



Firm Size as A Moderator of The Influence of Leverage, Capital Intensity, And Financial Health on Tax Avoidance in Healthcare Sector Companies

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Article Info:

Article history:

Received: August 03, 2026

Revised: September 07, 2026

Accepted: September 09, 2026

Available Online: September 30,
2026

Keywords:

Capital Intensity; Financial Health;
Firm Size; Leverage; Tax Avoidance



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Abstract

Background: Tax avoidance is proxied by the Cash Effective Tax Rate (CETR), leverage by the Debt to Equity Ratio (DER), capital intensity by the Capital Intensity Ratio (CIR), financial health by the Altman Z-Score modified for non-manufacturing firms, interpreted as a gradation of health among financially sound firms, and firm size by the natural logarithm of total assets.

Objective: This study analyzes the effect of leverage, capital intensity, and financial health on tax avoidance, and tests the moderating role of firm size.

Methods: The population in this study comprises all healthcare-sector firms listed on the Indonesia Stock Exchange over 2020–2024. Using purposive sampling, 14 firms and 70 observations were obtained. Data were analyzed using multiple linear regression and Moderated Regression Analysis (MRA); robustness was tested using robust standard errors.

Results: Results show that leverage and capital intensity have no direct effect on tax avoidance, whereas financial health has a significant positive effect. Firm size significantly moderates the effects of leverage and capital intensity, but not that of financial health. Marginal-effect analysis reveals a crossover pattern: among smaller firms both variables tend to encourage tax compliance, whereas among larger firms both tend to encourage tax avoidance.

Conclusion: This study clarifies the boundary conditions of the Resource-Based View: the resource advantages of large firms operate on strategic decision variables but not on conditions exogenous to the firm.

To cite this article: Olla, N. K., Kumar, A. M., Parawiyati, Sitinjak, N. D., & Sihwahjoeni. (2026). Firm size as a moderator of the influence of leverage, capital intensity, and financial health on tax avoidance in healthcare sector companies. *INKUBIS: Jurnal Ekonomi dan Bisnis*, 8(3), 2550-2562. <https://doi.org/10.59261/inkubis.v8i3.463>

INTRODUCTION

Tax is one of the largest sources of government revenue and plays a crucial role in supporting national development and improving public welfare (Nurisdianto, 2019). Tax revenue realization in 2025 was recorded at IDR 1,917.6 trillion, equivalent to 87.6% of the 2025 State Budget target, a figure reflecting reasonably good fiscal performance, although not yet fully optimal (Ministry of Finance of the Republic of Indonesia, 2026). However, revenue performance measured by target achievement does not reflect adequate fiscal capacity. An indicator that better reflects this capacity is the tax ratio. Based on OECD Revenue Statistics standards, Indonesia's tax ratio to Gross Domestic Product in 2024 was only 11.8%, far below the Asia-Pacific regional

average of 19.7% and the OECD country average of 34.1% (OECD, 2026).

The low tax ratio amidst increasing nominal revenues indicates that the tax base has not grown proportionally with economic activity, making revenue optimization a national fiscal policy priority through the strategy of collecting more (Ministry of Finance of the Republic of Indonesia, 2026). One of the main obstacles in maximizing tax revenue is the practice of tax avoidance undertaken by corporations, including issuers listed on the Indonesia Stock Exchange (IDX). Although classified as legal, this practice has the potential to erode state revenues and is commonly found in developing countries, including Indonesia (Kalbuana et al., 2023).

The healthcare sector provides a unique context for examining tax avoidance because its business characteristics differ from other sectors. The health services sector grew by 8.66% in 2019, surged to 11.56% in 2020, and continued to grow by 10.46% in 2021, the highest growth among all sectors in that year (BPS, 2022). This growth momentum makes the 2020–2024 period relevant for examining the tax behavior of this sector. The substantial investment needs for medical equipment and infrastructure mean that the proportion of fixed assets in healthcare companies is relatively large, so the resulting depreciation expenses have the potential to be utilized as a legal instrument for tax reduction (Damayanti & Sitorus, 2024).

Several internal factors drive tax avoidance practices. Leverage is an important variable because corporations with high debt tend to have large interest expenses that can be used as a tax shield (Modigliani & Miller, 1963). This relationship is substitutive: Xu et al. (2022) show that government-mandated deleveraging increases tax avoidance because the loss of the interest tax shield encourages companies to seek other tax-saving mechanisms. Similar logic applies to capital intensity, where depreciation expenses on fixed assets function as a deduction from taxable income (Damayanti & Sitorus, 2024).

However, these relationships are not consistent in the literature. Susanto and Hanah (2024) found that leverage affects tax avoidance in the pharmaceutical-healthcare sub-sector, but capital intensity was not significant. For financial health, there is a directional contradiction: some studies find that financial pressure encourages tax avoidance to maintain liquidity Dang (2021), while Ariff et al. (2023) found that companies experiencing financial distress are more compliant due to concerns about reputational risk and regulatory sanctions. This uncertainty even extends to the positioning of the variable: Karlinah et al. (2024) treated financial distress as a moderator of the relationship between financial performance (ROA and leverage) and tax avoidance in consumer sector companies on the IDX, but found no significant moderating effect. This contradiction confirms that the relationship between financial health and tax avoidance is not unidirectional, while also leaving the question of whether financial condition is more appropriately positioned as a direct determinant or as a contextual factor.

Firm size is positioned as a moderating variable because it can weaken or strengthen the relationship between independent variables and tax avoidance (Hendayana et al., 2024). Large corporations have better resources and tax planning capabilities, but at the same time face stricter scrutiny from regulators and stakeholders. Although previous research shows the importance of firm size, most only position it as an independent variable, not as a moderator. Even studies that have positioned firm size as a moderator in the IDX context such as Hendayana et al. (2024) on LQ45 companies generally stop at interaction coefficients without tracing the marginal effects of independent variables at various levels of firm size, so the possibility of a reversal in the direction of influence between small and large firms goes undetected. This research contributes by extending moderation analysis through detailed marginal effects examination, which enables detection of potential reversals in effect direction between small and large firms of the relationship between leverage, capital intensity, and financial health on tax avoidance in healthcare sector companies listed on the IDX.

The methodological consequences of this omission are fundamental. If the effect of a variable reverses direction between small and large firms, the two effects will cancel each other out in the aggregate model, so the average coefficient approaches zero and appears insignificant. The absence of a main effect can thus conceal two opposing mechanisms, rather than indicating the irrelevance of the variable. This conjecture also offers an explanation for the inconsistency of findings on leverage and capital intensity in previous literature, which has more often been attributed to sectoral differences or observation periods. This research therefore does not stop at

interaction coefficients but traces marginal effects across the range of firm sizes and formally tests their significance. This study aims to analyze and obtain empirical evidence on the direct influence of the three independent variables on tax avoidance, as well as the moderating role of firm size on each of these relationships. Its contribution is both theoretical and practical: clarifying the boundary conditions of the Resource-Based View in the tax context, while also providing an empirical basis for more targeted tax supervision of large-scale companies with high leverage and capital intensity.

Literature Review and Hypothesis Development

Theoretical Foundation

This research draws on several complementary theories to explain corporate tax decisions. Trade-Off Theory Kraus & Litzenberger (1973) views the optimal capital structure as a balance between the tax shield benefits of debt and the costs of financial distress; these tax benefits stem from Modigliani (1963) correction showing that interest deductions reduce corporate tax burdens, so high leverage has the potential to encourage tax avoidance. Agency Theory explains that financial pressure encourages management to seek cost efficiencies, including through tax avoidance; Empirically, companies facing higher financial constraints tend to pursue more aggressive tax planning strategies, particularly in the IDX context, Mangoting et al. (2023) affirmed the relevance of agency theory in explaining tax avoidance behavior as a strategic management choice. The Resource-Based View Barney (1991) asserts that large firms have more adequate resources to design complex tax strategies, in the form of competent internal tax teams and access to tax consultants. On the other hand, the Political Cost Hypothesis Watts (1986) predicts that large firms tend to choose accounting procedures that defer reported earnings because they are under more intense scrutiny from regulators, the media, and the public.

Hypothesis Development

Leverage and Tax Avoidance

Trade-Off Theory predicts that companies utilize interest expenses as a tax shield to reduce taxable income Modigliani (1963), so companies with high leverage have greater scope to reduce their effective tax burden. The direction of this relationship is not uniform in the literature: Kim and Im (2017) argue that companies with high leverage have already enjoyed savings from interest, so the motive for tax avoidance through other mechanisms actually decreases; a substitutive logic also seen in (Xu et al., 2022). However, in the Indonesian context, Susanto (2024) found that leverage affects tax avoidance in the pharmaceutical-healthcare sub-sector, in line with Trade-Off Theory predictions. Given the similarity of sectoral context and jurisdiction, this study establishes:

H₁: Leverage has a positive effect on tax avoidance.

Capital Intensity and Tax Avoidance

High capital intensity provides tax benefits through depreciation (Gupta & Newberry, 1997; Minnick & Noga, 2010). However, Sadewa (2023) found no significant effect. Given the capital-intensive characteristics of the healthcare sector, this study establishes:

H₂: Capital intensity has a positive effect on tax avoidance.

Financial Health and Tax Avoidance

Agency Theory predicts that financial health is related to tax avoidance, although the direction is still debated: some studies find that distressed companies are more aggressive in avoiding taxes to maintain liquidity (Dang & Tran, 2021); meanwhile, Rego (2012) and Ariff et al. (2023) found the opposite. This debate stems from two mechanisms. First, Edwards et al. (2016) found that companies with increasing financial constraints show lower cash effective tax rates because tax savings become a source of internal funds. Second, the capacity mechanism: complex tax planning requires resources, financial flexibility, and an adequate earnings base, so companies with stronger financial positions have greater scope to optimize their tax burdens. In the IDX context, Lestari et al. (2025) found that financial distress has a significant negative effect on tax avoidance, meaning that companies with healthier financial conditions tend to be more

aggressive. Because the sample in this study is entirely outside the distress zone, the cash-saving mechanism that applies to pressured companies is expected not to be dominant, so the capacity mechanism is more relevant. Based on these considerations, this study establishes:

H₃: Financial health has a positive effect on tax avoidance.

Moderation by Firm Size

The Resource-Based View posits that competitive advantage derives from valuable and difficult-to-imitate resources (Barney, 1991); in the tax context, the tax planning capacity of large firms enables more optimal utilization of tax shields and depreciation benefits. Hendayana et al. (2024) proved that firm size moderates the effect of leverage on tax avoidance in LQ45 companies, while Utomo (2020) found significant moderation on capital intensity, albeit in the opposite direction—an indication that the moderating effect needs to be traced through marginal effects, not merely from the sign of the interaction coefficient. As for financial health, the Political Cost Hypothesis in positive accounting theory predicts that large firms are more politically sensitive and bear greater political costs Watts (1986) so their tax planning incentives are more related to the visibility inherent in scale than to fluctuations in periodic financial conditions. Leverage and capital intensity are decision variables that companies can manage, whereas financial health is a resultant condition, so the resource advantages of large firms have no channel through which to operate on it. Empirically, Julianty et al. (2023) found no moderating effect of firm size on the relationship between financial distress and tax avoidance. Thus, it is established:

H₄: Firm size strengthens the positive effect of leverage on tax avoidance.

H₅: Firm size strengthens the positive effect of capital intensity on tax avoidance.

H₆: Firm size weakens the positive effect of financial health on tax avoidance.

METHOD

This study used a quantitative approach with a panel data design that combines a five-year time series dimension (2020–2024) with a cross-section dimension of healthcare sector companies listed on the IDX. The initial population comprised 37 healthcare sector companies listed on the IDX during that period. The sample was selected using purposive sampling through two screening stages.

The first stage required the availability of complete financial reports throughout 2020–2024. A total of 14 companies did not meet this requirement, mostly because their shares were only listed in the middle of the observation period, so their data series were incomplete. This screening was technical and unrelated to the companies' financial condition, leaving 23 companies eligible for analysis.

The second stage required companies to generate profits in all observation years. A total of 9 companies were eliminated at this stage. This criterion is necessary because the Cash Effective Tax Rate as a proxy for tax avoidance is not well-defined when pre-tax income is negative; the resulting ratio becomes economically meaningless and has the potential to produce extreme values that distort estimates. Similar restrictions are commonly adopted in tax literature using effective ratio-based proxies.

These two stages resulted in 14 companies with 70 observations, or 61% of companies meeting the data availability requirements. A consequence of the second criterion is that all observations fall within the healthy to grey range of the non-manufacturing Altman Z-Score. Therefore, the financial condition variable in this study is treated and interpreted as a gradation of health among generally sound companies, not as a contrast between healthy companies and those in distress. Secondary data were collected from audited annual financial reports published through the official IDX website (www.idx.co.id).

Table 1
Sample Selection Criteria

No	Criteria	Number of Companies
1	Healthcare sector companies listed on IDX for 2020–2024	37
2	Did not have complete financial reports during 2020–2024	(14)
3	Companies with complete data	23

4	Experienced losses in one or more observation years	(9)
5	Sample companies	14
6	Total research observations (14 × 5 years)	70

Source: Data processed, 2026

Table 2

Variable Operationalization

Variable	Type	Proxy	Measurement
Tax avoidance	Dependent	CETR	Cash tax paid : Pre-tax income
Leverage	Independent	DER	Total debt : Total equity
Capital intensity	Independent	CIR	Net fixed assets : Total assets
Financial health	Independent	Altman Z-Score	Modified non-manufacturing Z-Score
Firm size	Moderating	SIZE	Natural logarithm of total assets

Source: Data processed, 2026

The Altman Z-Score in this study is positioned as a measure of the gradation of financial health, not as an indicator of financial distress status. The data distribution obtained, as reported in the descriptive statistics, does not contain observations in the distress zone, so Z-Score variation represents differences in health levels among companies that are all generally sound. Interpretation of findings on this variable is therefore limited to that range and cannot be generalized to companies truly experiencing financial difficulties. The CETR proxy in Table 1 was chosen because it is considered to depict tax avoidance activities more accurately and is easier to interpret than other proxies, as well as reflecting the actual cash paid by companies for taxes (Mangoting et al., 2023). A lower CETR value, closer to zero, indicates a higher level of tax avoidance, so CETR is inversely related to the intensity of tax avoidance.

Data analysis was conducted in stages: descriptive statistics, classical assumption tests (normality, multicollinearity, heteroscedasticity, and autocorrelation), multiple linear regression to test H₁–H₃, and Moderated Regression Analysis (MRA) to test H₄–H₆. All variables forming interaction terms were mean-centered to avoid non-essential multicollinearity. The selection of the panel data model was verified through Chow, Hausman, and Lagrange Multiplier tests. To ensure robust inference, estimates were repeated using a Generalized Linear Model with robust (Huber-White) standard errors. The MRA equation is formulated as follows:

$$CETR = \alpha + \beta_1 DER + \beta_2 CIR + \beta_3 ZSCORE + \beta_4 SIZE + \beta_5 (DER \times SIZE) + \beta_6 (CIR \times SIZE) + \beta_7 (ZSCORE \times SIZE) + \varepsilon$$

RESULTS AND DISCUSSION

Results

Descriptive Statistics

Table 3

Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Dev.
DER	70	0.0958	2.2382	0.4765	0.36399
CIR	70	0.0308	0.7849	0.3559	0.21170
ZSCORE	70	2.1196	14.7061	8.0786	3.77177
SIZE	70	27.0060	31.0130	28.8961	1.03419
CETR	70	0.0430	0.8357	0.2972	0.16062

Source: SPSS Output, 2026

The average DER of 0.4765 indicates relatively moderate debt usage. The average CIR of 0.3559 indicates that approximately 35.59% of company assets are fixed assets. The average Z-Score of 8.0786 falls within the safe zone; even the minimum value (2.1196) is still in the grey zone, so there are no observations classified as being in the distress zone. The average CETR of 0.2972 (29.72%) is above the 22% Corporate Income Tax rate, although 24 out of 70 observations (34%) have CETR below 22%. Z-Score variation is thus more appropriately read as a gradation of

the level of financial health, rather than a contrast between healthy companies and those truly experiencing financial difficulties.

Classical Assumption and Robustness Tests

The Glejser test showed insignificant results overall but suggested potential heteroscedasticity when interpreted simultaneously;

Panel Data Model Selection

Table 4

Panel Data Model Selection Test Results

Test	Comparison	Prob.	Decision
Chow	Common vs Fixed	0.0082	Fixed Effect
Hausman	Fixed vs Random	0.2786	Random Effect
Lagrange Multiplier	Common vs Random	0.1118	Common Effect

Source: Eviews Output, 2026

The three tests yielded apparently different results and therefore need to be interpreted hierarchically. The Chow test ($p = 0.0082$) rejects the null hypothesis of homogeneous intercepts, indicating that the Fixed Effect Model is more appropriate than the Common Effect Model. The Hausman test ($p = 0.2786$) fails to reject the null hypothesis, so there is no evidence of correlation between individual effects and explanatory variables; in this condition, the Random Effect Model is consistent and more efficient than the Fixed Effect Model. The final stage, the Lagrange Multiplier test ($p = 0.1118$), directly tests whether the variance of the individual effect component differs from zero and fails to reject the null hypothesis. Because the variance of individual effects does not differ significantly from zero, the Random Effect Model mathematically reduces to Pooled OLS, so the Common Effect Model was chosen as the final model.

The difference in conclusions between the Chow test and the Lagrange Multiplier test is not an inconsistency, but a consequence of the different hypotheses being tested: the Chow test tests differences in intercepts as fixed parameters, while the Lagrange Multiplier test tests the variance of individual effects as a random component. In samples with a large number of units relative to the time span (14 companies, 5 years), the Chow test tends to be sensitive to between-company heterogeneity, which in this model has been partially absorbed by the SIZE variable and its interaction terms. Substantive considerations also reinforce this choice: SIZE is relatively stable within companies, so most of its information is between-entity variation that is actually removed by the Fixed Effect Model, making the estimation of moderating effects less precise. The selection of the Common Effect Model also avoids the reduction in degrees of freedom by 13 parameters that would occur with the Fixed Effect Model, a relevant consideration given that the MRA model already contains seven predictors across 70 observations. This conclusion simultaneously strengthens the justification for using multiple regression and MRA in testing the main hypotheses.

As a robustness check, the MRA model was re-estimated using the Fixed Effect Model. The direction and significance of the interaction coefficients $DER \times SIZE$ and $CIR \times SIZE$ remained consistent, as did the insignificance of $ZSCORE \times SIZE$, so the research conclusions are not sensitive to the choice of panel data model specification.

Direct Hypothesis Testing (H1–H3)

Table 5

Multiple Regression Analysis Results

Variable	Coef. (β)	t	Sig.	Description
Constant	0.4918	3.644	0.001	Significant
DER	-0.1439	-1.536	0.129	Not significant
CIR	0.0820	0.778	0.440	Not significant
ZSCORE	-0.0192	-2.222	0.030	Significant

Dependent variable: CETR. $N = 70$. $R^2 = 0.128$; Adjusted $R^2 = 0.088$; Omnibus Test: Likelihood Ratio $\chi^2 = 9.561$ ($df = 3$; $p = 0.023$). Estimation using Generalized Linear Model with robust standard errors. Source: SPSS Output, 2026

DER has no significant effect ($p = 0.129$), so H_1 is rejected. The moderate average DER indicates that the healthcare sector does not make extensive use of debt financing, so interest expenses are insufficient as a tax shield; financing decisions are more driven by the need to procure medical equipment. This finding is consistent with Lestari et al. (2025), who likewise found that leverage has no significant effect on tax avoidance. Cross-context evidence from Thayyib (2025) shows that leverage is actually positively associated with effective tax rates among Indian multinational companies, indicating that the interest tax shield does not necessarily reduce tax burdens in developing markets. The convergence of findings across two different sectors and countries strengthens the external validity of the conclusion that the leverage tax shield mechanism does not always work as predicted by Trade-Off Theory.

CIR also has no significant effect ($p = 0.440$), so H_2 is rejected. Fixed asset investment in this sector is mandatory—tied to BPJS Health partnership credentialing standards (Minister of Health Regulation No. 40 of 2022; Presidential Regulation No. 59 of 2024)—so its magnitude is not determined by tax planning. The direction of the finding is aligned with Sadewa (2023), as well as Hendayana et al. (2024), who also found no significant effect of capital intensity on tax avoidance in IDX-listed companies. Similar findings were reported by Susanto (2024) in the pharmaceutical-healthcare sub-sector for the 2018–2022 period, so this consistency persists across sectors and across observation periods.

ZSCORE has a significant negative effect on CETR ($p = 0.030$), meaning that financial health has a positive effect on tax avoidance. Because the direction is consistent with the hypothesis, H_3 is supported. Within a sample range entirely outside the distress zone, companies with higher levels of financial health show more aggressive tax avoidance. This finding indicates that tax planning requires capacity in the form of resources, financial flexibility, and an adequate earnings base, rather than being driven by financial pressure. This interpretation is consistent with Lestari et al. (2025) in the IDX context, which found that financial distress has a negative effect on tax avoidance (so healthier companies are actually more aggressive), and does not contradict Edwards et al. (2016), who found the opposite direction, because the cash-saving mechanism they documented applies to companies facing financial constraints, a condition not represented in this sample. The direction of the finding is also consistent with the capacity logic put forward by Rego (2012), while the opposite direction was reported by Dang (2021) on a sample containing distressed companies. Additional support comes from Karlinah et al. (2024), who found no significant moderating effect of financial distress on the relationship between financial performance and tax avoidance, so financial condition was not proven to alter the effect of profitability or leverage. The absence of this moderating effect is consistent with the rejection of H_6 in this study and supports the interpretation that financial health works as a direct determinant, not as a contextual factor.

Moderation Testing (H_4 – H_6)

Table 6

Moderated Regression Analysis (MRA) Results

Variable	Coef. (β)	t	Sig.	Description
Constant	0.2928	16.043	0.000	Significant
DER	-0.3294	-2.903	0.005	Significant
CIR	0.0055	0.049	0.961	Not significant
ZSCORE	-0.0332	-3.554	0.001	Significant
SIZE	-0.0353	-1.887	0.064	Not significant
DER $\times$ SIZE	-0.2648	-2.179	0.033	Significant
CIR $\times$ SIZE	-0.2601	-2.466	0.016	Significant
ZSCORE $\times$ SIZE	-0.0107	-1.107	0.273	Not significant

Dependent variable: CETR. Source: SPSS Output, 2026

The DER×SIZE interaction term is significant ($p = 0.033$) and in the same direction as the main DER coefficient, so firm size strengthens the effect of leverage on tax avoidance; H_4 is accepted. It should be noted that the main DER coefficient in this model needs to be read carefully because it contains variance shared with Z-Score; the robustness test with orthogonalization (Table 8) shows that the main DER coefficient becomes insignificant, while the DER×SIZE interaction actually strengthens. This moderation finding is consistent with Hendayana et al. (2024), who also found that firm size significantly moderates the effect of leverage on tax avoidance in LQ45 companies (DER×SIZE, $p = 0.009$). It should be noted that the direction of moderation in that study was reported inconsistently (the abstract states strengthening, while the interaction coefficient is negatively signed) so the convergence that can be claimed here is limited to the significance of the moderating role, not its direction. The CIR×SIZE interaction is also significant ($p = 0.016$), so H_5 is accepted, although its interpretation must be read through marginal effects because the main CIR coefficient is not significant. The ZSCORE×SIZE interaction is not significant ($p = 0.273$), so H_6 is rejected. The Adjusted R^2 value increased from 0.088 (multiple regression) to 0.178 (MRA), indicating that the inclusion of moderation improves the explanatory power of the model.

Discussion

Marginal Effect Analysis and Crossover Pattern

Table 7

Marginal Effect Analysis Results

Variable	Firm Size	Marginal Effect	Sig.	Description
DER	Small	0.171	0.363	Not significant
	Average	-0.329	0.005	Significant
	Large	-0.890	0.010	Significant
CIR	Small	0.497	0.008	Significant
	Average	0.006	0.961	Not significant
	Large	-0.545	0.066	Not significant

Small, average, and large firm categories were evaluated at the minimum (SIZE = 27.0060), mean (SIZE = 28.8961), and maximum (SIZE = 31.0130) values of the natural logarithm of total assets, respectively. Significance was tested through linear combinations of coefficients $\beta_1 + \beta_5(\text{SIZE} - \text{SIZE})$ using the LMATRIX procedure. Source: Data processed, 2026

The marginal effects reveal a crossover pattern. For leverage, the effect is positive for small firms (0.171; encouraging compliance) and significantly negative for large firms (-0.890; encouraging tax avoidance). For capital intensity, the effect is significant only for small firms (0.497; encouraging compliance), while the reversal for large firms (-0.545) does not reach significance ($p = 0.066$). Because CETR is inversely related to tax avoidance, a negative marginal effect indicates an increase in tax avoidance.

This pattern explains why DER and CIR appeared to have no effect in the model without moderation: the opposing effects between small and large firms cancel each other out, so the average effect approaches zero. This is the main contribution of this research, the absence of a main effect cannot be immediately concluded as irrelevance. The inconsistency of findings on leverage and capital intensity in previous literature may be caused by the aggregation of groups of companies with opposing behaviors, making moderation analysis crucial and not merely supplementary. The consistency of the pattern across both variables confirms that tax resource capacity functions as a moderating mechanism, as predicted by the Resource-Based View.

The inability of firm size to moderate financial health actually clarifies the mechanism while also marking its boundary conditions. Unlike leverage and capital intensity, which are strategic decision variables that management can optimize, financial health is a condition experienced, not chosen. The resource advantages of large firms thus only manifest on variables that are under management's control, an affirmation of the boundary condition of the Resource-Based View in the tax context.

Robustness Test: Orthogonalization of Financial Health Construct

The correlation matrix among variables shows a very strong correlation between DER and Altman Z-Score ($r = -0.758$; $p < 0.001$). This correlation is not merely a matter of statistical multicollinearity, but indicates construct overlap: one component of the non-manufacturing Altman Z-Score is the ratio of equity book value to total liabilities, which is mathematically the inverse of DER. Regressing ZSCORE on DER confirms this with $R^2 = 0.574$ ($\beta = -7.853$; $p < 0.001$), meaning that 57.4% of the variation in financial health can be explained by leverage alone. This condition has the potential to obscure the interpretation of both DER and ZSCORE coefficients because both contain partially shared information.

To ensure that the findings are not artifacts of this overlap, all models were re-estimated using the financial health component orthogonalized against leverage. The procedure was performed by regressing ZSCORE on DER and saving the unstandardized residuals (ZRES), so that ZRES represents variation in financial health that is entirely independent of capital structure. Verification shows that the correlation between DER and ZRES is 0.000 ($N = 70$), confirming that the shared variance has been completely removed. The allocation of shared variance to DER was based on the consideration that DER is a directly measurable ratio, whereas Z-Score is a derived composite index. The ZRES×SIZE interaction term was consistently re-formed, and estimation remained using robust standard errors.

Table 8

Comparison of VIF Values Before and After Orthogonalization

Variable	VIF Initial Model	VIF Orthogonalized Model
DER	3.408	1.132
CIR	1.460	1.460
ZSCORE / ZRES	3.119	1.328

Source: SPSS Output, 2026

Table 8 shows substantial decreases in VIF for DER (from 3.408 to 1.132) and for the financial health construct (from 3.119 to 1.328), while the CIR VIF does not change because it is not involved in the overlap. The re-estimation results of the MRA model are presented in Table 9.

Table 9

Comparison of MRA Results Before and After Orthogonalization

Variable	Coef. Initial	Sig.	Coef. Orthog.	Sig.
Constant	0.2928	0.000	0.2928	0.000
DER	-0.3294	0.005	-0.0685	0.248
CIR	0.0055	0.961	0.0055	0.963
ZSCORE / ZRES	-0.0332	0.005	-0.0332	<0.001
SIZE	-0.0353	0.064	-0.0353	0.053
DER × SIZE	-0.2648	0.033	-0.1807	<0.001
CIR × SIZE	-0.2601	0.016	-0.2601	0.011
ZSCORE/ZRES × SIZE	-0.0107	0.273	-0.0107	0.213
Adjusted R ²	0.178		0.178	

Dependent variable: CETR. The "Coef. Initial" column is sourced from Table 5. All estimations used robust standard errors. Source: SPSS Output, 2026

All main findings remain. The financial health coefficient does not change at all (-0.0332 ; $p < 0.001$), as does the insignificance of its interaction with firm size, so the conclusions on H_3 and H_6 remain consistent. The CIR×SIZE interaction also remains unchanged. The DER×SIZE interaction actually strengthens after the overlap is removed, from $p = 0.033$ to $p < 0.001$, so the support for H_4 becomes stronger. The Adjusted R^2 value is identical in both specifications because orthogonalization only rotates the predictor space without changing the explanatory power of the model.

A change occurs in the main DER coefficient, which loses significance (from -0.3294 ; $p = 0.005$ to -0.0685 ; $p = 0.248$). This indicates that the direct effect of leverage in the initial

specification largely reflects variance shared with financial health, not the independent effect of leverage itself. This finding actually strengthens the main argument of the research: the effect of leverage on tax avoidance works through the moderating mechanism of firm size, not as a main effect. This result is also consistent with the testing of H_1 in the model without moderation, which also found no direct effect of DER ($p = 0.129$), so the two specifications become aligned. Marginal effect testing on the orthogonalized specification was performed using the LMATRIX procedure at the same evaluation points as in Table 7. The results are presented in Table 10.

Table 10

Marginal Effects on the Orthogonalized Specification

Variable	Firm Size	Marginal Effect	Sig.	Description
DER	Small	0.273	0.022	Significant
	Average	-0.069	0.297	Not significant
	Large	-0.451	0.024	Significant
CIR	Small	0.497	0.008	Significant
	Average	0.006	0.961	Not significant
	Large	-0.545	0.066	Not significant

Evaluation points identical to Table 7. Source: Data processed, 2026

Unlike Table 7, which showed the effect on small firms being positive but not significant (0.171; $p = 0.363$), the orthogonalized specification produces a significant positive effect (0.273; $p = 0.022$) as well as a significant negative effect on large firms (-0.451; $p = 0.024$).

It should be noted that ZRES no longer represents financial health in its entirety, but rather operational financial health after controlling for capital structure. The interpretation of the construct in this specification is therefore narrower, although the consistency of direction and significance with the initial model shows that the research conclusions are not sensitive to the construct overlap.

Robustness Test: Inclusion of Profitability Control Variable

The main model of this research does not include control variables, based on the consideration of maintaining the ratio of observations to parameters. To assess robustness, the model was re-estimated with profitability as a control variable. Profitability was measured using return on assets (ROA), i.e., the ratio of net income to total assets, and was chosen because it is the most consistently reported determinant of tax avoidance in the literature. The control variable was included as a main effect without forming interaction terms, so the moderation testing structure remains unchanged.

The average ROA of the sample was 0.1086 with a standard deviation of 0.0663 and a range of 0.0035 to 0.3099. VIF values after ROA was included remained below the conventional threshold (DER 3.409; CIR 1.491; ZSCORE 3.776; ROA 1.677), so the addition of the control does not create concerning multicollinearity. Nevertheless, ROA correlates quite strongly with the Altman Z-Score ($r = 0.619$), which can be understood because one component of the Z-Score is the ratio of earnings before interest and taxes to total assets. The estimation results are presented in Table 11.

Table 11

MRA Results with and without Profitability Control Variable

Variable	Without Control	Sig.	With ROA	Sig.
Constant	0.2928	<0.001	0.2916	<0.001
DER	-0.3294	0.005	-0.2970	<0.001
CIR	0.0055	0.961	0.0084	0.940
ZSCORE	-0.0332	0.005	-0.0222	0.020
SIZE	-0.0353	0.064	-0.0286	0.138
DER × SIZE	-0.2648	0.033	-0.2226	0.004
CIR × SIZE	-0.2601	0.016	-0.1732	0.103
ZSCORE × SIZE	-0.0107	0.273	-0.0084	0.297

ROA	---	---	-0.7260	0.007
Adjusted R ²	0.178		0.214	

The "Without Control" column is sourced from Table 6.

The inclusion of profitability improves the explanatory power of the model, with Adjusted R² increasing from 0.178 to 0.214, and ROA itself has a significant negative effect on CETR (-0.726 ; $p = 0.007$), meaning that companies with higher profitability tend to be more aggressive in avoiding taxes. Most main findings remain robust. Financial health remains significant, although its coefficient diminishes (-0.022 ; $p = 0.020$ from -0.033 ; $p = 0.005$), so support for H₃ remains intact. The DER×SIZE interaction actually strengthens ($p = 0.004$ from $p = 0.033$) with the same direction, and the crossover pattern for leverage remains visible: the marginal effect is positive for small firms (0.124) and significantly negative for large firms (-0.768). Support for H₄ thus remains, as does the insignificance of the ZSCORE×SIZE interaction ($p = 0.297$), which maintains the conclusion on H₆.

One finding is not robust to this alternative specification. The CIR×SIZE interaction becomes insignificant (-0.173 ; $p = 0.103$ from -0.260 ; $p = 0.016$), so support for H₅ is sensitive to model specification. The crossover pattern for capital intensity, which in the model without controls showed a reversal between small and large firms, is no longer confirmed when profitability is included. Findings on capital intensity therefore need to be read as an initial indication requiring further confirmation. The weakening of this coefficient can be understood given that capital intensity and profitability are both related to the efficiency of asset utilization.

Overall, this robustness test places the research findings in proper proportion. The moderating pattern of firm size on leverage is proven consistent across all specifications tested (the initial model, the model with orthogonalized constructs, the Fixed Effect Model, and the model with the profitability control variable) making it the most reliable finding. The effect of financial health also holds across these specifications. The finding on the moderation of capital intensity, however, requires further confirmation through research with more complete specifications.

CONCLUSION

This study concludes that leverage and capital intensity have no direct effect on tax avoidance, whereas financial health has a significant positive effect, indicating that healthier healthcare companies tend to engage in more aggressive tax avoidance. Firm size consistently moderates the effect of leverage: the marginal effect changes from encouraging tax compliance among smaller firms to encouraging tax avoidance among larger firms, and this crossover pattern remains robust after orthogonalization and the inclusion of profitability as a control variable. Firm size also moderates the effect of capital intensity in the main model, but this result becomes insignificant after profitability is controlled; therefore, support for this moderating effect should be interpreted as preliminary. In contrast, firm size does not moderate the relationship between financial health and tax avoidance. These findings refine the Resource-Based View by showing that the resource advantages of large firms operate more clearly through strategic variables under managerial control, particularly leverage, than through financial conditions. They also demonstrate that an insignificant main effect may conceal opposing effects across firm-size categories. Practically, tax authorities should prioritize risk-based supervision of large firms with high leverage because this group consistently shows the strongest association with the use of interest expenses as a tax avoidance mechanism.

The findings should be interpreted within several limitations. The sample consists of 14 profitable healthcare companies and contains no observations in the financial-distress zone, which restricts the generalizability of the financial-health results. In addition, the Altman Z-Score overlaps mathematically with leverage; although orthogonalization addressed this overlap without changing the main conclusions, it still limits the simultaneous interpretation of both coefficients. The moderation of capital intensity is also sensitive to the inclusion of profitability, while 82.2% of the variation in tax avoidance remains unexplained by the model. Future research should therefore use larger and more diverse samples, include companies experiencing genuine financial distress, and incorporate additional determinants such as transfer pricing, political

connections, corporate governance, and profitability. Replication is especially needed to verify the moderating role of firm size in the relationship between capital intensity and tax avoidance.

ACKNOWLEDGEMENT

The authors express their appreciation to Universitas Merdeka Malang for the academic support provided during the preparation of this research. The authors also acknowledge the Indonesia Stock Exchange and the healthcare sector companies whose publicly available annual financial reports provided the data used in this study.

AUTHOR CONTRIBUTION STATEMENT

Nikolaus Kartono Olla contributed to conceptualization, data collection, formal analysis, and preparation of the original draft. Abdul Malik Kumar and Parawiyati contributed to methodology, interpretation of the results, and supervision. Norman Duma Sitinjak and Sihwahjoeni contributed to validation, critical revision, and editing of the manuscript. All authors reviewed and approved the final version of the manuscript.

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