? *Journal of Financial Economics*, *142*(2), 517–549. https://doi.org/10.1016/j.jfineco.2021.05.008

Cai, Y., Xiao, X., & Hu, Y. (2025). ESG initiatives and investment efficiency in energy industries: the moderating role of regulation. *Finance Research Letters*, 108371. https://doi.org/10.1016/j.frl.2025.108371

Cao, H., Guo, L., & Zhang, L. (2020). Does oil price uncertainty affect renewable energy firms' investment? Evidence from listed firms in China. *Finance Research Letters*, *33*, 101205. https://doi.org/10.1016/j.frl.2019.06.003

Chen, Y., Dong, S., Qian, S., & Chung, K. (2024). Impact of oil price volatility and economic policy uncertainty on business investment: Insights from the energy sector. *Heliyon*, *10*(3), e26533. https://doi.org/10.1016/j.heliyon.2024.e26533

Cook, M. (2021). Trends in global energy supply and demand. In *Developments in petroleum science* (Vol. 71, pp. 15–42). Elsevier. https://doi.org/10.1016/B978-0-12-821190-8.00002-2

Dixit, A. K., & Pindyck, R. S. (1994). *Investment under uncertainty*. Princeton university press.

Fazzari, S. M., Hubbard, R. G., & Petersen, B. C. (1988). Financing constraints and corporate investment. *Brookings Papers on Economic Activity*, *1988*(1), 141–195. https://doi.org/10.2307/2534426

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, *5*(4), 210–233. https://doi.org/10.1080/20430795.2015.1118917

Garefalakis, A., Stratidaki, F., Angelaki, E., Antonaki, D., & Papademetriou, C. (2026). Governance and financial outcomes of ESG implementation in tourism enterprises: A case study from Greece. *International Journal of Financial Studies*, *14*(3), 61. https://doi.org/10.3390/ijfs14030061

Gilchrist, S., Sim, J. W., & Zakrajšek, E. (2014). *Uncertainty, financial frictions, and investment dynamics*. National Bureau of Economic Research.

Guo, X. (2019). Oil price uncertainty and firm investment. *Energy Economics*, *78*, 266–277. https://doi.org/10.1016/j.eneco.2018.11.015

Hanieh, A. (2021). COVID-19 and global oil markets. *Canadian Journal of Development Studies/Revue Canadienne d'études Du Développement*, *42*(1–2), 101–108. https://doi.org/10.1080/02255189.2020.1821614

Henriques, I., & Sadorsky, P. (2008). Oil prices and the stock prices of alternative energy companies. *Energy Economics*, *30*(3), 998–1010.

https://doi.org/10.1016/j.eneco.2007.11.001
Ilyas, M., Khan, A., Nadeem, M., & Suleman, M. T. (2021). Economic policy uncertainty, oil price shocks and corporate investment: Evidence from the oil industry. *Energy Economics*, *97*, 105193. https://doi.org/10.1016/j.eneco.2021.105193
Kellogg, R. (2014). The effect of uncertainty on investment: Evidence from Texas oil drilling. *American Economic Review*, *104*(6), 1698–1734. https://doi.org/10.1257/aer.104.6.1698
Khan, M., Serafeim, G., & Yoon, A. (2016). Corporate sustainability: First evidence on materiality. *The Accounting Review*, *91*(6), 1697–1724. https://doi.org/10.2308/accr-51383
Liu, H., Fan, W., & Li, C. (2025). From ESG Performance to Corporate Resilience: Evidence from China's Manufacturing Industry. *Sustainability*, *17*(21), 9672. https://doi.org/10.3390/su17219672
McDonald, R., & Siegel, D. (1986). The value of waiting to invest. *The Quarterly Journal of Economics*, *101*(4), 707–727. https://doi.org/10.2307/1884175
Mohn, K., & Misund, B. (2009). Investment and uncertainty in the international oil and gas industry. *Energy Economics*, *31*(2), 240–248. https://doi.org/10.1016/j.eneco.2008.09.001
Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, *13*(2), 187–221. https://doi.org/10.1016/0304-405X(84)90023-0
Park, S. R., & Jang, J. Y. (2021). The impact of ESG management on investment decision: Institutional investors' perceptions of country-specific ESG criteria. *International Journal of Financial Studies*, *9*(3), 48. https://doi.org/10.3390/ijfs9030048
Patidar, A. K., Jain, P., Dhasmana, P., & Choudhury, T. (2024). Impact of global events on crude oil economy: a comprehensive review of the geopolitics of energy and economic polarization. *GeoJournal*, *89*(2), 50. https://doi.org/10.1007/s10708-024-11054-1
Phan, D. H. B., Tran, V. T., & Nguyen, D. T. (2019). Crude oil price uncertainty and corporate investment: New global evidence. *Energy Economics*, *77*, 54-65. https://doi.org/10.1016/j.eneco.2018.08.016
Pindyck, R. S. (1990). *Irreversibility, uncertainty, and investment*. National Bureau of Economic Research Cambridge, Mass., USA.
Rong, G., & Qamruzzaman, M. (2022). Symmetric and asymmetric nexus between economic policy uncertainty, oil price, and renewable energy consumption in the United States, China, India, Japan, and South Korea: Does technological innovation influence? *Frontiers in Energy Research*, *10*, 973557. https://doi.org/10.3389/fenrg.2022.973557
Sadorsky, P. (1999). Oil price shocks and stock market activity. *Energy Economics*, *21*(5), 449–469. https://doi.org/10.1016/S0140-9883%2899%2900020-1
Singhania, M., Saini, N., Shri, C., & Bhatia, S. (2024). Cross-country comparative trend analysis in ESG regulatory framework across developed and developing nations. *Management of Environmental Quality: An International Journal*, *35*(1), 61–100. https://doi.org/10.1108/MEQ-02-2023-0056
Sun, Z., Cai, X., & Huang, W.-C. (2022). The impact of oil price fluctuations on consumption, output, and investment in China's industrial sectors. *Energies*, *15*(9), 3411. https://doi.org/10.3390/en15093411
Tlaty, M., El Idrissi, E. M., Nakhcha, M., & Ouahi, Y. (2024). The impact of ESG ratings on investment decisions in the energy sector during uncertain times. *European Scientific Journal*, *20*(28), 165. https://doi.org/10.19044/esj.2024.v20n28p165
Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data* (2nd ed.). MIT Press.
Zhan, Y. (2024). International oil price uncertainty and enterprise investment efficiency: An empirical research of listed companies in China. *PLOS ONE*, *19*(10), e0299084. https://doi.org/10.1371/journal.pone.0299084
Zhang, C., Farooq, U., Jamali, D., & Alam, M. M. (2024). The role of ESG performance in the nexus between economic policy uncertainty and corporate investment. *Research in International Business and Finance*, *70*, 102358. https://doi.org/10.1016/j.ribaf.2024.102358