

The Impact of Debt Ratio on Corporate Profitability: A Study of Small and Medium-Sized Enterprises in Indonesia

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ABSTRACT: This study empirically examines the impact of the debt ratio on corporate profitability among Indonesian small and medium-sized enterprises (SMEs) from 2015 to 2024, with a focus on the underlying mechanisms and boundary conditions. The findings indicate that a higher debt ratio significantly reduces Return on Assets (ROA), suggesting that excessive reliance on debt financing undermines profitability and operational efficiency by amplifying interest burdens and increasing financial risk. Heterogeneity analysis shows that this negative effect is stronger among firms with low growth, low liquidity, and low net worth growth, as well as those in industries without high-leverage business models. Mechanism tests confirm that the interest coverage ratio partially mediates the link between the debt ratio and ROA, validating the transmission channel wherein elevated debt levels weaken interest coverage capacity, which in turn erodes profitability. The findings suggest that Indonesian SMEs should manage debt levels prudently and strengthen internal growth capacity, while policymakers should refine financial-support policies to promote sustainable enterprise development.

KEYWORDS: Debt Ratio; Corporate Profitability; Indonesian SMEs

I. INTRODUCTION

The Indonesian economy is heavily reliant on the development contributions of its small and medium-sized enterprises (SMEs), which supported more than 60% of domestic economic activity (Amatilah et al., 2021). These enterprises serve not only as a critical component for the country's economic stability—demonstrating notable resilience, particularly in times of crisis—but also generate a substantial number of employment opportunities for the domestic labor market. They play a key role in alleviating unemployment pressures and promoting inclusive growth (Diana et al., 2022). Against this background, this paper aimed an in-depth understanding of the mechanisms driving the profitability of SMEs is of significant importance for enhancing their performance and fostering sustainable economic development.

When examining the drivers of SME profitability, the debt ratio, a key metric for assessing capital structure and financial risk, has garnered significant scholarly attention. For instance, research focusing on Indonesian micro and small food-processing enterprises found that the Debt-to-Asset Ratio (DAR) exerts a significant positive impact on profitability, suggesting that moderate debt financing may enhance firm performance (Kamal et al., 2024). This literature further emphasizes that managing the debt ratio requires careful optimization in relation to firm size and industry-specific characteristics. This approach has been shown to balance financial risk control with the strengthening of profit resilience, thereby providing a theoretical foundation for the sustainable growth of SMEs.

As a core indicator of corporate financial health, profitability is subject to the influence of multiple internal and external factors. In emerging markets such as Indonesia, its manifestations are particularly complex and region-specific. Profitability not only reflects an enterprise's efficiency in resource utilization, its cost-control capabilities, and market competitiveness, but is also closely related to its strategic choices, technological innovation, and governance structure (Aprianti et al., 2024). For small- and medium-sized enterprises (SMEs), enhancing profitability necessitates pursuing growth through economies of scale, operational optimization, and technology adoption. However, this pursuit must be balanced with the simultaneous confrontation of challenges such as financing constraints, inadequate managerial capabilities, and external environmental volatility (Budiarto et al., 2022). Consequently, a systematic analysis of the factors affecting profitability is of significant theoretical and practical importance for formulating effective business strategies, optimizing resource allocation, and shaping supportive policies.

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Currently, research on factors influencing the profitability of SMEs remains a topic of discussion. On one hand, sound corporate governance, digital transformation, and innovation capabilities are widely recognized as significant enhancers of profit levels (Prihandono et al., 2024). On the other hand, high debt ratios, intense market competition, and management conflicts during integration processes may also have a negative impact on profitability (Talunohi et al., 2022). Furthermore, external economic policies, industry characteristics, and market structures also substantially influence corporate earnings (Ismanto et al., 2022). Given the important role of SMEs in the Indonesian economy and the multidimensional nature of profitability determinants, there is a pressing need to systematically investigate the mechanisms driving their financial performance.

The contributions of this study include several aspects. First, to empirically identify and test the key factors affecting profitability, thereby deepening the understanding of the formation mechanisms underlying Indonesian SMEs' financial performance. Second, to provide an evidence-based foundation for formulating targeted policies and business strategies that account for local contextual factors and enterprise practices. Third, to offer practical managerial insights for SMEs and their stakeholders, enabling them to better identify growth opportunities and mitigate potential risks in pursuit of sustainable operations.

II. LITERATURE REVIEW

A. Debt Ratios And Corporate Profitability

Research on the factors influencing corporate profitability reveals significant variations across national contexts, industries, and time periods. This study employs the Pecking Order Theory, established by Myers and Majluf (1984), to theoretically provide the relationship between profitability and capital structure among Indonesian firms. This theoretical framework systematically explains that in markets characterized by information asymmetry, firms demonstrate a distinct financing hierarchy: they prioritize internal financing, followed by debt issuance, and consider equity financing only as a last resort (Umdiana et al., 2020).

Within Indonesia's emerging market context, where capital markets are less developed and information transparency remains limited, firms face substantial external financing constraints. As a result, the Pecking Order Theory offers a particularly relevant lens for understanding corporate financial decision-making in this setting (Oktavina et al., 2018). The theory suggests a systematic behavioral pattern: when a firm demonstrates strong profitability, substantial retained earnings provide ample internal funding for investment activities. This enables the firm to avoid seeking high-cost external debt, thereby maintaining lower debt levels (Sitompul et al., 2023). Conversely, when profitability is weak, limited internal accumulation proves insufficient to meet funding needs. Given that equity financing often presents prohibitive costs and high barriers, firms are compelled to turn to debt markets, consequently elevating their debt ratio (Budhidharma et al., 2024). This profitability-driven financing mechanism theoretically supports a stable negative relationship between Return on Assets (ROA) and debt levels.

In Indonesia's distinct market environment, the factors influencing corporate profitability display considerable diversity. Empirical research suggests that profitability's responsiveness to capital structure varies notably across industries, reflecting differences in operational characteristics, capital intensity, and market structures (Arintoko et al., 2021). Studies such as those by Shahniah et al. (2020) and Sari et al. (2022) have consistently found that the Debt Ratio exerts a significant negative impact on Return on Assets (ROA), supporting the theoretical view that excessive leverage can erode profitability. In sectors that typically operate with high leverage—such as financial services, real estate, and infrastructure—stronger profitability often supports lower debt levels. In contrast, industries like manufacturing and transportation-logistics, which also rely heavily on leverage, may see the expected negative link between profitability and debt ratio weaken or even reverse due to industry-specific factors (Zakaria et al., 2025). Additionally, firm-level factors—including size, asset composition, liquidity, and business risk—moderate the relationship between profitability and financing choices in ways that differ across different industries (Kowanda et al., 2022). Collectively, these findings suggest that the impact of profitability on capital structure is not uniform among Indonesian firms but is highly contingent on industry-specific conditions. Based on this reasoning, the following hypothesis is proposed:

H1: *An increase in the debt ratio significantly reduces corporate profitability.*

B. The Mediating Role Of The Interest Coverage Ratio In The Profitability–Debt Ratio Relationship

When examining the relationship between corporate profitability and debt ratio, the Interest Coverage Ratio (ICR) acts as a critical mediating mechanism. By measuring a firm's ability to cover interest expenses using earnings before interest and taxes, the ICR directly channels the effect of profitability on solvency risk, thereby influencing capital structure decisions (Akber et al., 2021). Existing literature supports this mechanism both theoretically and empirically. At the theoretical level, the mediating role of the interest coverage ratio is rooted in financial distress cost theory. This theory holds that high debt levels increase fixed interest payments, which in turn lowers the interest coverage ratio. A lower ICR signals greater financial risk for the firm (Fitri et al., 2020). This heightened risk affects profitability through multiple channels. On one hand, a heavier interest burden directly

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reduces corporate earnings, lowering returns on equity and assets (Farah et al., 2021). On the other hand, a low ICR sends negative signals to the market, raising financing costs, limiting investment capacity, and ultimately impairing long-term profitability (Mugosa, 2015). Empirically, several cross-country studies lend support to the mediating role of the interest coverage ratio. Wang et al. (2024), examining firms across the Asia-Pacific region, found that the debt ratio exerts a significant indirect effect on profitability via the ICR. This mediating effect proved especially strong in emerging economies with less developed capital markets. In a similar vein, Sultoni et al. (2023) showed that in Southeast Asian countries, the interest coverage ratio mediates about 30% of the total effect of the debt ratio on corporate profitability.

This research focusing on emerging markets, further substantiates these findings. Mubeen (2022), in a study of publicly listed companies in China, demonstrated that the interest coverage ratio serves a partial mediating role in the relationship between capital structure and firm performance. This mediating effect was found to be particularly pronounced during periods of monetary policy tightening. Within the specific Indonesian context, Suranta (2023) discovered that an increased interest burden significantly reduces the interest coverage ratio of local firms, which subsequently exerts a negative impact on both investment efficiency and profitability. Taken together, the existing literature—spanning theoretical mechanisms to empirical findings—consistently supports the significant mediating role of the interest coverage ratio in the relationship between debt levels and corporate profitability. However, in the distinctive setting of Indonesia as an emerging economy, the specific manifestations and the extent of this mechanism require further empirical validation. This gap offers a meaningful opportunity for theoretical extension in the present study. Based on the discussion above, the following theoretical hypothesis is formulated:

H2: *The debt ratio affects corporate profitability by undermining the firm's interest coverage capacity.*

III. DATA SOURCES AND VARIABLE MEASUREMENTS

A. Econometric Model

$$ROA_{it} = \alpha_0 + \alpha_1 Debt_{it} + \alpha_2 Control_{it} + \delta_i + \mu_t + \varepsilon_{it} \quad (1)$$

In equation (1), i denotes the firm, t denotes time, and ROA represents corporate profitability as the dependent variable, $Debt$ denotes the debt ratio as the core explanatory variable, $Control$ refers to a set of control variables, δ captures firm fixed effects, μ captures year fixed effects, and ε is the stochastic error term.

B. Data Description

This study using panel data from Indonesian small and medium-sized enterprises (SMEs) from 2015 to 2024 as the sample of this research. The primary source of raw data is the Indonesia Stock Exchange (IDX). The sample selection process follows these steps: first, companies undergoing trading suspension are excluded to minimize potential bias arising from abnormal operating conditions; second, observations with consecutive missing values for key variables are removed; finally, all continuous variables are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers. Through this screening procedure, a balanced panel dataset comprising 437 firm-year observations is obtained. The sample cover multiple sectors, including manufacturing, consumer goods, industry, and infrastructure, thereby ensuring a degree of representativeness and providing a robust foundation for the empirical analysis of factors influencing profitability among Indonesian SMEs.

C. Variable Definition

a. Dependent Variable

Return on Assets (ROA) is a classical indicator for assessing the efficiency of a company's management in generating after-tax profit from its total assets. This metric directly reflects how effectively a firm using their assets to generate profit and offers a comprehensive measure of overall operational performance (Gunanto et al., 2024). ROA is also sensitive to changes in a company's financial condition (Larasati et al., 2020), with higher values indicating stronger asset profitability and more efficient resource utilization. Compared with Return on Equity (ROE), ROA avoids the distorting influence of capital structure on profitability evaluation, thereby providing a clearer reflection of operational efficiency and fundamental earning capacity (Cunha, 2025). Within Indonesia's banking sector, Hasanatun et al. (2025) found a significant negative relationship between debt and ROA, means that excessive leverage undermines asset-based profitability. Similarly, in the consumer-goods industry, Maharani et al. (2025) found that in the Indonesian market, the drivers of profitability may be more complex, resulting in debt exerting a significant negative impact on ROA. Likewise, in the manufacturing sector, Sodik et al. (2025) demonstrated using data from IDX-listed manufacturing firms that debt significantly reduces ROA, suggesting that rising debt levels erode returns on assets.

Based on existing literature, and to systematically examine corporate profitability, this study follows Farel et al. (2024) in employing ROA (after tax) as the dependent variable. This indicator provides a comprehensive measure of performance while eliminating the influence of financing decisions, thus offering a clearer reflection of asset-operating efficiency. Additionally, to

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capture the intrinsic profitability of assets from operational activities, this paper draws on Fadhilah et al. (2025) by adopting ROA (before tax, before interest, before depreciation) as an alternative proxy for the dependent variable.

b. Independent Variable

Debt Ratio is a key indicator for assessing a firm's capital structure and financial leverage. This ratio directly reflects a company's reliance on debt financing, revealing the proportion of assets funded by creditors (Suzan et al., 2024). Debt ratio exerts a dual effect on firm profitability— moderate leverage can reduce the effective tax burden through the interest tax shield effect, potentially increasing after-tax net income and thus having a positive influence on ROA (Qin, 2024). On the other hand, excessively high debt levels significantly raise financial expenses, intensify cash-flow pressure, weaken a firm's ability to cope with market fluctuations, and may lead to higher financing costs due to elevated credit risk, ultimately constraining operating profitability (Basyith et al., 2021).

Studies across Indonesian industries show that high debt harms profitability—in manufacturing (Aristiani et al., 2025), banking (Rachmawati et al., 2024), mining (Aliah et al., 2025), and textiles (Ananda et al., 2025). Accordingly, this paper uses the Debt Ratio (Auliasari et al., 2025) as the core explanatory variable and the Liability-to-Equity Ratio (Paramitha et al., 2024) as a complementary measure to analyze how leverage affects firm performance.

c. Control Variable

Consistent with prior research (Shahnia et al., 2020; Sianturi et al., 2023), the following control variables are included in this study: Size is Natural logarithm of total assets, Total asset turnover (TTA) is calculated as the ratio of total revenue to total assets, Operating expense ratio (Oer) is defined as operating expenses divided by total revenue, Total Assets Growth Rate (Tagr) is calculated as the percentage change in total assets from the prior period to the current period, Fixed Assets (Fix) is defined as the proportion of net fixed assets relative to total assets, Cash is defined as the proportion of cash and cash equivalents relative to total assets, Accounts Receivable Turnover Ratio (AR_Turn) is defined as the ratio of total revenue to average accounts receivable, Net Worth Turnover Rate (NW_Turn) is defined as the ratio of total revenue to shareholders' equity.

Table 1. Descriptive Statistic

Variable	Obs	Mean	Std. Dev.	Min	Max
Roa	4370	0.021	0.105	-0.506	0.369
Debt	4370	0.695	0.891	0.008	6.758
Size	4370	28.89	1.855	24.63	33.55
TTA	4370	0.341	0.257	-0.189	1.339
Oer	4370	-0.137	0.167	-0.724	1.097
Tagr	4370	0.079	0.229	-1.092	1.101
Fix	4370	0.485	0.291	0.003	0.995
Cash	4370	0.166	0.259	0.001	1.576
AR_Turn	4370	0.353	0.303	-1.814	1.718
NW_Turn	4370	0.392	0.331	-1.603	1.181

IV. RESULT AND ANALAYSIS

A. Benchmark Regression

Table 2 showing the results of the baseline regression. In Column (1), we test the data without controlling year and individual fixed effect and also not added control variables, the coefficient for Debt is negative and significant at the 1% level. Column (2) we test the data with controlling year and individual fixed effects into the model, and the coefficient for Debt remains statistically significant with a negative sign. Column (3) we test with controlling year, individual fixed effects, and also added a set of control variables. The regression coefficient for Debt is -0.013, which remains statistically significant negative at the 1% level. These findings suggest that excessive reliance on debt financing may undermine firm profitability and operational efficiency—likely through multiple channels, including heightened interest expenses, elevated financial risk, and the crowding out of funds that could otherwise be allocated to core business activities. The consistent and robust negative association between debt and profitability across specifications provides empirical support for Hypothesis 1.

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Table 2. Benchmark Regression Result

Variables	Roa (1)	Roa (2)	Roa (3)
Debt	-0.029*** (0.004)	-0.014*** (0.002)	-0.013*** (0.002)
Size			0.005 (0.003)
TTA			-0.008 (0.006)
Oer			0.086*** (0.008)
Tagr			0.081*** (0.006)
Fix			-0.033*** (0.007)
Cash			0.047*** (0.006)
AR_Turn			-0.007 (0.005)
NW_Turn			0.024*** (0.004)
Constant	0.042*** (0.003)	0.031*** (0.002)	-0.098 (0.086)
Firm & Year	No	Yes	Yes
Observations	4,370	4,370	4,370
R-squared	0.062	0.497	0.550

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

B. Robustness Test

a. Replace The Explained Variable

In the baseline analysis, firm profitability is measured by ROA (after tax). However, after-tax profit may be influenced by factors such as tax incentives, non-operating income and expenses, and varying depreciation accounting policies—all of which can be endogenous to a firm's debt decisions and thus introduce measurement bias into the estimation. To mitigate this potential measurement error and more cleanly capture the efficiency of firms' core operating performance, we follow Fadhilah et al. (2025) and adopt an alternative profitability measure: ROA calculated before tax, before interest, and before depreciation (Roa_Ebitda). The results of this robustness check are reported in Column (1) of Table 3. The coefficient on Debt remains negative and statistically significant, closely aligning with the baseline findings and reinforcing the robustness of our main conclusion.

b. Replacing Explanatory Variables

In the baseline explanation, Debt is measured as the ratio of total liabilities to total assets (i.e., the debt-to-asset ratio), which primarily reflects the extent to which a firm's assets are financed by debt. To offer a complementary perspective, we now consider Liability-to-Equity, which directly compares total liabilities to shareholders' equity. This alternative metric places greater emphasis on the relative weight of debt versus internal capital, offering a sharper lens on financial leverage and the associated risk premium pressures (Tampubolon et al., 2025). Especially when shareholders' equity is relatively small or highly volatile, a high debt-to-equity ratio may still indicate substantial debt repayment pressure and financial vulnerability, even if the overall debt-to-asset ratio is not high. Following Paramitha et al. (2024), we therefore adopt Liability-to-Equity (Lte) as an alternative proxy for debt in our robustness analysis. As shown in Column (2) of Table 3, the coefficient on this alternative debt measure remains negative and statistically significant, corroborating the baseline findings and underscoring the robustness of our central conclusion.

c. Adding High-Dimensional Effects

To ensure that the baseline estimates are not confounded by unobserved industry-specific characteristics, firm-level heterogeneity, or common time trends, we enhance the model specification by incorporating high-dimensional fixed effects. Specifically, we simultaneously control for industry, firm, and year fixed effects, and cluster the standard errors at the firm level

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to account for within-firm serial correlation. The result show in Column (3) of Table 3, the coefficient on Debt remains negative and statistically significant, closely mirroring the baseline result. This indicate the robustness of our finding that higher debt levels are consistently associated with lower profitability among Indonesian SMEs, even after rigorously accounting for multiple sources of unobserved heterogeneity.

Table 3. Robustness Test Result

Variables	Roa_Ebitda (1)	Roa (2)	Roa (3)
Debt	-0.009*** (0.002)		-0.013*** (0.004)
Lte		-0.006*** (0.002)	
Constant	-0.131 (0.099)	-0.195** (0.086)	-0.098 (0.201)
Controls Variable	Yes	Yes	Yes
Firm & Year	Yes	Yes	Yes
Firm Cluster	No	No	Yes
Observations	4,370	4,370	4,370
R-squared	0.505	0.546	0.550

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

C. Endogeneity Test

The relationship between debt ratio (Debt) and firm profitability (ROA) may be subject to endogeneity concerns, particularly reverse causality—whereby profitable firms may choose different debt levels—or omitted variable bias. To address these issues, we employ two complementary identification strategies.

Table 4. Endogeneity Test Result

Variables	First Stage Debt (1)	Second Stage Roa (2)	First Stage Debt (3)	Second Stage Roa (4)
Debt.L1	0.046*** (2.80)			
Debt		-0.038*** (-8.23)		
IV			0.907*** (0.039)	
Debt				-0.012** (0.005)
Constant	7.555*** (9.10)	-0.152*** (-6.20)		
Cragg-Donald Anderson Statistic				538.130 528.084***
Controls Variable	Yes	Yes	Yes	Yes
Firm & Year	Yes	Yes	Yes	Yes
Observations	3,933	3,933	4,370	4,370
R-squared	0.578	0.241		0.116

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

First, we mitigate reverse causality by lagging the main explanatory variable: Debt is replaced with its value from the previous year and estimated using two-stage least squares. This specification rests on the logical premise that debt decisions made in the previous period temporally precede and influence current profitability outcomes, thereby substantially reducing the channel

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through which contemporaneous ROA could affect current-period leverage. Table 4 columns (1) and (2) showing the regression results. It can be observed that the coefficient for Debt.L1 in the first stage is significantly positive, indicating a strong correlation between the debt ratio of the previous period and the current period. The results from the second stage show that the coefficient for the debt ratio remains significantly negative at the 1% level, and its absolute value has increased compared to the OLS estimate, consistent with theoretical expectations.

Second, following the Bartik-style instrumental variable approach, we construct an instrument for the core explanatory variable Debt by computing the average debt ratio of all other firms in the same industry and year (i.e., the industry-year mean of Debt). This instrument is valid for two reasons. First, firms in the same industry often face similar financing conditions, norms, and regulations, so their leverage decisions tend to move together—ensuring relevance. Second, the average debt level of peer firms should not directly affect a specific firm’s profitability; it influences ROA only indirectly, through the firm’s own debt choices (Jaiswal et al., 2025). Columns (3) and (4) of Table 4 show the 2SLS results. The first-stage estimate is positive and highly significant, confirming that the instrument strongly predicts a firm’s own debt. In the second stage, the coefficient on Debt remains negative and statistically significant, aligning with our baseline findings. The instrument also passes key validity tests. The Cragg–Donald Wald F statistic value is 538.130—far above the Stock–Yogo critical value of 16.38—ruling out weak instrument concerns. Additionally, the Anderson LM statistic is 528.084 and significant at the 1% level, rejecting the possibility of under-identification. Therefore, even when leveraging industry-level variation as a source of exogenous leverage shifts, we continue to find a robust negative link between debt and profitability—further supporting our main analysis.

D. Heterogeneity Test

To further examine whether the effect of debt ratio on firm profitability varies across firms with different growth prospects, financial conditions, or industry business models, we conduct a several of heterogeneity analyses. Specifically, we perform divide regressions across the following four dimensions:

Table 5 Heterogeneity Test

Variables	High-Growth (1)	Low-Growth (2)	High-Liquidity (3)	Low-Liquidity (4)
Debt	0.001 (0.002)	-0.014*** (0.003)	0.007 (0.006)	-0.016*** (0.003)
Constant	0.070 (0.090)	0.248 (0.153)	-0.310** (0.129)	0.152 (0.136)
Controls Variable	Yes	Yes	Yes	Yes
Firm & Year	Yes	Yes	Yes	Yes
Fisher’s Test	0.027		0.004	
Observations	2,070	2,300	2,170	2,200
R-squared	0.673	0.600	0.589	0.596

a. Enterprise Growth Potential.

Following Yunia et al. (2025), the sample was divided into high-growth and low-growth firms based on the median Total Assets Growth Rate. Columns (1) and (2) of Table 5 show that the negative effect of debt ratio on profitability is significantly stronger among low-growth firms. This finding indicate that in firms with limited ability to expand, additional debt is less likely to generate into productive investments or revenue growth. Instead, it primarily increases interest expenses and amplifies financial stress. In contrast, high-growth firms may benefit from more favorable financing terms based on their stronger future earnings prospects, and their shorter investment payback periods help offset the dampening effect of leverage on ROA (Nam et al., 2024).

b. Liquidity Level.

Liquidity level. Following Oktaviana et al. (2024), we divided the sample into high and low liquidity groups based on the median ratio of Cash to Total Assets. Columns (3) and (4) in Table 5 show that the negative impact of debt ratio on profitability is much stronger in firms with low liquidity. These firms already face elevated short-term solvency risk; when combined with high debt levels, they are more vulnerable to cash flow, which can crowd out operational funding and substantially impair performance. In contrast, firms with ample liquidity possess a stronger buffer against financial shocks, allowing them to better absorb the burdens of debt and mitigate its negative impact on ROA.

Continued Table 5 Heterogeneity Test

Variables	High-Leverage Firm (5)	Low-Leverage Firm (6)	High Net Growth Value (7)	Low Net Growth Value (8)
Debt	0.002 (0.003)	-0.014*** (0.003)	-0.002 (0.002)	-0.015*** (0.003)
Constant	-0.263** (0.126)	0.000 (0.110)	0.211** (0.085)	0.101 (0.150)
Controls Variable	Yes	Yes	Yes	Yes
Firm & Year	Yes	Yes	Yes	Yes
Fisher's Test	0.022		0.046	
Observations	1,430	2,940	2,070	2,300
R-squared	0.457	0.593	0.691	0.577

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

c. Industry business model

Based on the industry classification of the Indonesia Stock Exchange (IDX), we classify firms into high-leverage-oriented and low-leverage-oriented industries. Columns (5) and (6) of Table 5 show that the negative effect of debt ratio on ROA is significantly stronger in low-leverage industries. In contrast, firms in high-leverage industries—such as finance, property, and infrastructure—typically operate with business models that feature stable cash flows and substantial tangible assets that can be used as collateral. As a result, they often enjoy easier access to bank credit, and debt financing is widely regarded as a standard part of their financial strategy. Consequently, their profitability tends to be less sensitive to changes in leverage.

d. Trend of Changes in Net Assets

Following Yadav et al. (2024), we split the sample into high and low-net growth value based on the median of the trend of changes in net assets. The results in columns (7) and (8) of Table 5 show that the negative effect of debt is more pronounced in low-net growth firms. These firms typically lack sufficient internal capital generation and rely more heavily on external debt, which strains cash flow and undermines profitability. In contrast, firms with high-net growth value generally demonstrate stronger earnings capacity and better corporate governance, enabling them to fund expansion through retained earnings and reducing their dependence on debt (Juwono et al., 2025).

E. Mechanism Test

To further explore the underlying mechanism through which debt ratio affects firm profitability, we follow Liu et al. (2025) and introduce the Interest Coverage Ratio (ICR) as a mediating variable. ICR measures a firm's ability to meet its interest obligations using operating profits and serves as a key indicator of financial safety margins and debt sustainability. A higher ICR suggests lower financial distress risk and weaker constraining effects of debt on operations, whereas a low ICR signals a heavy interest burden and potential difficulties in servicing debt. To test this channel, we estimate the following mediation model:

$$Icr_{it} = \beta_0 + \beta_1 Debt_{it} + \beta_2 Control_{it} + \delta_i + \mu_t + \varepsilon_{it} \quad (2)$$

$$ROA_{it} = \phi_0 + \phi_1 Debt_{it} + \phi_2 Icr_{it} + \phi_3 Control_{it} + \delta_i + \mu_t + \varepsilon_{it} \quad (3)$$

In Equation (2), i denotes the firm, t denotes time. The dependent variable, Icr_{it} , represents the Interest Coverage Ratio—defined as earnings before interest and taxes (EBIT) divided by interest expenses—capturing the firm's capacity to cover interest payments with operating profits. Equation (3), we introduce Icr_{it} as a mediating variable to examine whether debt ratio affects profitability through its impact on interest coverage ratio. The model also includes a vector of control variables ($Control_{it}$), firm fixed effects (δ_i), to account for time-invariant firm heterogeneity, year fixed effects (μ_t), to absorb common macroeconomic shocks, and a random error term (ε_{it}).

Table 6 Mechanism Test

Variables	Icr (1)	Roa (2)
Debt	-0.074*** (0.011)	-0.012*** (0.002)
Icr		0.010*** (0.003)

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Constant	-1.847*** (0.481)	-0.080 (0.086)
Controls Variable	Yes	Yes
Firm & Year	Yes	Yes
Sobel Z value	-2.99**	
Goodman-1	-2.97**	
Goodman-2	-3.02**	
Observations	4,370	4,370
R-squared	0.455	0.551

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Column (1) of Table 6 shows that Debt has a significantly negative effect on the Interest Coverage Ratio (ICR), indicating that higher leverage weakens a firm's ability to service its interest obligations. In Column (2), when ICR is added to the model, the negative effect of debt on ROA becomes smaller in coefficient, and ICR itself has a strong positive effect on ROA. This suggests that ICR partially explains how debt lowers profitability—acting as a mediating channel. High debt hurts profitability not just directly, but also indirectly: by weakening a firm's ability to meet interest obligations, it increases financial stress and operational performance. For Indonesian SMEs—facing high borrowing costs and unstable cash flows—maintaining a healthy ICR is essential to cushion the negative effects of debt and protect profitability. These results provide empirical support for Hypothesis 2.

CONCLUSIONS

This study examines the impact of debt ratio (Debt) on firm profitability—measured by Return on Assets (ROA). Using a panel of Indonesian SMEs from 2015 to 2024, this study finds that higher debt ratios significantly reduce firm profitability, a result that holds after addressing endogeneity and across multiple robustness checks. The negative impact is particularly strong among low-growth, low-liquidity, and low-net growth firms, as well as industries with asset-light, low-leverage business models. Mediation analysis also reveals that weakened interest coverage—reflecting heightened financial strain—partially explains this negative relationship.

These findings carry practical relevance. Firms should avoid excessive debt, particularly when facing growth or liquidity constraints, and instead prioritize capital structure discipline and interest coverage capacity. Investors and lenders should incorporate these risk dimensions into credit assessments. Policymakers, meanwhile, can support SME financial health by expanding access to diversified financing—such as through deeper capital markets or targeted credit schemes—to reduce reliance on costly debt.

This study also has some limitations. Our sample is limited to listed firms, and we focus exclusively on financial variables, omitting potentially relevant non-financial factors like governance quality or managerial characteristics. Future research could extend the analysis to private SMEs and examine how strategic decisions—such as digital transformation or innovation investments—moderate the debt–profitability link.

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