



Debt Financing as a Structural Shield: Capital Intensity, CSR, and Tax Aggressiveness in Indonesian Manufacturing

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Abstract

Tax aggressiveness remains a persistent concern for fiscal authorities and stakeholders, as it directly diminishes public revenue and complicates regulatory compliance. While firm-level attributes such as capital intensity, leverage, and corporate social responsibility (CSR) frequently inform discussions on tax planning, empirical consensus regarding their influence remains elusive, particularly within the Indonesian manufacturing sector. This study investigates the impact of these three determinants on corporate tax aggressiveness among manufacturing entities listed on the Indonesia Stock Exchange (IDX). Utilizing a quantitative framework, we applied panel data regression analysis to a purposive sample of 93 manufacturing firms observed between 2019 and 2024. Our analysis reveals that neither capital intensity nor CSR exerts a statistically significant influence on tax aggressiveness. Conversely, leverage demonstrates a significant negative association with tax aggressive behavior. This inverse relationship suggests that firms maintaining higher debt levels benefit from substantial interest tax shields; these deductible expenses effectively lower taxable income, thereby reducing the firm's overall tax liability. These findings indicate that leverage serves as a primary mechanism for tax management in this context. Rather than pursuing aggressive avoidance strategies, highly leveraged firms appear to prioritize the inherent tax advantages derived from their financing structures. These results offer critical implications for policymakers, investors, and corporate managers navigating the intersection of capital structure decisions and fiscal compliance.

Keywords: Capital Intensity, Leverage, Corporate Social Responsibility, Tax Aggressiveness, Manufacturing Firms

Introduction

Taxes constitute an unavoidable fiscal obligation, representing a substantial drain on corporate cash flows and directly deflating net profitability. This reduction in net income incentivizes corporate executives to deploy strategic mechanisms aimed at minimizing fiscal liabilities. Conversely, the state relies fundamentally on tax yields to underwrite public infrastructure and sustain national development agendas. This divergence in operational priorities creates an inherent conflict of interest between corporate actors and regulatory authorities, frequently manifesting as corporate tax aggressiveness. Within the Indonesian macroeconomic landscape, empirical data from the 2019 to 2024 fiscal periods reveal highly volatile tax revenue trajectories, persisting despite marginal gains in broader corporate tax compliance metrics. This volatility is



particularly acute within the manufacturing sector, where sovereign revenue collection faces persistent headwinds from aggressive state-issued fiscal incentives and structural signals of premature deindustrialization. Consequently, deciphering the determinants of manufacturing tax aggressiveness has acquired heightened urgency for regulatory designers and corporate strategists navigating this shifting fiscal terrain.

Table 1: Realization and Target of State Tax Revenue in 2019-2024

Year	Realization (Rp Trillion)	% Target	Growth (Annual)
2019	1,332.67	84.5%	1.5%
2020	1,072.11	89.4%	-19.6%
2021	1,278.63	104.0%	19.3%
2022	1,716.77	115.6%	34.3%
2023	1,869.23	102.8%	8.9%
2024	1,932.40	97.2%	3.5%

Tax aggressiveness encompasses deliberate corporate maneuvers designed to minimize fiscal liabilities by compressing taxable income. These strategies span a spectrum from legal tax planning (tax avoidance) to non-compliant practices that breach statutory frameworks. Extant literature identifies capital intensity, leverage, and corporate social responsibility (CSR) as primary structural determinants of this phenomenon. Capital intensity involves substantial allocations toward fixed assets, which yield depreciation shields capable of deflating taxable income. Leverage captures a firm's reliance on debt financing, creating tax-deductible interest obligations. Concurrently, CSR initiatives intersect with fiscal liabilities, as specific sustainability-related outlays qualify as deductible expenditures under Indonesian tax statutes.

Despite voluminous research, empirical consensus regarding these determinants remains elusive. For instance, Kogha and Nursyirwan (2021) and Yahya et al. (2022) demonstrated that capital intensity exerts no statistically significant influence on tax aggressiveness, directly contradicting competing empirical evidence. Similarly, while Rahmadi and Suharti (2018) documented a significant relationship between leverage and aggressive tax practices, Apriliana (2022) and Burhanudin and Kodriyah (2023) detected no such nexus. Equivocal outcomes likewise characterize CSR inquiries, with researchers divided between reporting significant impacts and discovering zero empirical association. This lingering empirical dissonance highlights a persistent research gap, demanding rigorous re-examination within the contemporary Indonesian manufacturing sector.

Consequently, this study evaluates the empirical effects of capital intensity, leverage, and CSR on tax aggressiveness among manufacturing enterprises listed on the Indonesia Stock Exchange (IDX). To operationalize this objective, we address three central research questions: (1) To what extent does capital intensity dictate tax aggressiveness? (2) How does leverage drive aggressive corporate tax behavior? (3) What role does CSR play in shaping tax minimization strategies? Governed by these inquiries, this study tests formal hypotheses derived from corporate finance and stakeholder theories.

We adopted a quantitative research design utilizing panel data regression analysis. The sample comprises IDX-listed manufacturing corporations observed across the 2019 to 2024 fiscal years, selected via purposive sampling governed by rigorous inclusion criteria. Secondary data were extracted directly from audited annual reports and financial statements. Hypotheses were empirically validated through static panel data regression estimation techniques.

This inquiry contributes to the corporate taxation literature by delivering updated empirical evidence from an emerging market context. Academically, the insights assist regulatory authorities in tightening tax compliance frameworks, aid institutional investors in evaluating corporate governance quality, and guide corporate executives in calibrating capital structures and tax planning policies.

To formalize the operational variables, tax aggressiveness is defined as the deployment of tax-planning instruments to reduce overall tax liabilities. Capital intensity represents the proportion of non-current fixed assets relative to total corporate assets. Leverage denotes the structural depth of debt financing within the corporate capital architecture. Corporate Social

Responsibility reflects a firm's systemic commitment to triple-bottom-line sustainability through verifiable, responsible business operations.

Structurally, this manuscript is organized into five cohesive chapters. Chapter I establishes the research background, delineates the empirical gap, and outlines the study's objectives and significance. Chapter II synthesizes the theoretical framework and develops the hypotheses. Chapter III details the research methodology, variable operationalization, and model specification. Chapter IV presents the empirical estimations, robust diagnostics, and substantive discussions. Finally, Chapter V synthesizes the conclusions, policy implications, study limitations, and avenues for future inquiry.

According to the Theory of Planned Behavior (TPB), formalized by Ajzen (1991), managerial decisions represent intentional actions shaped by perceived utility and operational opportunities. Firms characterized by high capital intensity maintain expansive fixed-asset portfolios, generating heavy depreciation expenses that shield taxable income. This structural asset configuration creates an operational opportunity, incentivizing management to exploit depreciation as a predictable tax planning mechanism. Thus, higher asset concentrations should theoretically accelerate aggressive tax behavior, a position aligned with Soelitiono and Adi (2022). H1: *Capital intensity exerts a positive and statistically significant effect on tax aggressiveness.*

Under the TPB framework, executives also rationally weigh the structural risks and non-compliance penalties associated with corporate financing choices. Heavily leveraged firms generate substantial interest expenses that serve as legal tax deductions, mechanically suppressing taxable income. Furthermore, extensive debt exposure subjects corporate insiders to heightened monitoring by external creditors, which constrains opportunistic tax behavior. Consequently, leverage is hypothesized to act as a governance check, mitigating tax aggressiveness. This mechanism aligns with the empirical observations of Riswandari and Bagaskara (2020) and Puteri (2024). H2: *Leverage exerts a negative and statistically significant effect on tax aggressiveness.*

Legitimacy Theory posits that corporations constantly seek to secure institutional legitimacy by aligning their operational footprints with societal expectations. CSR disclosures reflect a strategic commitment to these social contracts. Firms with robust CSR profiles actively safeguard their reputational capital, avoiding aggressive tax practices that external stakeholders could interpret as socially irresponsible or extractive. This reputational constraint is supported by Kogha and Nursyirwan (2021). H3: *Corporate Social Responsibility disclosures exert a negative and statistically significant effect on tax aggressiveness.*

TPB expands upon the Theory of Reasoned Action (Fishbein and Ajzen, 1980), asserting that human behavior is driven by behavioral intentions rooted in behavioral attitudes, subjective norms, and perceived behavioral control. Within this analytical framework, corporate decision-makers act rationally, evaluating operational data and pricing the long-term consequences of strategic choices before executing fiscal policies.

This theory offers an excellent lens for evaluating tax aggressiveness, as corporate tax positioning represents a calculated managerial strategy rather than an arbitrary operational output. The intent to pursue aggressive tax minimization is shaped by managerial evaluations of risk-adjusted benefits, regulatory scrutiny, and institutional pressures. TPB explains how executives navigate these trade-offs.

In this study, tax aggressiveness represents the focal behavioral outcome. Leverage maps onto perceived behavioral control; debt financing yields statutory interest shields that expand managerial agency and flexibility within tax planning boundaries. Capital intensity reflects the strategic attitude toward fixed-asset accumulation, creating structural depreciation shields that compress tax liabilities. These financial attributes collectively shape the managerial intentions that drive tax outcomes, showing how firms exploit accounting mechanisms to meet strategic targets.

Legitimacy Theory, adapted from Dowling and Pfeffer (1975) and Gray et al. (1995), assumes that organizations operate under an implied social contract with society. To maintain corporate survival, firms must ensure their actions conform to prevailing ethical norms and institutional

expectations. Legitimacy is maintained only when stakeholders perceive that corporate activities support broader societal welfare.

This framework is highly relevant because corporate tax compliance and CSR are increasingly viewed as benchmarks of corporate citizenship. Modern corporations face scrutiny not just for profitability, but also for their civic contribution through fair-share tax payments. Excessive tax avoidance threatens organizational legitimacy, exposing the firm to severe reputational damage.

CSR serves as the primary operational variable representing institutional legitimacy-seeking behavior. Elevated CSR disclosure signals an alignment with stakeholder interests, which implicitly restrains managers from engaging in aggressive tax non-compliance. Viewed through this lens, socially responsible firms balance fiscal efficiency with ethical accountability, grounding the expected negative relationship between CSR and tax aggressiveness within the IDX manufacturing sector.

Methods

Research Design

We adopted a quantitative, explanatory research design utilizing static panel data analysis to isolate the causal linkages between the structural independent variables and the target dependent construct. This explanatory approach is uniquely suited for this inquiry, as it moves beyond simple association to empirically validate the underlying causal mechanisms driving corporate tax outcomes within the IDX manufacturing cohort.

Data Sources

The study uses secondary data obtained from publicly available sources, including annual reports, financial statements, and sustainability reports of manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2019-2024 period. The research population consists of 226 manufacturing companies listed on the IDX.

Instrument

The primary research instrument is a structured data extraction sheet used to collect financial and non-financial information from corporate reports. The variables are operationalized as follows (Table 2):

Table 2. Operational Definition of Variables

Variable	Measurement
Tax Aggressiveness (Y)	$CETR = \text{Tax Payments} / \text{Income Before Tax}$
Capital Intensity (X1)	$CINT = \text{Total Fixed Assets} / \text{Total Assets}$
Leverage (X2)	$DAR = \text{Total Liabilities} / \text{Total Assets}$
Corporate Social Responsibility (X3)	$CSRI = \text{Number of CSR Items Disclosed} / 91 \text{ Disclosure Items}$

Data Collection and Procedure

The empirical data was compiled via systematic document analysis of audited annual reports, financial statements, and standalone sustainability reports harvested from the official IDX repository and individual corporate websites. To ensure sample homogeneity and data continuity, we enforced a rigorous purposive sampling protocol governed by three strict inclusion parameters. First, the enterprise must maintain its listed status within the manufacturing sector on the IDX throughout the 2019 to 2024 fiscal window. Second, the firm must present uninterrupted financial reporting across the entire six-year observation timeline. Third, the corporation must provide continuous, verifiable CSR disclosures over the identical period. Applying these filters eliminated non-compliant entities, yielding a balanced panel of 93 manufacturing firms. This sampling architecture culminates in 465 distinct firm-year observations available for empirical estimation.

Data Analysis

Data were analyzed using panel data regression analysis. Prior to hypothesis testing, classical assumption tests were conducted to ensure that the regression model met the required statistical assumptions. The regression model used in this study is:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Information:

Y = Tax Aggressiveness

α = Constant

β = Regression Coefficient

X 1 = Capital Intensity

X 2 = Lever

X 3 = Corporate Social Responsibility

e = Interference error

Accuracy, Validity, and Reliability

To guarantee data integrity, we extracted all empirical inputs exclusively from audited financial statements, annual reports, and verified sustainability disclosures retrieved from the official IDX database and corporate publication channels. The operationalization of variables strictly mirrors metrics validated in foundational accounting and taxation literature, thereby safeguarding the construct validity and statistical reliability of the subsequent estimations.

Trustworthiness

This inquiry relies on a quantitative architecture utilizing secondary corporate data, we anchored methodological credibility in objective measurement metrics, explicit sampling parameters, and uniform data-harvesting protocols. Replicating standardized mathematical formulas systematically across the entire cross-sectional panel eliminates investigator bias, thereby reinforcing the operational rigor and diagnostic consistency of the empirical outcomes.

Ethical Review

This study utilizes secondary data that are publicly available and does not involve human participants, confidential information, or experimental interventions. Therefore, formal ethical approval was not required. Nevertheless, the study adhered to academic integrity standards by accurately reporting data sources and research findings.

Findings

Descriptive Statistics

Table 3 presents the descriptive statistics of the study variables, namely Tax Aggressiveness (CETR), Capital Intensity (CINT), Leverage (DAR), and Corporate Social Responsibility (CSRI).

Table 3: Descriptive Statistics

Statistics	Y	X1	X2	X3
Mean	0.1964	0,3804	0,4344	0,2878
Median	0.1980	0,3810	0,4310	0,2860
Maximum	0,7610	0.7810	1.0440	0.7030
Minimum	-0,390	0,0010	0,0020	0,0330
Standard Deviation	0.1983	0,2146	0,2199	0,1475
Tendency	0,2758	-0,045	0,2541	0,5042
Kurtosis	3.7589	1.8844	2.5266	2.8253

Source: *Eviews 12 Output Results*

The descriptive statistics provide an overview of the distribution of the research variables. The results indicate variations in the levels of tax aggressiveness, capital intensity, leverage, and CSR disclosure among manufacturing firms listed on the Indonesia Stock Exchange during the 2019–2024 period. These variations suggest that companies adopt different financial structures and CSR practices, which may influence their tax behavior. The existence of substantial variation in the variables also supports the suitability of panel data regression analysis for examining the relationships among the variables.

Figure 1: Conceptual Illustration of the Research Findings

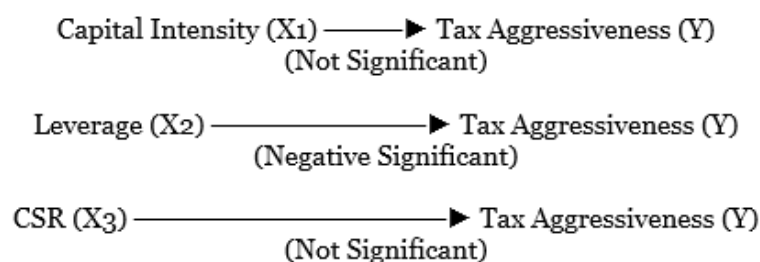


Figure 1 illustrates the relationship between the independent variables and tax aggressiveness. Among the three explanatory variables, only leverage demonstrates a statistically significant relationship with tax aggressiveness.

Panel Data Regression

Table 4 presents the estimation results of the panel data regression model.

Table 4: Fixed Effects Model Regression Results

Variables	Coefficient	Standard Error	T statistics	Probability
C	0,2831	0,0568	4.9859	0,0000
X1	-0,0001	0,0960	-0,0016	0,9987
X2	-0,1741	0,0733	-2.3727	0,0181
X3	-0,0382	0,0726	-0,5270	0,5985

Source: Output Results Eviews 12

The model selection process identified the Fixed Effects Model (FEM) as the most appropriate specification for the data. The estimated regression equation is: $Y = 0.2832 - 0.000155X_1 - 0.174157X_2 - 0.03826X_3$

The regression coefficient for capital intensity (X1) is negative (-0.000155), indicating an inverse relationship with tax aggressiveness. However, the effect is statistically insignificant. Similarly, CSR (X3) has a negative coefficient (-0.03826) but does not significantly influence tax aggressiveness. In contrast, leverage (X2) has a negative coefficient (-0.174157), indicating that higher leverage levels are associated with lower tax aggressiveness.

Multicollinearity Test

Table 5 presents the multicollinearity test results using the Variance Inflation Factor (VIF).

Table 5: Multicollinearity Test

Variables	Coefficient Difference	Not centralized VIF	Centralized VIF
C	8.88005	10.3144	NA
X1	0.000256	5.739312	1.475197
X2	0.000195	5.614938	1.264546
X3	0.000607	7.818758	2.024019

Source: Output Results Eviews 12

The results show that all centered VIF values are below the threshold value of 10. Specifically, capital intensity has a VIF of 1.475, leverage has a VIF of 1.265, and CSR has a VIF of 2.024. These findings indicate that multicollinearity is not a concern in the regression model and that the independent variables provide distinct information.

Hypothesis Testing

Table 6 presents the results of hypothesis testing.

Table 6: Hypothesis Testing Results

Variables	Coefficient	t statistics	Possibility
C	0.2831	4.9859	0.0000
X1	-0.0001	-0.0016	0.9987
X2	-0.1741	-2.3727	0.0181
X3	-0.0382	-0.5270	0.5985
R-squared	0.376981		

Adjusted R-squared	0.230571
F statistic	2.574835
Probability (F statistic)	0.000000

Source: Output Results Eviews 12

The coefficient of capital intensity is -0.0001 with a probability value of 0.9987, which exceeds the significance level of 0.05. Therefore, H1 is rejected, indicating that capital intensity does not significantly affect tax aggressiveness. This finding suggests that investment in fixed assets does not necessarily motivate firms to engage in more aggressive tax planning practices.

The leverage variable has a coefficient of -0.1741 and a probability value of 0.0181, which is below 0.05. Therefore, H2 is accepted. The negative coefficient indicates that firms with higher leverage tend to exhibit lower levels of tax aggressiveness. One possible explanation is that interest expenses generated from debt financing are tax-deductible, thereby reducing taxable income without requiring additional aggressive tax planning strategies.

The CSR variable has a coefficient of -0.0382 with a probability value of 0.5985, indicating that H3 is rejected. The results suggest that CSR disclosure does not significantly influence corporate tax aggressiveness. This finding implies that CSR activities may be driven by legitimacy and stakeholder considerations rather than tax minimization objectives.

Furthermore, the F-statistic probability of 0.0000 indicates that the model is jointly significant. The adjusted R-squared value of 0.2306 suggests that approximately 23.06% of the variation in tax aggressiveness can be explained by capital intensity, leverage, and CSR, while the remaining 76.94% is explained by other factors outside the model.

Discussion

Extant empirical literature thoroughly evaluates capital intensity, leverage, and corporate social responsibility (CSR) as primary structural drivers of corporate tax aggressiveness. Mechanistically, capital intensity yields fiscal advantages through depreciation shields, leverage generates statutory tax deductions via interest expenses, and CSR maps onto corporate legitimacy and ethical stewardship. Nonetheless, empirical consensus across diverse operational environments and industry sectors remains heavily fragmented.

This study unpacks these interconnected dynamics by investigating the impact of capital intensity, leverage, and CSR on tax aggressiveness within the Indonesian manufacturing sector from 2019 to 2024. Our empirical framework models the extent to which these distinct corporate attributes explain systematic variances in aggressive tax behavior among enterprises listed on the Indonesia Stock Exchange (IDX).

The panel estimations reveal that neither capital intensity nor CSR exerts a statistically significant influence on corporate tax aggressiveness. Conversely, leverage exhibits a robust, statistically significant negative relationship with aggressive tax positioning. These outcomes identify corporate debt architecture as the sole empirical anchor among the three tested independent constructs capable of explaining variations in manufacturing tax behavior.

A pivotal insight from this inquiry is the negative trajectory of the leverage coefficient. This inverse relationship indicates that highly leveraged firms pull back from aggressive tax planning instruments. This observation challenges conventional assumptions that corporations uniformly maximize tax minimization across all operational thresholds.

Equally striking is the statistically neutral intersection between CSR disclosures and tax aggressiveness. This null result introduces a conceptual paradox, as sustainability initiatives are traditionally framed as indicators of corporate ethics and normative accountability, attributes theoretically incompatible with extractive tax avoidance.

From a comparative literature perspective, the pronounced influence of leverage corroborates the empirical precedents established by Rahmadi and Suharti (2018). Similarly, the statistically non-significant footprint of capital intensity aligns with the evidence documented by Kogha and Nursyirwan (2021) and Yahya et al. (2022).

Conversely, these results diverge from several empirical baselines. The statistically significant negative path of leverage directly contradicts Apriliana (2022) and Burhanudin and Kodriyah (2023), who reported no empirical relationship. Furthermore, the neutral effect of CSR

stands in tension with Soelitiono and Adi (2022) and Ramadani and Hartiyah (2020), both of whom documented significant behavioral links.

Granular structural mechanisms explain these divergent empirical paths. For capital intensity, the statistical insignificance stems from the fact that Indonesian tax authorities strictly regulate depreciation schedules under statutory law, leaving negligible room for opportunistic accounting manipulation. Fixed-asset accumulation is therefore driven by operational scaling rather than tactical tax avoidance. For leverage, the negative effect operates through dual channels. Legally, debt-servicing costs generate automatic interest tax shields that deflate taxable income, rendering risky, covert tax minimization redundant. Operationally, extensive debt exposure invites rigorous oversight from institutional creditors, actively suppressing managerial opportunism. Regarding the neutral CSR effect, the data indicate that sustainability reporting operates purely as a reputational buffer and stakeholder-relations tool rather than an integrated component of corporate tax strategy.

These conclusions require nuanced boundaries, as our sample isolates IDX-listed manufacturing corporations, limits generalizability to non-manufacturing sectors, and omits foreign regulatory environments. Moreover, corporate tax strategies are driven by complex variables outside this model's scope. Future inquiries should investigate whether internal corporate governance structures, firm profitability, institutional ownership blocks, or idiosyncratic executive characteristics moderate the nexus between financial policy and tax outcomes.

Ultimately, these insights demonstrate that corporate capital structure dominates tax aggressiveness decisions within Indonesian manufacturing, whereas capital intensity and CSR remain peripheral considerations. These findings enrich corporate finance and taxation literature while providing diagnostic coordinates for regulatory bodies, institutional investors, and corporate strategists. Future research should extend the longitudinal observation window, incorporate additional explanatory control variables, conduct cross-sectoral comparisons, and utilize alternative proxies for tax aggressiveness to yield more comprehensive empirical evidence.

Conclusion

This inquiry evaluated the empirical impacts of capital intensity, leverage, and corporate social responsibility (CSR) on tax aggressiveness across manufacturing enterprises listed on the Indonesia Stock Exchange (IDX) throughout the 2019 to 2024 fiscal window.

The empirical estimations demonstrate that neither capital intensity nor CSR exerts a statistically significant influence on corporate tax aggressiveness. Conversely, leverage exhibits a robust, statistically significant negative relationship with aggressive tax behavior. This inverse trajectory indicates that heavily leveraged corporations pull back from aggressive tax planning mechanisms. Legally, substantial debt exposures generate statutory interest expenses that shield taxable income, mechanically deflating corporate tax liabilities and rendering high-risk tax minimization strategies redundant.

These outcomes enrich the corporate taxation literature by injecting updated empirical evidence from an emerging market context. Academically, the insights advance the understanding of how capital architecture and non-financial reporting frameworks intersect with corporate fiscal positioning. Specifically, this study demonstrates that structural debt architecture dominates tax behavior, eclipsing the behavioral footprints of capital intensity and CSR disclosures. Consequently, these contemporary insights help reconcile the empirical dissonance characterizing previous localized inquiries.

Despite these contributions, several institutional boundaries limit the scope of this research. First, the explanatory model isolates only three structural variables. Second, the operationalization of CSR relies strictly on self-reported disclosure indices mapped onto the GRI-G4 framework and SEOJK No. 16/SEOJK.04 guidelines, which may capture symbolic compliance rather than substantive ethical execution. Third, the sample isolates the manufacturing sector, restricting the generalizability of the behavioral paths to non-manufacturing industries or distinct regulatory landscapes. Nevertheless, the undercurrents remain clear: leverage operates as a primary structural anchor of fiscal behavior, whereas capital intensity and CSR remain peripheral considerations within the observed macroeconomic environment.

To advance this research trajectory, future inquiries should integrate comprehensive explanatory covariates, such as firm profitability, internal corporate governance metrics, institutional ownership blocks, firm scale, and idiosyncratic executive characteristics. Extending the longitudinal observation window and executing cross-sectoral comparative analyses will enhance the generalizability of these empirical paths. Future studies should also deploy alternative proxies for tax aggressiveness to verify the diagnostic robustness of these outcomes across different measurement specifications.

From a regulatory standpoint, policymakers must continue tightening monitoring frameworks governing corporate financing choices, specifically targeting debt utilization thresholds given their direct impact on fiscal compliance. Corporate executives must carefully calibrate tax planning policies to ensure continuous alignment with shifting statutory parameters and long-term sustainability goals. Finally, institutional investors should monitor corporate leverage levels as an essential diagnostic indicator when evaluating underlying tax exposures and long-term financial risk.

Ethics approval

This study utilized secondary data obtained from publicly available annual reports, financial statements, and sustainability reports of manufacturing companies listed on the Indonesia Stock Exchange (IDX). The study did not involve human participants, animals, confidential personal data, or experimental interventions. Therefore, ethical approval and informed consent were not required. The study was conducted in accordance with accepted academic research standards and ethical principles.

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Competing interests

All the authors declare that there are no conflicts of interest.

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Underlying data

Derived data supporting the findings of this study are available from the corresponding author on request.

Declaration of artificial intelligence use

This study used artificial intelligence (AI) tools and methodologies in the following capacity:

Manuscript writing support: AI-based language models, such as ChatGPT, were employed to:

- a. Language refinement (improving grammar, sentence structure, and readability of the manuscript).
- b. Technical writing assistance (providing suggestions for structuring technical descriptions more effectively).

We confirm that all AI-assisted processes were critically reviewed by the authors to ensure the integrity and reliability of the results. The final decisions and interpretations presented in this article were solely made by the authors.

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