

THE EFFECT OF THIN CAPITALIZATION AND TUNNELING INCENTIVES ON TAX AVOIDANCE THROUGH TRANSFER PRICING PRACTICES

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Abstract

Tax avoidance remains a critical issue in Indonesia's taxation system, as it potentially undermines government revenue. This study examines the effect of thin capitalization and tunneling incentives on tax avoidance, with transfer pricing serving as an intervening variable. The research focuses on energy sector companies listed on the Indonesia Stock Exchange (IDX) during the 2019–2023 period. Using a quantitative approach, this study applies purposive sampling and obtains 265 firm-year observations. Data were analyzed using STATA version 19 through regression and mediation analysis to test the proposed hypotheses. The empirical results indicate that thin capitalization has a significant positive effect on tax avoidance, suggesting that higher debt reliance is associated with greater tax aggressiveness. Tunneling incentives are also found to significantly influence tax avoidance, reflecting the role of controlling shareholders in shifting profits. Furthermore, the mediation analysis reveals that transfer pricing partially mediates the relationship between thin capitalization and tax avoidance, as well as between tunneling incentives and tax avoidance. These findings highlight the importance of transfer pricing practices as a mechanism through which aggressive tax planning strategies are implemented. This study contributes to the literature on corporate taxation by providing empirical evidence from the energy sector in an emerging market context and offers insights for regulators in strengthening tax supervision and transfer pricing regulations.

Keywords: Thin Capitalization, Tunneling Incentive, Transfer Pricing, Tax Avoidance, Energy Sector

1. Introduction

Taxation is a prior source of state revenue that supports public welfare and national development across various sectors (Sudirman & Mahwiyah, 2024). In Indonesia, the self-assessment system allows taxpayers to independently calculate and report their tax obligations, which creates opportunities for tax planning practices such as tax avoidance efforts to minimize tax liabilities within legal boundaries (Desmon & Hairudin, 2020). Under Law Number 1 of 2022, although state revenue also derives from non-tax income and grants, taxation remains the primary contributor to national income.

Table 1. State Revenue for 2020–2024

Description	(in trillions of rupiah)				
	2020	2021	2022	2023	2024
Domestic Income	1,629.00	2,006.30	2,630.10	2,634.10	2,801.90
I. Tax Revenue	1,285.10	1,547.80	2,034.60	2,118.30	2,309.90
Tax Revenue	1,072.10	1,278.60	1,716.80	1,818.20	1,988.90
Customs and Excise	213	269.2	317.8	300.1	321
II. Non-Tax State Revenue	343.8	458.5	595.6	515.8	492

Description	2020	2021	2022	2023	2024
Grants	18.8	5	5.7	0.4	0.4
Total State Revenue	1,647.80	2,011.30	2,635.80	2,634.50	2,802.30

Source: Processed from the Directorate General of Taxes Performance Report, 2026

Based on Table 1, Indonesia's state revenue during the 2020–2024 period shows a clear upward trend. Total state revenue increased from IDR 1,647.8 trillion in 2020 to IDR 2,802.3 trillion in the 2024 State Budget. This growth was primarily driven by a significant rise in domestic revenue, which expanded from IDR 1,629.0 trillion in 2020 to IDR 2,801.9 trillion in 2024, with tax revenue as the main contributor. Tax revenue increased substantially from IDR 1,072.1 trillion in 2020 to IDR 1,988.9 trillion in 2024, while customs and excise revenue also rose from IDR 213.0 trillion to IDR 321.0 trillion, despite a slight decline in 2023. In addition, non-tax state revenue (PNBP) contributed to overall revenue, although it fluctuated over the period, increasing from IDR 343.8 trillion in 2020 to a peak of IDR 595.6 trillion in 2022 before declining to IDR 492.0 trillion in the 2024 budget. Grants, which represent the smallest component of state revenue, experienced a sharp decrease from IDR 18.8 trillion in 2020 to only IDR 0.4 trillion in the 2024 State Budget.

Tax avoidance poses a serious challenge to Indonesia's taxation system due to its substantial impact on state revenue. In 2020, Indonesia suffered potential tax losses of US\$4.785 billion (approximately IDR 69.34 trillion), ranking fourth highest in Asia, while global tax avoidance causes annual losses of about US\$427 billion, largely driven by transfer pricing practices of multinational enterprises. This issue is particularly concerning amid efforts to improve tax compliance, as transfer pricing often combined with thin capitalization and tunneling incentives serves as a key mechanism for profit shifting and is closely linked to the Base Erosion and Profit Shifting (BEPS) phenomenon.

The OECD and G20 have introduced global initiatives, including Pillar One and Pillar Two, to curb BEPS practices; however, their effectiveness in Indonesia remains limited due to weaknesses in domestic regulation and international cooperation. The Directorate General of Taxes reports that only 8.92% of potential tax losses from avoidance have been detected, indicating significant regulatory gaps. These challenges are reflected in cases such as the alleged transfer pricing by PT Adaro Energy Tbk through its Singapore affiliate, involving an estimated tax loss of USD 125 million, and the KPK's findings of illegal nickel ore exports to China between 2020 and 2022, which caused state losses of up to IDR 14.5 trillion due to price manipulation and monitoring weaknesses, despite the implementation of the Simbara system (Suryani & Associate, 2023).

From a theoretical perspective, thin capitalization is a major driver of tax avoidance, as firms rely excessively on debt relative to equity, thereby increasing interest expenses that reduce taxable income (Curry & Fikri, 2023; Lucky & Murtanto, 2022). This strategy is common among multinational corporations with extensive cross-border affiliates (Waluyo & Doktoralina, 2018), given that financing choices whether through debt or equity carry significant tax implications (Sari et al., 2021). Indonesian tax regulations permit interest expense deductions, making debt financing more attractive than equity financing (Ayuningtyas & Pratiwi, 2022; Sari et al., 2021; Togatorop & Tambunan, 2020), as governed by Directorate General of Taxes Regulation No. PER-25/PJ/2017. However, empirical findings remain mixed, with several studies reporting a significant effect of thin capitalization on tax avoidance (Nadhifah & Arif, 2020; Pratiwi & Ratnasari, 2019; Sueb, 2020), while others find no significant relationship (Anggraini & Trisnawati, 2025; Kurniawati & Mukti, 2023; Pangestu et al., 2024).

Another important determinant of tax avoidance is tunneling incentive, which refers to actions taken by controlling shareholders to transfer corporate assets or profits for personal benefit, often at the expense of minority shareholders (Ayshinta et al., 2019; Herlina & Murniati, 2023; Puspita & Gunadi, 2025). Such practices are frequently implemented through non arm's length transfer pricing transactions that shift profits to low tax jurisdictions (Sa'diah & Afriyenti, 2021; Wahyudi & Fitriah, 2021). Empirical findings on tunneling incentive also vary. Research (Nokiyanti & Ernawati, 2023; Rahayu & Handayani, 2023; Ratnandari & Achyani, 2023) find a significant effect on tax avoidance, while (Imaniah, 2023; Waluyo et al., 2023) report insignificant results.

Transfer pricing refers to a strategy through which firms exploit differences in tax regulations across jurisdictions via related-party transactions to obtain fiscal benefits (Utami & Irawan, 2022), driven by tax avoidance motives and opportunistic profit shifting (Aryati & Harahap, 2021). It is a critical concern for tax authorities because it determines the allocation of taxing rights over multinational profits. In this study, transfer pricing is treated as an intervening variable, as it represents the main mechanism through which thin capitalization and tunneling incentives affect tax avoidance, particularly through interest expense allocation and profit transfers within affiliated entities. Empirical evidence on its impact remains mixed, with some studies confirming its effect on tax avoidance (Arlita & Meihera, 2024; Juliana & Stiawan, 2022; Sianturi & Sanulika, 2023), while others report no significant relationship (Arlita & Meihera, 2024; Sianturi & Sanulika, 2023), underscoring the need for further investigation.

The persistence of tax avoidance practices in Indonesia, despite ongoing regulatory reforms and international initiatives, motivates this study. The limited detection of potential tax losses and the inconsistent empirical findings regarding the effects of thin capitalization, tunneling incentive, and transfer pricing indicate unresolved research gaps. Most prior studies focus on direct relationships and overlook the role of transfer pricing as a mechanism through which aggressive tax strategies are implemented, particularly in sectors with intensive cross-border transactions such as the energy sector. This study seeks to address these gaps by providing a more comprehensive explanation of corporate tax avoidance behavior in Indonesia.

This study offers novelty by incorporating transfer pricing as an intervening variable that explains how thin capitalization and tunneling incentive influence tax avoidance, moving beyond conventional direct effect models. By focusing on energy sector companies listed on the Indonesia Stock Exchange and employing recent data that reflect post-regulatory reforms, this research provides updated and sector-specific evidence. The integrated analytical framework adopted in this study contributes to resolving inconsistencies in prior findings and offers practical insights for policymakers in strengthening tax avoidance prevention strategies.

2. Theoretical Background

2.1 Agency Theory

Agency theory, widely introduced by Meckling & Jensen, (1976), explains the relationship between principals (shareholders) and agents (management) in which decision-making authority is delegated to managers to operate the firm. Conflicts arise because agents and principals often have different interests, leading to information asymmetry and agency costs, as managers possess more detailed knowledge about the firm's financial and non financial conditions (Eisenhardt, 1989). In the context of tax avoidance, agency theory suggests that managers may pursue strategies that benefit

themselves but are not fully aligned with shareholder interests or tax compliance. Such strategies include thin capitalization, where firms rely heavily on debt to reduce taxable income through interest deductions, and tunneling incentives, whereby controlling shareholders shift profits within a business group to entities with lower tax burdens. Transfer pricing frequently serves as the main mechanism facilitating these practices, acting as an intervening variable that links thin capitalization and tunneling incentives to tax avoidance. Consequently, strong tax regulations and effective monitoring are essential to limit opportunistic behavior and protect minority shareholders and other stakeholders.

2.2 Signalling Theory

Signalling theory, introduced by Spence, (1973), explains how managers, as parties with superior information, convey signals to investors to reduce information asymmetry and reflect the firm's condition and future prospects. In efficient capital markets, credible and timely information disclosed by firms is quickly interpreted by investors and incorporated into stock prices or returns. The theory assumes that management possesses more accurate information than external parties, making signalling an important mechanism to mitigate information asymmetry (Meckling & Jensen, (1976). Within the concept of equilibrium signaling, only firms with good performance are willing and able to send positive signals because the cost of signalling is too high for poorly performing firms. Financial statements therefore serve as key signals for assessing operational stability, tax compliance, and going concern. In relation to thin capitalization, tunneling incentives, and tax avoidance with transfer pricing as an intervening variable, signalling theory suggests that capital structure and tax strategies convey important messages to investors and regulators. While tax efficiency may signal managerial competence, overly aggressive practices can generate negative signals regarding governance and sustainability, potentially undermining investor confidence and long term business continuity (von Deimling et al., 2022).

2.3 The Effect of Thin Capitalization on Tax Avoidance

Thin capitalization is a strategy commonly employed by multinational firms to reduce tax burdens by increasing the proportion of debt relative to equity, thereby generating higher interest expenses that are deductible from taxable income. From an agency theory perspective, this practice reflects potential opportunistic behavior by managers who, due to information asymmetry, have discretion over capital structure decisions and may prioritize short-term performance through tax savings, despite the higher financial risk borne by shareholders, creditors, and the state as an indirect principal. Excessive leverage not only heightens bankruptcy and liquidity risks but also contributes to reduced government tax revenue, extending agency conflicts beyond the firm to tax authorities. From a signalling theory viewpoint, capital structure decisions convey signals to investors regarding a firm's financial risk and governance quality. Aggressive thin capitalization may be perceived as a negative signal, undermining investor confidence and firm value, whereas a prudent and transparent use of debt within regulatory limits can signal managerial efficiency in optimizing financing and tax costs. The interaction between agency problems and signalling effects implies that overly aggressive debt policies may damage market trust, while balanced strategies support sustainability. Empirical evidence supports this relationship, with prior studies (Nadhifah & Arif, 2020; Prastiwi & Ratnasari, 2019; Sueb, 2020) documenting a significant positive

effect of thin capitalization on tax avoidance. Based on this explanation, the following hypothesis can be proposed

H₁: Thin capitalization affects tax avoidance

2.4 The Effect of Tunneling Incentive on Tax Avoidance

Tunneling incentive refers to the transfer of assets or profits by controlling shareholders or management for private benefits, while the costs are borne by minority shareholders (Tarmidi et al., 2023). This practice may occur through related-party transactions, such as selling products below market prices to affiliated firms or exploiting managerial positions despite declining competence (Mineri & Paramitha, 2021). From an agency theory perspective, tunneling arises from conflicts of interest and information asymmetry in firms with concentrated ownership or ultimate ownership structures, where controlling shareholders have incentives to expropriate firm resources. One mechanism that facilitates tunneling is aggressive tax avoidance, as minimizing tax payments allows greater cash flows to be redirected for the benefit of controlling shareholders at the expense of minority owners and the state. According to signalling theory, tax avoidance linked to tunneling sends ambiguous signals to the market. While moderate tax planning may signal efficiency and value maximization, tax avoidance associated with tunneling can be interpreted as a negative signal of weak corporate governance, higher expropriation risk, and lower transparency. Excessively aggressive practices may undermine investor confidence, increase regulatory scrutiny, and threaten corporate sustainability. Integrating agency and signalling theories suggests that tunneling-driven tax avoidance not only affects tax efficiency but also influences governance quality, perceived risk, and going concern. Consistent with this view, empirical studies by (Nokiyanti & Ernawati, 2023; Rahayu & Handayani, 2023; Ratnandari & Achyani, 2023) find that tunneling incentive has a significant effect on tax avoidance. Based on this explanation, the following hypothesis can be proposed

H₂: Tunneling incentive affects tax avoidance

2.5 The Effect of Transfer Pricing on Tax Avoidance

Transfer pricing is a common strategy used by multinational firms to set prices for goods or services exchanged between entities within the same corporate group, enabling profit shifting from high-tax to low-tax jurisdictions and thereby legally reducing tax burdens (Aryati & Harahap, 2021). From an agency theory perspective, managers acting as agents of shareholders have discretion over transfer pricing policies, which may be exploited opportunistically to maximize after-tax profits, especially when managerial incentives emphasize short-term or accounting performance. This can create conflicts of interest between managers, controlling shareholders, minority shareholders, and tax authorities, particularly if transfer pricing is applied aggressively beyond arm's-length principles. Signalling theory suggests that transfer pricing also conveys information externally to investors and stakeholders. When applied transparently and within regulatory limits, it signals effective tax risk management and resource optimization, enhancing market perception of managerial quality and firm value. However, aggressive or opaque practices can be interpreted negatively, indicating weak governance, high tax compliance risk, and potential threats to business sustainability. Under equilibrium signalling, firms must balance tax efficiency with credible information disclosure. Integrating agency and signalling theories, transfer pricing functions both as a tax management mechanism and as a signal reflecting managerial effectiveness, where

success depends on controlling agency conflicts, maintaining transparency, and aligning tax strategies with shareholder and regulatory interests. Empirical studies by (Arlita & Meihera, 2024; Juliana & Stiawan, 2022; Sianturi & Sanulika, 2023) confirm that transfer pricing significantly affects tax avoidance. Based on this explanation, the following hypothesis can be proposed

H₃: Transfer pricing affects tax avoidance

2.6 The Effect of Thin Capitalization on Tax Avoidance Through Transfer Pricing

Thin capitalization refers to a company's financing structure heavily weighted toward debt rather than equity. In taxation, this allows firms especially those with affiliated entities to use interest expenses as deductions to reduce taxable income, indirectly promoting legal but aggressive tax avoidance. Transfer pricing is often used in this scheme, enabling profit shifting to lower-tax jurisdictions and reducing overall group tax liability. From an agency theory perspective, conflicts between owners (principals) and managers (agents) arise due to differing interests and information asymmetry. Managers may exploit high leverage and transfer pricing to maximize after tax profits and short term performance, potentially increasing future tax compliance and legal risks, which can harm owners via reputational damage, penalties, and uncertainty about business sustainability. Signalling theory views financial and tax policies as signals to investors and stakeholders regarding management quality and firm prospects. High leverage can signal confidence in future cash flows and financial capability, positively affecting investor trust and firm value. However, excessive debt combined with manipulative tax avoidance can send negative signals, reflecting weak governance, low financial integrity, and higher regulatory risk. Equilibrium signalling emphasizes balancing tax efficiency and transparency to maintain credible signals and protect investor confidence and going concern. Integrating agency and signalling theories shows that debt policy and tax avoidance affect not only short-term financial performance but also market perception, long-term risk, and corporate sustainability. Firms must balance managerial interests, regulatory compliance, and signal credibility to sustain firm value. Empirical studies by (Fasita et al., 2022; Indrastuti & Apriliawati, 2023; Paulus et al., 2025) confirm that thin capitalization influences tax avoidance through transfer pricing. Based on this explanation, the following hypothesis can be proposed

H₄: Thin capitalization affects tax avoidance through transfer pricing.

2.7 The Effect of Tunneling Incentives on Tax Avoidance Through Transfer Pricing

Tunneling incentive refers to controlling shareholders' motivation to divert company resources for personal gain, often through related party transactions at non market prices. A common method is transfer pricing, where profits are shifted to controlled entities, typically in lower-tax jurisdictions, reducing taxable income and enabling systematic tax avoidance. Agency theory explains tunneling as a structural conflict between controlling and minority shareholders. In concentrated ownership, controlling shareholders have greater power and information access, allowing opportunistic decisions that benefit themselves at the expense of minority shareholders and tax authorities. Transfer pricing serves as an effective mechanism for such profit shifting, strengthening Type II agency problems and affecting tax compliance and state revenue. Signalling theory adds that tunneling via transfer pricing influences the signals sent to investors and regulators. Detected irregularities signal weak corporate governance, low managerial integrity, and high tax risk, damaging reputation and investor confidence.

Undetected, however, misleading signals may present the company as financially healthy while profit is diverted, creating equilibrium signaling issues where market perceptions differ from economic reality. Integrating agency and signalling theories shows that tunneling incentives drive tax avoidance through transfer pricing and affect the credibility of market signals. Exposure of such practices impacts not only taxation but also reputation, investor trust, and long-term sustainability (going concern). Empirical studies (Elfa et al., 2022; Herlina & Murniati, 2023; Maryanti & Munandar, 2024) confirm that tunneling incentives influence transfer pricing. Based on this explanation, the following hypothesis can be proposed

H₅: Tunneling incentives affects tax avoidance through transfer pricing

3. Methods

3.1 Research Design

This study employs a causal research design aimed at examining the cause-and-effect relationships between independent variables and the dependent variable. Specifically, the study investigates how thin capitalization and tunneling incentives, as independent variables, influence tax avoidance, the dependent variable, both directly and indirectly through transfer pricing as a mediating variable. Thin capitalization refers to the practice of financing a company with a high proportion of debt relative to equity, which can reduce taxable income through deductible interest expenses. Tunneling incentive represents controlling shareholders' motivation to divert company resources for personal gain, often through transactions with related parties, potentially impacting tax liabilities. Transfer pricing functions as a mechanism through which both thin capitalization and tunneling incentives affect tax avoidance, allowing companies to shift profits to entities in lower-tax jurisdictions legally. By using this causal framework, the study aims to analyze not only the direct effects of thin capitalization and tunneling incentives on tax avoidance but also the mediating role of transfer pricing in this relationship.

3.2 Measurement Variable

The operational definitions of the research variables are clearly defined to provide a precise understanding of the constructs being examined. The dependent variable in this research is Tax Avoidance (Y), which refers to legally minimizing the company's tax obligations through various strategies, including the use of debt financing and transfer pricing mechanisms. The independent variables are Thin Capitalization (X1) and Tunneling Incentive (X2). Thin capitalization describes a corporate financing structure in which debt levels are disproportionately high compared to equity, allowing the company to deduct interest expenses and reduce taxable income. Tunneling incentive represents the motivation of controlling shareholders or management to divert company resources or profits for personal benefit, often at the expense of minority shareholders. Transfer Pricing (Z) is included as an intervening variable, functioning as the mechanism through which both thin capitalization and tunneling incentive influence tax avoidance by setting transfer prices in related-party transactions to shift profits to jurisdictions with lower tax rates. By clearly defining these variables, the study ensures conceptual clarity and provides a basis for accurate measurement and empirical analysis.

Table 2. Measurement Variable

No	Variable	Proxy	Scale
1	Tax Avoidance	$ETR = \frac{\text{Tax Expense}}{\text{Income Before Tax}}$ Source: (Tarmidi et al., 2023)	Ratio
2	Thin Capitalization	$DER = \frac{\text{Total Debt}}{\text{Total Equity}}$ Sumber: (Sueb, 2020)	Ratio
3	Tunneling Incentive	$TI = \frac{\text{Largest Shareholding Amountsar}}{\text{Total Shares}}$ Sumber: (Maryanti & Munandar, 2024)	Ratio
4	Transfer Pricing	$TP = \frac{\text{Receivable From Related Parties}}{\text{Total Receivable}}$ Sumber: (Paulus et al., 2025)	Ratio

Source: Author, (2026)

3.3 Population and Sample

The population of this study consists of all energy sector companies listed on the Indonesia Stock Exchange (IDX) from 2019 to 2023, selected due to their high reliance on external financing and the potential for related-party transactions relevant to thin capitalization, tunneling incentive, and transfer pricing in tax avoidance. Based on the selection criteria, the initial population included 83 companies, but 2 companies were delisted and 2 did not report financial statements consistently, resulting in 79 eligible companies. Considering the 5-year research period, the total population data consisted of 395 observations, of which 130 were incomplete, leaving 265 usable data points for analysis. The sample was selected using purposive sampling, ensuring that companies consistently listed on the IDX, with complete financial reporting and related-party transactions, were included. This method ensures that the sample accurately represents the population to examine the effects of thin capitalization and tunneling incentive on tax avoidance, with transfer pricing as an intervening variable.

3.4 Data Analysis Method

The data analysis in this study uses panel data regression, which examines relationships across both cross-sectional and time-series dimensions, making it suitable for analyzing companies over multiple years. This method, processed using STATA 19, allows for controlling firm specific effects and capturing temporal variations, providing more reliable estimates than purely cross-sectional or time-series approaches. The analysis begins with data preparation, followed by descriptive statistics, correlation tests, and panel regression to assess the direct effects of thin capitalization and tunneling incentive on tax avoidance, as well as indirect effects through transfer pricing as an intervening variable. Model selection (fixed or random effects) and diagnostic tests for heteroscedasticity and autocorrelation ensure robustness. This approach integrates agency and signaling theory, linking managerial incentives, market signals, and tax avoidance mechanisms within energy sector companies listed on the Indonesia Stock Exchange.

4. Results and Discussion

4.1 Descriptive Statical Analysis

Table 3. Descriptive Analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
Tax Avoidance (Y)	265	0.362	0.797	-9.435	2.189
Thin Capitalization (X1)	265	1.702	13.149	-125.891	152.106
Tunneling Incentive (X2)	265	0.301	3.825	-61.635	1.000
Transfer Pricing (Z)	265	0.273	0.287	0.000	1.000

Source: Data processed with STATA V.19, (2026)

Based on 265 firm-year observations of energy sector companies listed on the Indonesia Stock Exchange, the descriptive statistics indicate substantial heterogeneity across all research variables. Tax avoidance shows a positive mean (0.362) with a relatively high standard deviation (0.797), suggesting that firms generally engage in legally permissible tax minimization strategies, although with considerable variation driven by differences in financial conditions and managerial policies. Thin capitalization records a mean value of 1.702 and an exceptionally large standard deviation of 13.149, reflecting extreme dispersion in leverage structures, which is consistent with the capital-intensive nature of the energy industry and indicates that some firms may employ high debt levels as part of tax planning strategies, while others undergo significant financial restructuring. Tunneling incentive exhibits a mean of 0.301 and a standard deviation of 3.825, highlighting wide disparities in ownership concentration and related-party transactions, and implying varying degrees of potential resource transfers within business groups. Transfer pricing shows a moderate mean of 0.273 with a standard deviation of 0.287, indicating uneven reliance on intra-group transactions across firms, which may serve as an intervening mechanism linking financing and ownership structures to corporate tax avoidance behavior.

4.2 Model Selection Analysis

Table 4. Model Selection

Testing	Prob	Model Selection
Chow Test	0.393	CEM
Langrange Multiplier Test	0.450	CEM

Source: Data processed with STATA V.19, (2026)

Model selection was conducted using the Chow test and the Lagrange Multiplier test to determine the most appropriate panel data estimation model. The Chow test produced a probability value of 0.393, while the Lagrange Multiplier test yielded a probability of 0.450, both of which exceed the 5% significance level. These results indicate the absence of significant individual or random effects across cross-sectional units, leading to the selection of the Common Effect Model (CEM) as the most suitable estimation approach. Accordingly, the empirical analysis in this study is based on the CEM specification.

4.3 Multicollinearity Analysis

Table 5. Multicollinearity Test

	Tax Avoidance (Y)	Thin Capitalization (X1)	Tunneling Incentive (X2)	Transfer Pricing (Z)
Tax Avoidance (Y)	1.000			
Thin Capitalization (X1)	0.018	1.000		
Tunneling Incentive (X2)	0.049	-0.009	1.000	
Transfer Pricing (Z)	-0.075	0.064	0.003	1.000

Source: Data processed with STATA V.19, (2026)

The multicollinearity test was conducted using a correlation matrix among the research variables, as presented in Table 4. The results show that all pairwise correlation coefficients are relatively low, with the highest absolute value well below the commonly accepted threshold of 0.80. Specifically, the correlations between tax avoidance and thin capitalization (0.018), tunneling incentive (0.049), and transfer pricing (-0.075) indicate weak linear relationships among the variables. Similarly, the correlations among the independent and intervening variables are minimal. These findings confirm the absence of multicollinearity issues, suggesting that each variable provides distinct explanatory information and that the regression estimates are unlikely to be biased due to high intercorrelations.

4.4 Heteroscedasticity Analysis

Table 6. Heteroscedasticity Test

Testing	Prob	Information
Breusch-Pagan Test	0.295	Heteroskedastisitas

Source: Data processed with STATA V.19, (2026)

The heteroscedasticity test was performed using the Breusch-Pagan test, as reported in Table 5. The test yields a probability value of 0.295, which exceeds the 5% significance level, indicating that the null hypothesis of homoscedasticity cannot be rejected. This result suggests that the variance of the error terms is constant across observations, and therefore, no heteroscedasticity problem is detected in the regression model. Consequently, the estimated coefficients can be considered efficient and reliable for further statistical inference.

4.5 Hypothesis Analysis

Table 7. Hypothesis Test

Tax Avoidance (Y)	Coefficient	t	P>t	Information
cons	0.444	9.830	0.000	
TC => TA	0.018	2.470	0.014	Accepted
TI => TA	0.252	6.650	0.000	Accepted
TP => TA	-0.058	-2.100	0.036	Accepted

Tax Avoidance (Y)	Coefficient	t	P>t	Information
TP*TC => TA	2.401	3.940	0.000	Accepted
TP*TI => TA	-0.386	-3.530	0.000	Accepted
F-Test		0.000		Simultaneous Effect
R-Square		0.882		Strong

Source: Data processed with STATA V.19, (2026)

The hypothesis testing results indicate that thin capitalization has a positive and significant effect on tax avoidance ($t = 2.470$; $p = 0.014$), supporting the first hypothesis. Tunneling incentive also shows a strong positive effect on tax avoidance ($t = 6.650$; $p < 0.001$), confirming the second hypothesis. Transfer pricing is found to have a significant effect on tax avoidance ($t = -2.100$; $p = 0.036$), thereby supporting the third hypothesis. Furthermore, the mediation analysis reveals that transfer pricing significantly mediates the relationship between thin capitalization and tax avoidance ($t = 3.940$; $p < 0.001$), as well as between tunneling incentive and tax avoidance ($t = -3.530$; $p < 0.001$), leading to the acceptance of the fourth and fifth hypotheses. The overall model is statistically significant, as indicated by an F-test probability of 0.000, demonstrating that thin capitalization, tunneling incentive, transfer pricing, and their interactions jointly influence tax avoidance. The model exhibits strong explanatory power, with an R-squared value of 0.882, indicating that 88.2% of the variation in tax avoidance is explained by the variables included in the model, while the remaining 11.8% is attributable to factors outside the model. This high explanatory capacity suggests that the model is well specified and effectively captures the key determinants of tax avoidance behavior.

4.6 Discussion

The empirical results indicate that thin capitalization has a significant effect on tax avoidance, suggesting that a higher proportion of debt financing particularly related party or non-arm's length debt increases firms incentives to engage in tax avoidance. Debt financing enables firms to utilize interest expenses as tax deductible items, thereby reducing taxable income and positioning capital structure decisions not merely as financial choices but also as fiscal strategies aimed at minimizing tax burdens. From the perspective of agency theory, managers may adopt thin capitalization opportunistically to enhance reported after-tax profits, which can directly benefit them through performance-based incentives, reputational gains, or achievement of evaluation targets, even though excessive leverage may increase financial risk and tax audit exposure for shareholders. This finding implies that tax avoidance is not solely driven by efficiency considerations but is also influenced by agency conflicts inherent in managerial decision-making. In addition, signalling theory suggests that leverage may serve as a signal to external stakeholders, where firms deliberately employing debt-based tax strategies attempt to convey their ability to manage capital structures efficiently and enhance profitability. Consistent with prior studies (Nadhifah & Arif, 2020; Prastiwi & Ratnasari, 2019; Sueb, 2020) the results confirm that thin capitalization constitutes an important mechanism through which firms systematically pursue tax avoidance.

The empirical findings demonstrate that tunneling incentive has a significant effect on tax avoidance, indicating that stronger incentives for controlling shareholders or related parties to extract corporate resources increase firms' propensity to engage in tax avoidance practices. Tunneling incentive reflects the controlling parties' motivation to appropriate private benefits through related party transactions, transfer pricing

arrangements, and cost structuring mechanisms that facilitate systematic profit shifting. In this context, tax avoidance functions as a strategic instrument that reduces fiscal burdens and expands the scope for reallocating profits or assets to affiliated entities. From the perspective of agency theory, this behavior represents a Type II agency conflict between controlling and minority shareholders, where controlling owners exploit their dominance over corporate policies to pursue private benefits at the expense of minority interests. Tax avoidance is therefore employed to maximize the net value of transferred profits by minimizing corporate tax liabilities prior to tunneling activities. Furthermore, signalling theory suggests that tax avoidance driven by tunneling incentives may also be interpreted by certain stakeholders as a positive signal of managerial competence in tax planning and regulatory navigation, particularly by profit-oriented investors who perceive efficient tax management as an indicator of strategic capability. Consistent with prior empirical evidence (Nokiyanti & Ernawati, 2023; Rahayu & Handayani, 2023; Ratnandari & Achyani, 2023), these results confirm that tunneling incentive plays a critical role in shaping corporate tax avoidance behavior.

The empirical results confirm that transfer pricing has a significant effect on tax avoidance, indicating that greater intensity in related-party pricing arrangements increases firms' propensity to engage in tax avoidance. Transfer pricing provides firms with flexibility to shift profits from entities operating in high-tax jurisdictions to those located in lower-tax environments, thereby systematically reducing overall tax liabilities. From an agency theory perspective, this practice reflects agency conflicts arising from information asymmetry, where management, often influenced by controlling shareholders, utilizes transfer pricing to allocate profits in line with group-level interests, potentially at the expense of minority shareholders and host-country tax authorities. Consequently, tax avoidance through transfer pricing is not solely driven by operational efficiency but also by strategic considerations aligned with ownership control. Moreover, signalling theory suggests that effective transfer pricing may convey a positive signal to the market, as firms capable of managing intercompany pricing and cross-jurisdictional tax regulations are perceived as possessing strong tax planning capabilities and fiscal management expertise. For value-oriented investors, such efficiency in minimizing tax burdens may be interpreted as strategic competence that enhances firm profitability. These findings are consistent with prior studies (Arlita & Meihera, 2024; Juliana & Stiawan, 2022; Sianturi & Sanulika, 2023) which document a significant relationship between transfer pricing and corporate tax avoidance.

The empirical results indicate that thin capitalization significantly influences tax avoidance through transfer pricing, suggesting that debt-dominated financing structures not only directly encourage tax avoidance but also indirectly shape firms' decisions to employ transfer pricing as an additional mechanism to reduce tax burdens. High leverage, particularly when sourced from related parties, strengthens incentives to combine interest deductibility with profit shifting through intra-group pricing arrangements, resulting in more aggressive tax avoidance strategies. From an agency theory perspective, this mediating relationship reflects agency conflicts in which management or controlling shareholders exploit complex financing and affiliated transaction structures to pursue private or group level benefits that may not fully align with the interests of minority shareholders or tax authorities. Moreover, signalling theory suggests that the integration of thin capitalization and transfer pricing strategies may convey a positive signal to the market regarding firms' capabilities in tax planning and regulatory navigation, as effective coordination of financing and profit allocation mechanisms demonstrates

managerial competence in fiscal optimization. These findings are consistent with prior studies (Fasita et al., 2022; Indrastuti & Apriliawati, 2023; Paulus et al., 2025) which document the mediating role of transfer pricing in the relationship between thin capitalization and tax avoidance.

The empirical findings demonstrate that tunneling incentive significantly influences tax avoidance through transfer pricing, indicating that stronger motivations of controlling shareholders to extract corporate resources increase firms' reliance on transfer pricing as a mechanism for tax avoidance. Tunneling incentive not only directly encourages the reduction of corporate tax burdens but also intensifies the use of transfer pricing to shift profits to affiliated entities located in lower-tax jurisdictions. From an agency theory perspective, this mediating relationship reflects a Type II agency conflict between controlling and minority shareholders, where controlling owners leverage their authority over related-party transactions to reallocate profits in ways that both minimize taxes and facilitate tunneling activities. Transfer pricing thus serves as an effective intermediary that enables controlling shareholders to appropriate private benefits after tax liabilities are reduced. Furthermore, signalling theory suggests that, despite its opportunistic nature, the strategic use of transfer pricing may be perceived by certain investors as a positive signal of managerial competence in tax planning and group-level financial optimization. Firms that successfully manage transfer pricing within regulatory boundaries may be viewed as possessing strong fiscal expertise and strategic capability. These results are consistent with prior studies (Elfa et al., 2022; Herlina & Murniati, 2023; Maryanti & Munandar, 2024) which document the significant role of transfer pricing in mediating the relationship between tunneling incentive and corporate tax avoidance.

5. Conclusion

Based on the empirical results and discussion, this study concludes that thin capitalization, tunneling incentive, and transfer pricing significantly influence corporate tax avoidance in energy sector firms. Higher reliance on debt financing, particularly related-party debt, increases firms' incentives to engage in tax avoidance. Similarly, stronger tunneling incentives among controlling shareholders intensify tax avoidance behavior, reflecting the role of ownership concentration and resource expropriation motives. Transfer pricing is also found to significantly increase tax avoidance, indicating that intensive related-party pricing arrangements facilitate profit shifting. Furthermore, transfer pricing plays a mediating role in the relationships between thin capitalization and tax avoidance as well as between tunneling incentive and tax avoidance, suggesting that financing and ownership structures indirectly encourage tax avoidance through intra-group profit allocation mechanisms.

The findings of this study underscore the importance of strengthening corporate governance, regulatory oversight, and tax enforcement in mitigating tax avoidance practices. For corporate management, greater transparency and prudence in financing decisions and related-party transactions are essential, particularly in maintaining balanced capital structures and consistently applying the arm's length principle in transfer pricing to reduce tax compliance and fiscal risks. Controlling shareholders are encouraged to prioritize long-term firm value over short-term private benefits by reinforcing internal control mechanisms, audit committees, and board supervision to minimize conflicts of interest and protect minority shareholders. From a regulatory and policy perspective, tax authorities should enhance risk based audits and consistently enforce thin capitalization rules and transfer pricing documentation requirements, especially in capital-intensive

sectors such as energy. In parallel, capital market regulators and policymakers are advised to strengthen disclosure obligations and oversight of related party transactions to improve investor protection and reduce opportunities for profit shifting and value expropriation through tax avoidance.

This study is subject to several limitations. First, the sample is limited to energy sector firms listed on the Indonesia Stock Exchange during the 2019–2023 period, which restricts the generalizability of the findings to other industries or time horizons. Second, the analysis focuses only on thin capitalization, tunneling incentive, and transfer pricing, while other relevant determinants of tax avoidance such as corporate governance quality, profitability, firm size, audit quality, and managerial incentives are not incorporated. Third, the use of quantitative panel regression limits the ability to capture qualitative aspects, including managerial motivations and institutional pressures. Future research is therefore encouraged to expand the sectoral scope, include additional explanatory variables, and apply alternative methodological approaches, such as non-linear models or causal inference techniques, to provide a more comprehensive understanding of corporate tax avoidance behavior.

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