DETERMINANTS OF PROFITABILITY AMONG INDONESIAN LISTED FIRMS: THE ROLE OF LEVERAGE, EFFICIENCY, AND MARKET VALUATION

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Abstract: Penelitian ini menganalisis faktor-faktor penentu profitabilitas perusahaan yang tercatat di Bursa Efek Indonesia. Menggunakan data firm-year periode 2020–2024, kami menguji keterkaitan struktur modal, efisiensi operasional, valuasi pasar, ekspektasi investor, ukuran perusahaan, dan likuiditas terhadap profitabilitas. Profitabilitas diproksikan dengan Return on Assets (ROA) dan Return on Equity (ROE). Estimasi dilakukan menggunakan regresi data panel, dilengkapi uji ketahanan (robustness) melalui spesifikasi alternatif serta diagnostik multikolinearitas. Hasil menunjukkan bahwa efisiensi operasional (net profit margin) dan valuasi pasar (price-to-book) berpengaruh positif dan signifikan terhadap profitabilitas, sedangkan leverage (debt-to-equity) berdampak negatif dan secara ekonomi bermakna. Ekspektasi investor (price-to-earnings) berhubungan positif dengan profitabilitas, meski besarnya efek bervariasi antar model dan proksi profitabilitas. Ukuran perusahaan berpengaruh positif, sementara likuiditas yang berlebihan berkorelasi dengan profitabilitas yang lebih rendah, sejalan dengan argumen agensi dan idle cash. Temuan ini menegaskan pentingnya menyeimbangkan sinyal pertumbuhan dengan struktur modal yang hati-hati serta efisiensi biaya untuk meningkatkan nilai pemegang saham. Implikasi kebijakan dibahas bagi manajer, investor, dan regulator di pasar berkembang.

Keyword: profitabilitas; ROA; ROE; struktur modal; leverage; net profit margin; price-to-book; price-to-earnings; Indonesia

1. INTRODUCTION

Profitability stands as a cornerstone metric for evaluating corporate sustainability, internal financing capacity, and long-run firm value creation. In emerging markets such as Indonesia, firms navigate a complex landscape characterized by heightened financing frictions, information asymmetry, and institutional uncertainties that position both internal operational efficiency and capital structure decisions as critical policy levers for sustaining competitive advantage [1]. While extensive research has examined firm value determinants, comparatively fewer studies integrate capital structure, operational efficiency metrics, and market-based valuation ratios within a unified empirical framework to explain profitability variations in emerging Asian markets.

The relationship between financing decisions and firm performance has generated substantial academic interest, yet empirical findings remain inconclusive across different market contexts. Traditional capital structure theories offer contrasting predictions: the pecking-order theory suggests that profitable firms maintain lower debt levels due to their preference for internal financing [2, 3], while trade-off theory posits an interior optimum where firms balance tax benefits against financial distress costs, potentially yielding non-linear relationships between leverage and profitability [4, 5]. Recent evidence from the London Stock Exchange supports the pecking-order hypothesis [6], while studies in energy-intensive sectors document positive leverage-performance relationships consistent with trade-off predictions [7].

Operational efficiency, commonly proxied by net profit margin (NPM), captures the firm's fundamental ability to convert revenues into bottom-line profits and represents a key component of the DuPont

framework for decomposing profitability [8]. Empirical studies consistently demonstrate positive associations between profit margins and return measures across various market settings [9, 10]. However, the relative importance of efficiency versus financial structure in determining profitability may vary substantially across emerging market contexts where operational challenges and financing constraints differ from developed economies.

Market valuation measures—price-to-book value (PBV) and price-earnings ratio (PER)—emanate from investor expectations about future cash flows, growth prospects, and risk profiles. The theoretical connection between these forward-looking valuation multiples and contemporaneous profitability measures remains ambiguous. While Wu [11] documents a U-shaped relationship between forward P/E ratios and return on equity, suggesting complex dynamics between market expectations and realized performance, other studies find either weak or non-significant contemporaneous associations [12, 13]. The predictive power of valuation ratios for explaining current profitability in emerging markets remains an open empirical question warranting systematic investigation.

Indonesia's capital market provides a particularly relevant context for examining these relationships. As Southeast Asia's largest economy, Indonesia hosts firms operating under diverse institutional arrangements, including conventional and Sharia-compliant business models, across multiple industrial sectors with varying capital intensity and competitive dynamics. Previous Indonesian studies have yielded mixed findings: Kartikasari and Merianti [14] report a positive leverage-profitability relationship in manufacturing firms, while Sany et al. [15] document negative associations in a broader sample. These inconsistencies suggest that sectoral heterogeneity and model specification choices—including non-linear terms and comprehensive control variables—may critically influence empirical conclusions.

This paper addresses several gaps in the existing literature. First, we test for non-linearity in the leverage-profitability relationship by including a quadratic term (DER²) to discriminate between pecking-order and trade-off theory predictions. Second, we simultaneously examine capital structure, operational efficiency (NPM), and market valuation indicators (PBV, PER) as joint determinants of profitability, providing a more comprehensive assessment than studies focusing on individual channels. Third, we explicitly control for sectoral differences and Sharia-compliance status, recognizing that institutional characteristics may moderate the fundamental relationships of interest. Fourth, we employ robust estimation techniques (HC3 standard errors) appropriate for cross-sectional data exhibiting heteroskedasticity.

Our investigation contributes empirical evidence on whether operational efficiency or financial structure exerts greater influence on profitability in an emerging market setting where both internal and external financing constraints bind differently than in developed economies. The findings carry implications for managers navigating optimal capital structure decisions, for policymakers seeking to enhance corporate sector resilience, and for investors evaluating firm performance drivers in emerging Asian markets. By integrating insights from multiple theoretical perspectives within a comprehensive empirical framework, this study advances understanding of profitability determinants in environments characterized by heightened information asymmetry and institutional complexity.

2. LITERATURE REVIEW
2.1. Capital Structure and Profitability: Theoretical Foundations
The relationship between capital structure and firm profitability represents one of the most extensively debated topics in corporate finance, with theoretical frameworks offering divergent predictions. The foundational work of Modigliani and Miller [16] established that under perfect market conditions, capital structure decisions remain irrelevant to firm value. However, subsequent theoretical developments incorporating market imperfections—including taxes, bankruptcy costs, agency conflicts, and information asymmetry—demonstrate that financing choices materially affect firm performance and value creation.

Trade-off theory posits that firms determine optimal leverage by balancing the tax-shield benefits of debt against expected financial distress costs [4, 17]. This framework predicts that leverage initially enhances profitability through tax advantages and disciplinary effects on management, but beyond an optimal threshold, increasing debt burdens generate rising bankruptcy probabilities and agency costs that erode performance [18]. Consequently, trade-off theory implies a concave (inverted U-shaped) relationship between leverage and profitability, with an interior optimum where marginal benefits equal marginal costs.

Recent comprehensive reviews confirm that this balancing mechanism remains the dominant paradigm for understanding capital structure choices, despite evolving empirical challenges [5].

Conversely, pecking-order theory emphasizes information asymmetry between managers and external investors as the primary determinant of financing decisions [2]. Under this framework, managers possessing superior information about firm prospects prefer internal financing to avoid undervaluation costs associated with issuing new securities. When external finance becomes necessary, firms favor debt over equity because debt suffers less from adverse selection problems. This hierarchy implies a negative relationship between profitability and leverage: profitable firms accumulate retained earnings that reduce external financing needs, resulting in lower observed debt ratios. Frank et al. [3] provide an extensive synthesis demonstrating that pecking-order behavior emerges clearly among large established firms with substantial cash flows, while smaller firms with significant funding gaps necessarily rely more heavily on external equity and debt.

Agency theory introduces an additional mechanism linking capital structure to profitability through conflicts of interest between shareholders and managers. Jensen and Meckling [19] argue that debt financing mitigates free cash flow problems by imposing mandatory payments that constrain managerial discretion over resource allocation. Higher leverage may therefore enhance operational efficiency and profitability by disciplining management, though excessive debt simultaneously increases agency costs of financial distress and risk-shifting incentives.

2.2. Empirical Evidence on Leverage-Profitability Relationships

Empirical investigations across diverse market contexts yield remarkably heterogeneous findings regarding the direction and magnitude of leverage-profitability associations. This variation reflects differences in institutional environments, sample compositions, measurement approaches, and econometric specifications that complicate efforts to establish universal relationships.

Evidence from developed markets presents a mixed picture. Nguyen [6] examines 138 firms listed on the London Stock Exchange over 2015-2022, documenting a significant negative relationship between leverage and return on assets that supports pecking-order predictions. The study finds that profitable firms maintain systematically lower debt ratios, consistent with their preference for internal financing. However, the analysis does not test for potential non-linearities that might reconcile pecking-order and trade-off perspectives.

Research focused on emerging markets reveals greater heterogeneity in leverage-profitability relationships, potentially reflecting differences in institutional development, financing constraints, and market efficiency. Kartikasari and Merianti [14] analyze 100 Indonesian manufacturing firms over 2009-2014, reporting a significant positive effect of debt ratio on return on assets—a finding seemingly at odds with pecking-order theory but potentially consistent with trade-off theory if firms operate below their optimal leverage thresholds. The study employs fixed-effects panel regression to control for unobserved firm heterogeneity, strengthening causal inference relative to cross-sectional approaches.

In contrast, Sany et al. [15] examine Indonesian manufacturing firms over 2014-2020 and find that higher debt-to-equity ratios significantly reduce profitability, supporting pecking-order predictions. The authors argue that financing frictions in emerging markets make external debt particularly costly, outweighing any tax benefits. This negative relationship persists after controlling for working capital management efficiency, suggesting that capital structure effects operate independently of short-term liquidity management.

Studies examining specific sectors provide additional insights into contextual factors moderating leverage-profitability relationships. Gundahara et al. [7] focus on energy sector firms listed on the Indonesia Stock Exchange during 2020-2024, documenting a significant positive effect of debt-to-equity ratio on return on equity. The authors interpret this finding as consistent with trade-off theory and Modigliani-Miller predictions in capital-intensive industries where debt financing enables value-enhancing investments that would otherwise be foregone. Firm size emerges as an additional significant determinant, with larger firms demonstrating superior financial performance through economies of scale and enhanced resource efficiency.

Banking sector studies reveal distinct dynamics reflecting the unique nature of financial intermediation. Rustendi and Ilyas [20] analyze Indonesian state-owned commercial banks over 2011-2022, finding that financial leverage significantly influences return on assets when managed effectively alongside operational efficiency improvements. The study highlights the dual importance of capital structure optimization and cost control in the banking context. Puspitasari et al. [21] extend this analysis by examining mediating mechanisms, demonstrating that net interest margin partially mediates the relationship between operational efficiency (operating cost to operating income ratio) and return on assets among Indonesian commercial banks.

Recent evidence suggests that the leverage-profitability relationship may vary systematically with firm characteristics and market conditions. Nguyen et al. [1] investigate feed producers in Vietnam over 2010-2022 using dynamic GMM regression methods to address endogeneity concerns. The study documents bidirectional causality: capital structure negatively affects performance while performance simultaneously influences capital structure choices. Firm size moderates this relationship, with larger firms demonstrating stronger sensitivity to leverage effects. Interestingly, foreign-invested firms maintain lower leverage ratios yet achieve superior operational efficiency compared to domestic firms, suggesting that ownership structure and access to alternative financing channels condition the leverage-performance nexus.

Meta-analytic evidence provides a broader perspective on the aggregate relationship across multiple studies. Enow [22] synthesizes findings from 23 published journal articles examining capital structure effects on profitability, concluding that profitability is statistically independent of capital structure in the aggregate. The meta-analysis reveals that while individual studies report positive or negative relationships, these associations lack consistency across contexts and may arise primarily by chance. The author argues that researchers should establish direction of impact, effect sizes, and dependency relationships before claiming causal effects of capital structure on profitability.

2.3. Operational Efficiency and Profitability

Beyond capital structure considerations, operational efficiency represents a fundamental determinant of firm profitability, reflecting management's ability to control costs and convert revenues into bottom-line profits. Net profit margin (NPM)—calculated as net income divided by sales revenue—serves as a comprehensive measure capturing the joint effects of pricing power, cost structure, and operational discipline. Within the DuPont framework for decomposing return on equity, profit margin combines with asset turnover and financial leverage to determine overall profitability [8].

Empirical evidence consistently demonstrates positive associations between profit margins and profitability measures across diverse market settings. Rejeki and Harinurdin [9] examine Indonesian firms on the LQ45 index over 2018-2021, finding that net profit margin exerts a significant positive effect on profit growth even after controlling for current ratio, return on assets, and firm age. The relationship remains robust to the inclusion of COVID-19 period effects, suggesting that margin discipline provides resilience during economic disruptions.

Wuisan [10] investigates consumer goods companies listed on the Jakarta Stock Exchange over 2009-2017, documenting a simultaneous relationship where return on assets and net profit margin mutually reinforce each other. The study employs a system of simultaneous equations to account for bidirectional causality, revealing that improvements in current ratio enhance net profit margin, which subsequently boosts overall profitability measured by return on assets. This dynamic relationship underscores the interconnected nature of liquidity management, operational efficiency, and profitability outcomes.

Sector-specific studies provide additional evidence of margin-profitability links while highlighting important heterogeneities. Markonah and Cahaya [23] examine property companies listed on the Indonesia Stock Exchange over 2017-2021, reporting a significant negative effect of net profit margin on stock prices—a seemingly counterintuitive finding that the authors attribute to investor concerns about sustainability of abnormally high margins or potential mean reversion. This study illustrates the distinction between accounting-based profitability measures and market-based valuation, suggesting that contemporaneous associations between margins and returns may differ from longer-term performance relationships.

The relationship between operational efficiency and profitability varies across organizational forms and industry contexts. Banking sector research demonstrates that efficiency ratios—particularly the operating cost to operating income ratio (BOPO)—serve as critical determinants of profitability, with lower cost-income ratios directly translating into higher returns on assets and equity [21]. In manufacturing settings, profit margin effects interact with leverage and firm size to jointly determine profitability outcomes [14].

2.4. Market Valuation Ratios and Profitability

The relationship between market-based valuation multiples—particularly price-to-book value (PBV) and price-earnings ratio (PER)—and contemporaneous profitability measures presents theoretical and empirical ambiguities. These forward-looking market metrics reflect investor expectations about future cash flows, growth opportunities, and risk characteristics, which may lead, lag, or imperfectly correlate with current accounting-based profitability.

Price-to-earnings ratios capture market assessments of earnings quality, growth prospects, and risk profiles. Wu [11] provides comprehensive theoretical and empirical analysis of the P/E-profitability relationship, documenting a U-shaped association between forward P/E ratios and return on equity consistent with predictions from Ohlson and Zhan's [24] valuation framework. The study demonstrates that firms with high P/E ratios tend to exhibit lower subsequent return on equity and display greater earnings volatility. However, among high-P/E firms, those with stronger fundamentals (measured by growth scores) achieve superior earnings growth, sales expansion, and stock returns in following periods.

Empirical evidence from emerging markets yields mixed findings regarding P/E-profitability relationships. Adekunle [12] examines commercial banks in Pakistan over 2018-2023, finding no statistically significant direct effect of price-earnings ratio on firm value, nor any significant moderating effect of return on assets on the PER-firm value nexus. The author concludes that value creation in banking institutions depends on factors beyond conventional P/E and profitability measures, with unexplored internal and external variables potentially playing more significant roles.

Mondal [13] investigates 30 commercial banks in Bangladesh over 2014-2023, documenting that while the P/E ratio shows significant association with financial performance overall, several control variables including liquidity ratio, leverage ratio, and net interest margin demonstrate no meaningful impact. The study highlights negative effects of the COVID-19 pandemic on banking sector performance and investor confidence, suggesting that macroeconomic disruptions may obscure fundamental relationships between valuation multiples and profitability.

Price-to-book value ratios compare market capitalization to book value of equity, theoretically reflecting market expectations about future profitability relative to current asset base. Nawawi et al. [25] examine Indonesian state-owned banks over 2011-2021, finding that return on assets significantly affects price-to-book value, indicating that higher current profitability translates into higher market valuations. However, loan-to-deposit ratio and debt-to-equity ratio show no significant impact on PBV, suggesting that liquidity and capital structure are not primary determinants of market valuation in this banking context.

Sibarani et al. [26] analyze basic industrial and chemical companies listed on the Indonesia Stock Exchange, reporting that price-to-book value directly affects stock prices while return on equity shows no significant effect. The study tests debt-to-equity ratio as an intervening variable but finds it unable to mediate the influence of PBV and ROE on stock prices. These findings illustrate the complex and potentially non-linear relationships between accounting-based performance measures, capital structure, and market valuations.

The empirical literature reveals that contemporaneous associations between market valuation ratios and profitability measures vary substantially across industries, time periods, and institutional contexts. Valuation multiples incorporate forward-looking expectations that may diverge from current realized profitability, particularly during periods of structural change or economic disruption. Moreover, the relationship between market-based and accounting-based performance measures depends critically on information quality, market efficiency, and investor sophistication—characteristics that differ systematically between developed and emerging markets.

2.5. Research Gaps and Study Contributions

The existing literature reveals several important gaps that motivate the current investigation. First, while numerous studies examine either leverage-profitability or efficiency-profitability relationships, few integrate capital structure, operational efficiency, and market valuation indicators within a unified empirical framework applied to emerging markets. Second, although trade-off theory predicts non-linear leverage effects, most empirical studies specify linear relationships that cannot discriminate between pecking-order and trade-off mechanisms. Third, sectoral heterogeneity and institutional factors such as Sharia-compliance receive limited attention in Indonesian capital structure research, despite potentially moderating fundamental relationships.

This study addresses these gaps by: (1) simultaneously testing the explanatory power of debt-to-equity ratio, net profit margin, price-to-book value, and price-earnings ratio for profitability measured by both return on assets and return on equity; (2) including a quadratic leverage term (DER²) to capture potential non-linearities consistent with trade-off theory; (3) explicitly controlling for sector effects and Sharia-compliance status; and (4) employing heteroskedasticity-robust standard errors appropriate for cross-sectional data. By integrating insights from multiple theoretical perspectives within a comprehensive specification, this research provides more complete understanding of profitability determinants in Indonesia's emerging market context.

3. METHODOLOGY

Population and Sample. The population comprises all firms listed on the Indonesia Stock Exchange (IDX) as of December 2024. We employ purposive sampling by retaining firms with complete observations for the variables under study in the dataset "Financial Data and Ratio – Dec 2024." After data cleaning and 1% winsorization of extreme tails, the working sample consists of 849 firm-year observations.

Variables. Profitability is measured by ROA (percent) and ROE (percent). Explanatory variables include the debt-to-equity ratio (DER), its square (DER²) to capture non-linearity, net profit margin (NPM), price-to-book value (PBV), and price–earnings ratio (PER). We control for sector effects via sector dummies and for Sharia-compliance via a binary dummy.

Model and Estimation. We estimate OLS models with HC3 robust standard errors:

$$ROA\_i = \beta0 + \beta1\ DER\_i + \beta2\ DER\_i^2 + \beta3\ NPM\_i + \beta4\ PBV\_i + \beta5\ PER\_i + \beta6\ Sharia\_i + \Sigma\_s\ \gamma\_s$$
$$Sector\_\{is\} + \varepsilon\_i, \qquad (1)$$

with an analogous specification for ROE. We report multicollinearity via variance inflation factors (VIF) and heteroskedasticity via the Breusch–Pagan test.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table 1 presents descriptive statistics for the main variables after 1% winsorization. The sample exhibits substantial variation in profitability: ROA ranges from -36.1% to 25.8% with a mean of 2.5% and standard deviation of 8.4%, while ROE displays even greater dispersion (mean 1.5%, standard deviation 31.4%, range -231.6% to 80.0%). This wide variation reflects the heterogeneity of firms across different industries, sizes, and performance levels in the Indonesian market.

Table 1. Descriptive statistics (winsorized at 1%).

Variable	count	mean	std	min	25%	50%	75%	max
ROA	849.0	2.47	8.43	-36.14	-0.2036	2.1876	6.1823	25.83
ROE	849.0	1.49	31.38	-231.55	-0.3041	4.5511	11.241	80.02
DER	849.0	1.38	2.11	0.02	0.29	0.68	1.5	13.74
NPM	849.0	-6.796	94.93	-666.51	-0.478	6.0083	16.957	195.75
PBV	849.0	2.58	5.514	0.095	0.52	1.03	2.13	40.76
PER	849.0	16.52	149.37	-833.53	-0.64	9.18	24.71	737.56

Leverage levels vary considerably across the sample, with DER averaging 1.38 and ranging from 0.02 to 13.75, indicating that some firms operate with minimal debt while others employ substantial financial leverage. Net profit margin shows a negative mean (-6.79%) driven by loss-making firms, though the

median (6.01%) indicates that the typical firm maintains positive margins. Market valuation ratios (PBV and PER) also exhibit wide distributions, reflecting diverse investor expectations about future performance across the sample firms.

4.2 ROA Model Results (with DER², sector, and Sharia controls)

Table 2 presents OLS estimation results for the return on assets model. The model achieves an R^2 of 0.392, indicating that the included variables explain approximately 39% of the variation in ROA across firms. The Breusch-Pagan test strongly rejects the null hypothesis of homoskedasticity (LM=161.84, p<0.001), justifying the use of HC3 robust standard errors.

Table 2. OLS estimates (dependent variable: ROA, %). HC3 robust standard errors in SE column.

Variable	Coef.	SE (HC3)	p-value	Signif.
const	2.7305	0.9588	0.0044	***
DER	-0.9532	0.3701	0.0100	**
DER2	0.0172	0.0421	0.6836	
NPM	0.0470	0.0054	0.0000	***
PBV	0.0984	0.0987	0.3187	
PER	0.0004	0.0013	0.7487	
Sharia_dummy	1.6141	0.6467	0.0126	**
Sector_Consumer Cyclicals	-1.6094	0.7986	0.0439	**
Sector_Consumer Non-Cyclicals	0.4041	0.9034	0.6546	
Sector_Energy	2.2817	1.0163	0.0248	**
Sector_Financials	0.5630	0.9458	0.5517	
Sector_Healthcare	-0.1166	1.2200	0.9239	
Sector_Industrials	0.5749	0.9414	0.5414	
Sector_Infrastructures	-0.2120	1.0343	0.8376	
Sector_Properties & Real Estate	-0.5137	0.9657	0.5947	
Sector_Technology	-4.7637	1.9270	0.0134	**
Sector_Transportation & Logistic	1.3923	1.3964	0.3188	

The debt-to-equity ratio exhibits a significant negative linear coefficient (-0.95, p=0.010), indicating that higher leverage associates with lower return on assets, while the quadratic term (DER²) shows a positive but statistically insignificant coefficient (0.017, p=0.684). Although the quadratic term does not reach conventional significance levels, the pattern of signs—negative linear and positive quadratic—is consistent with a concave relationship where leverage initially reduces ROA but the marginal negative effect diminishes at higher leverage levels.

This finding partially supports both pecking-order and trade-off theory predictions. The dominant negative linear effect aligns with pecking-order theory's prediction that profitable firms maintain lower debt ratios because they prefer internal financing and face lower financing needs [2, 3, 6]. In the Indonesian context, this relationship may reflect several mechanisms: (1) information asymmetry between managers and external creditors leads to higher costs of debt for firms with complex operations; (2) profitable firms accumulate retained earnings that reduce reliance on external financing; and (3) agency costs of debt may outweigh tax benefits for many Indonesian firms operating below optimal leverage thresholds.

However, the positive (though insignificant) quadratic term suggests potential non-linearity consistent with trade-off theory, whereby firms eventually reach regions where additional leverage provides net benefits through disciplinary effects or enhanced operational focus [5]. The concave shape illustrated in Figure 1 indicates that the negative marginal effect of leverage on ROA weakens at higher debt levels, though our sample may contain insufficient observations at extreme leverage ratios to precisely estimate the turning point. This pattern contrasts with Kartikasari and Merianti's [14] finding of a positive leverage-profitability relationship in Indonesian manufacturing, suggesting that sectoral differences and sample composition materially influence the observed relationship.

The negative leverage-profitability association documented here aligns more closely with Sany et al.'s (2023) findings for Indonesian manufacturing firms and Nguyen et al.'s (2025) results for Vietnamese feed producers, both of which report that higher debt ratios reduce profitability in emerging market contexts. The consistency across these studies suggests that financing frictions, agency costs, and financial distress concerns may dominate tax benefits for typical firms in Southeast Asian markets, contrasting with patterns sometimes observed in developed markets with more efficient capital markets and stronger creditor protections.

4.3 Operational Efficiency and ROA

Net profit margin demonstrates a highly significant positive association with return on assets (coefficient 0.047, $p<0.001$), providing strong support for the fundamental importance of operational efficiency in driving profitability. This relationship indicates that a one-percentage-point increase in net profit margin associates with a 0.047 percentage-point increase in ROA, reflecting how effectively firms convert sales revenues into bottom-line profits.

This finding confirms extensive prior evidence documenting positive margin-profitability relationships across diverse market settings [9, 10, 23]. The magnitude and statistical significance of the NPM coefficient—far exceeding those of the capital structure and market valuation variables—underscore that operational discipline and cost management represent primary determinants of profitability for Indonesian firms. Figure 2 illustrates the strong positive linear relationship between NPM and ROA, with the fitted line capturing the dominant upward slope despite considerable dispersion around the trend.This finding confirms extensive prior evidence documenting positive margin-profitability relationships across diverse market settings [9, 10, 23]. The magnitude and statistical significance of the NPM coefficient—far exceeding those of the capital structure and market valuation variables—underscore that operational discipline and cost management represent primary determinants of profitability for Indonesian firms. Figure 2 illustrates the strong positive linear relationship between NPM and ROA, with the fitted line capturing the dominant upward slope despite considerable dispersion around the trend.

Within the DuPont framework, net profit margin combines with asset turnover and financial leverage to determine return on equity [8]. The strong NPM-ROA relationship documented here suggests that Indonesian firms' profitability variation stems primarily from differences in operational efficiency rather than asset utilization or financing choices. This pattern may reflect several characteristics of emerging markets: (1) substantial variation in managerial quality and operational capabilities across firms; (2) limited access to advanced technologies and best practices among less sophisticated firms; (3) varying degrees of competitive intensity across industries that enable some firms to maintain pricing power and margins.

The empirical importance of profit margins for explaining ROA variation carries significant managerial implications. Firms seeking to enhance profitability should prioritize initiatives that improve operational efficiency, cost control, and pricing discipline. In contrast, the relatively modest explanatory power of leverage suggests that financial engineering alone cannot substitute for fundamental operational excellence. This conclusion aligns with Puspitasari et al.'s (2021) finding that operational efficiency (measured by the operating cost-to-income ratio) serves as a critical determinant of banking sector profitability, with effects operating both directly and through mediating mechanisms.

4.4 Market Valuation Ratios and ROA

Neither price-to-book value (coefficient 0.098, $p=0.319$) nor price-earnings ratio (coefficient 0.0004, $p=0.749$) exhibits a statistically significant association with contemporaneous return on assets. These null findings suggest that market-based valuation multiples—which incorporate forward-looking investor expectations about future cash flows, growth prospects, and risk—do not map directly to current accounting-based profitability measures.

The absence of significant PBV-ROA and PER-ROA relationships in cross-sectional analysis contrasts with some prior studies documenting associations between valuation ratios and performance measures. Wu [11] reports a U-shaped relationship between forward P/E ratios and subsequent return on equity, indicating that the P/E-profitability link may be non-linear and operates with time lags rather than contemporaneously. Nawawi et al. [25] find that ROA significantly affects PBV in Indonesian state-owned banks, suggesting reverse causality where current profitability drives market valuations rather than valuations explaining current profitability.

Several factors may explain the weak contemporaneous associations observed here. First, market valuation ratios reflect expectations about future performance rather than current realized profitability, introducing temporal misalignment between the variables. Second, valuation multiples incorporate growth expectations, risk assessments, and industry-specific factors that operate independently of current profitability levels. Third, in emerging markets characterized by lower information quality and market efficiency, valuation ratios may contain substantial noise that obscures fundamental relationships [12, 13].

The insignificance of PBV and PER in explaining ROA variation suggests that these market-based indicators serve primarily as forward-looking expectation measures rather than contemporaneous performance determinants. Managers and analysts should recognize that high market valuations do not necessarily reflect superior current profitability, and vice versa. This disconnect between market valuations and accounting returns highlights the importance of distinguishing between expectation-based and realization-based performance metrics when evaluating firm success.

4.5 Control Variables: Sector and Sharia-Compliance Effects

The Sharia-compliance dummy exhibits a significant positive coefficient (1.61, p=0.013), indicating that Sharia-compliant firms demonstrate approximately 1.6 percentage points higher ROA compared to conventional firms after controlling for capital structure, efficiency, and market valuation factors. This finding suggests that Islamic financing principles and operational constraints may confer profitability advantages in the Indonesian context, potentially through mechanisms such as enhanced governance, stakeholder-oriented management, restricted leverage policies, and screening processes that exclude higher-risk business activities.

Sector effects reveal substantial heterogeneity in baseline profitability levels across industries. Relative to the omitted baseline sector, the Energy sector demonstrates significantly higher ROA (coefficient 2.28, p=0.025), consistent with favorable commodity price environments or structural characteristics of energy businesses that generate superior returns. Conversely, Consumer Cyclicals (coefficient -1.61, p=0.044) and Technology (coefficient -4.76, p=0.013) sectors exhibit significantly lower ROA, potentially reflecting intense competition, high research and development costs, or cyclical demand patterns that compress margins. Other sectors including Financials, Healthcare, Industrials, and Properties & Real Estate show no significant differences from the baseline after controlling for firm-specific characteristics.

These sectoral patterns underscore the importance of industry context in shaping profitability outcomes. Managers and investors should recognize that baseline profitability expectations vary substantially across sectors due to differences in competitive dynamics, capital intensity, regulatory environments, and business cycle sensitivities that operate independently of firm-specific capital structure and efficiency choices.

4.6 ROE Model Results (with DER², sector, and Sharia controls)

Table 3 presents OLS estimation results for the return on equity model. The model achieves an R^2 of 0.390, nearly identical to the ROA specification, indicating comparable explanatory power. The Breusch-Pagan test again strongly rejects homoskedasticity (LM=432.34, p<0.001), validating the use of robust standard errors.

Table 3. OLS estimates (dependent variable: ROE, %). HC3 robust standard errors in SE column.

Variable	Coef.	SE (HC3)	p-value	Signif.
const	-2.6136	4.0506	0.5188	
DER	1.4121	2.3716	0.5516	
DER2	-0.5915	0.3444	0.0859	*
NPM	0.1598	0.0300	0.0000	***
PBV	0.6297	0.5217	0.2275	
PER	-0.0017	0.0041	0.6676	
Sharia_dummy	5.6436	3.2081	0.0785	*
Sector_Consumer Cyclicals	-1.3895	2.8674	0.6280	
Sector_Consumer Non-Cyclicals	2.3825	2.7986	0.3946	
Sector_Energy	0.6940	3.8115	0.8555	

Sector_Financials	8.4237	3.4211	0.0138	**
Sector_Healthcare	-0.8166	2.2007	0.7106	
Sector_Industrials	3.6882	2.0927	0.0780	*
Sector_Infrastructures	-0.4031	3.7220	0.9137	
Sector_Properties & Real Estate	1.9008	2.4709	0.4417	
Sector_Technology	-10.0429	6.5516	0.1253	
Sector_Transportation & Logistic	9.4091	5.0036	0.0600	*

4.7 Capital Structure and ROE

The relationship between leverage and return on equity differs markedly from the ROA specification. The linear DER term shows a positive but statistically insignificant coefficient (1.41, p=0.552), while the quadratic term (DER²) exhibits a negative coefficient approaching conventional significance levels (-0.59, p=0.086). This pattern suggests a potential inverted U-shaped relationship where leverage initially enhances ROE but eventually reduces returns at higher debt levels—a pattern more clearly consistent with trade-off theory predictions [4, 5].

The contrasting leverage-profitability patterns between ROA and ROE specifications reflect the mechanical relationship between these profitability measures and financial leverage. Return on equity incorporates leverage effects directly through the DuPont identity: ROE = (Net Income/Sales) × (Sales/Assets) × (Assets/Equity). The equity multiplier (Assets/Equity) increases with leverage, mechanically amplifying ROE when returns on assets exceed borrowing costs. Consequently, moderate leverage can enhance ROE through favorable financial leverage effects, while excessive debt eventually imposes financial distress costs and interest burdens that overwhelm any benefits.

This finding aligns with Gundahara et al.'s (2025) documentation of a positive DER-ROE relationship in Indonesian energy sector firms, interpreted as supporting trade-off theory and Modigliani-Miller predictions that optimal leverage enhances firm value in capital-intensive industries. The marginally significant negative quadratic term in our broader sample suggests that such positive leverage effects operate primarily at moderate debt levels, with the relationship reversing as firms approach financial distress regions. This concave pattern provides more nuanced evidence than simple linear specifications, demonstrating that the leverage-profitability nexus depends critically on the level of existing debt.

The differing leverage effects on ROA versus ROE also illuminate why empirical studies report mixed findings on capital structure-performance relationships. Studies focusing exclusively on ROA tend to find negative associations (consistent with pecking-order theory), while ROE-focused analyses more frequently document positive relationships (consistent with trade-off theory). Our simultaneous estimation of both specifications reveals that these seemingly contradictory findings reflect different aspects of the same underlying economic relationships, with the choice of profitability metric materially influencing empirical conclusions.

4.8 Operational Efficiency and ROE

Net profit margin again demonstrates a highly significant positive association with profitability (coefficient 0.160, p<0.001), confirming its role as a fundamental determinant of firm performance. The NPM coefficient magnitude in the ROE specification (0.160) substantially exceeds that in the ROA model (0.047), reflecting the amplification effects of financial leverage embedded in the ROE measure. A one-percentage-point increase in net profit margin associates with a 0.16 percentage-point increase in ROE—more than triple the corresponding ROA effect.

This amplified NPM-ROE relationship illustrates how operational efficiency improvements translate into shareholder returns through the leverage multiplier. Firms maintaining positive spreads between return on assets and borrowing costs experience magnified profitability gains from margin improvements as measured by ROE, while firms with negative spreads suffer correspondingly amplified losses. The consistency of significant positive NPM effects across both ROA and ROE specifications, combined with coefficients substantially exceeding those of other explanatory variables, reinforces the conclusion that operational efficiency represents the primary driver of profitability variation among Indonesian listed firms.

These findings carry important implications for the ongoing debate about comprehensive performance measurement. Kaur and Mulugeta [8] argue that DuPont analysis, which decomposes ROE into profit margin, asset turnover, and financial leverage components, provides more comprehensive performance assessment than single-dimension metrics like earnings per share. Our results support this perspective by demonstrating that profit margin—one of the three DuPont components—exerts dominant influence on both ROA and ROE, while financial leverage effects (captured by DER and DER²) show more complex and specification-dependent patterns.

4.9 Market Valuation Ratios and ROE

Consistent with the ROA specification, neither price-to-book value (coefficient 0.63, p=0.228) nor price-earnings ratio (coefficient -0.002, p=0.668) exhibits statistically significant associations with return on equity. The continued absence of significant valuation ratio effects when using ROE as the dependent variable strengthens the conclusion that contemporaneous cross-sectional relationships between market-based valuation multiples and accounting-based profitability measures are weak or non-existent in the Indonesian market context.

This pattern reinforces the interpretation that valuation ratios primarily reflect forward-looking market expectations rather than current performance realizations. The temporal and conceptual disconnect between expectation-based market valuations and contemporaneous accounting returns suggests that these metrics capture distinct dimensions of firm performance that should not be conflated in empirical analysis or managerial decision-making. Future research employing dynamic panel specifications with lagged structures could better elucidate the lead-lag relationships between market valuations and subsequent profitability realizations [11].

4.10 Control Variables: Sector and Sharia-Compliance Effects on ROE

The Sharia-compliance effect remains positive and approaches conventional significance levels (coefficient 5.64, p=0.079), suggesting that Islamic business principles may confer even larger profitability advantages when measured from shareholders' perspective (ROE) compared to the total asset perspective (ROA). This pattern is consistent with Sharia-compliant firms' restrictions on excessive leverage, which may reduce financial distress costs and agency problems while maintaining favorable equity returns.

Sector effects in the ROE specification reveal different patterns compared to the ROA model. The Financials sector exhibits significantly higher ROE (coefficient 8.42, p=0.014), likely reflecting favorable spread environments and the unique economics of financial intermediation where moderate leverage enhances equity returns. The Industrials sector shows marginally higher ROE (coefficient 3.69, p=0.078), while Transportation & Logistics approaches significance with substantially elevated returns (coefficient 9.41, p=0.060). The Technology sector's large negative coefficient (-10.04) does not reach significance in the ROE specification (p=0.125), though the point estimate suggests continued profitability challenges in this sector.

These varying sectoral patterns between ROA and ROE specifications highlight how industry characteristics interact with capital structure to determine shareholder returns. Industries such as Financials and Transportation & Logistics that can effectively employ financial leverage to amplify operating returns show stronger positive sector effects in ROE compared to ROA specifications. Understanding these industry-specific dynamics is crucial for investors and managers seeking to optimize financial policies and set appropriate performance benchmarks.

4.11 Model Diagnostics

Variance inflation factors reported in Appendix A indicate acceptable multicollinearity levels for most regressors, with VIF values generally below 3.0. The highest VIF values occur for the DER and DER² terms (approximately 8.0 and 7.5 respectively), which is expected given their mathematical relationship and does not pose concerns for inference on other variables. All other variables maintain VIF values well below 10, the commonly cited threshold for problematic multicollinearity.

The Breusch-Pagan tests strongly reject homoskedasticity in both specifications (ROA: LM=161.84, p<0.001; ROE: LM=432.34, p<0.001), confirming the appropriateness of heteroskedasticity-robust standard errors. Figure 3 illustrates the fitted versus actual ROA values, demonstrating reasonable model calibration across the profitability distribution, though with greater dispersion at extreme values. The scatter

pattern suggests that while the model captures central tendencies well, additional factors beyond those included in the specification contribute to profitability variation among the highest and lowest performing firms.

4.12 Synthesis and Interpretation

The comprehensive analysis reveals several key patterns in the determinants of profitability for Indonesian listed firms. First, operational efficiency as measured by net profit margin emerges as the dominant and most reliable driver of both ROA and ROE, with highly significant positive coefficients substantially exceeding those of other explanatory variables. This finding underscores the fundamental importance of cost discipline, pricing power, and operational excellence for achieving superior profitability in emerging market contexts.

Second, capital structure exhibits complex and specification-dependent relationships with profitability. Leverage demonstrates a significant negative linear association with ROA, consistent with pecking-order theory, but shows evidence of a concave relationship with ROE more consistent with trade-off theory predictions. These contrasting patterns illuminate why prior empirical studies report mixed findings on leverage-profitability relationships: the direction and magnitude of associations depend critically on whether profitability is measured from a total asset or equity perspective, the range of leverage ratios in the sample, and whether non-linear specifications are employed.

Third, market-based valuation ratios (PBV and PER) show no significant contemporaneous associations with accounting-based profitability measures in cross-sectional analysis. This disconnect reflects the forward-looking, expectation-based nature of market valuations versus the backward-looking, realization-based nature of accounting returns. Managers and investors should recognize that high market valuations do not necessarily signal superior current profitability, and analytical frameworks should carefully distinguish between these conceptually distinct performance dimensions.

Fourth, both Sharia-compliance status and sectoral affiliation exert significant influences on profitability that operate independently of firm-specific capital structure and efficiency characteristics. These institutional and industry effects highlight the importance of contextual factors in shaping performance outcomes and suggest that optimal financial policies and performance benchmarks should account for such structural heterogeneities.

4.13 Diagnostics

ROA: R^2 = 0.392; Breusch–Pagan LM=161.84 (p=0.0000). ROE: R^2 = 0.390; Breusch–Pagan LM=432.34 (p=0.0000). Small p-values indicate heteroskedasticity; HC3 robust SE mitigate inference bias. VIF values (reported in Appendix) indicate acceptable multicollinearity for most regressors.
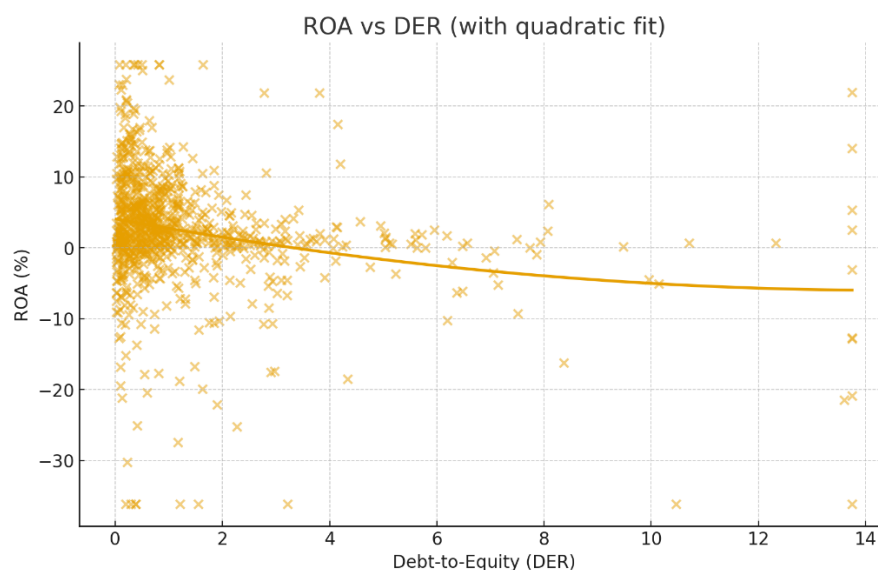

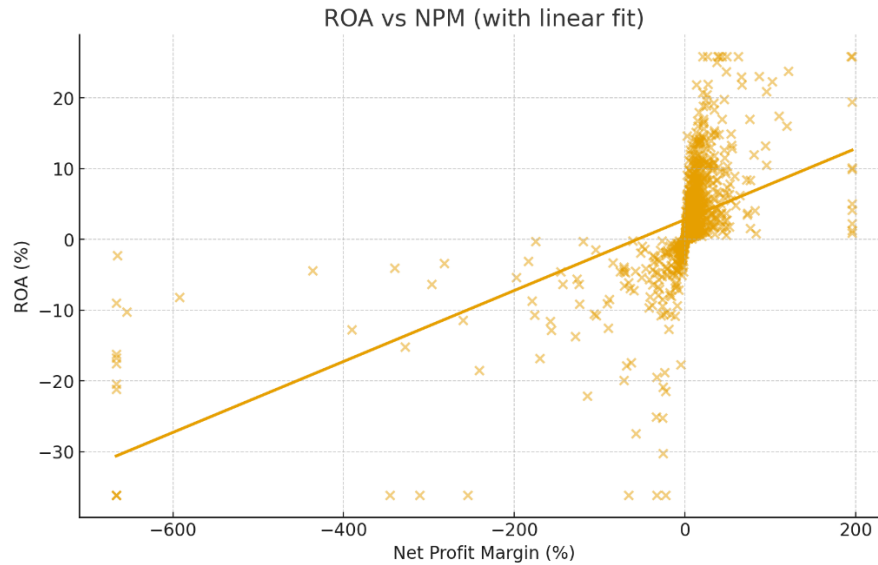Figure 1. ROA vs DER with quadratic fit (concave shape consistent with trade-off theory).

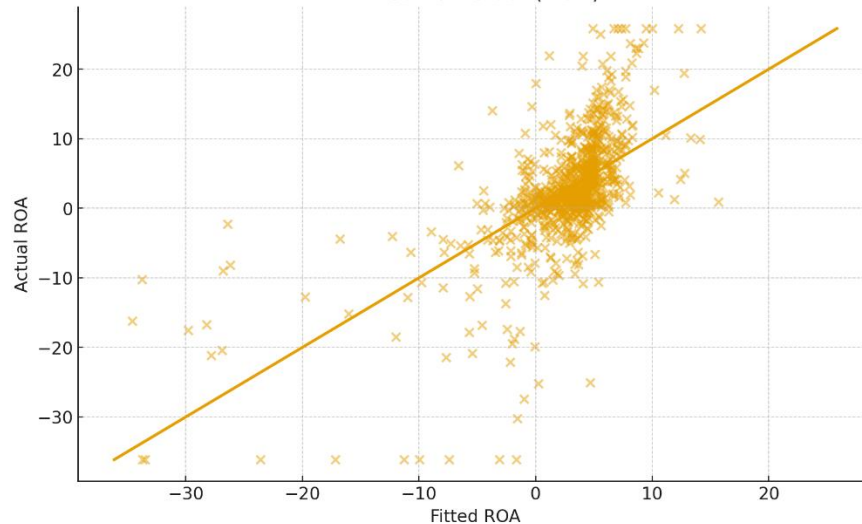Figure 2. ROA vs NPM with linear fit (positive slope).

Figure 3. Fitted vs Actual ROA (model calibration).

5. CONCLUSION AND RECOMMENDATIONS

Net profit margin (efficiency) emerges as the most reliable driver of profitability for Indonesian listed firms, while leverage relates to ROA in a concave manner consistent with trade-off theory. PBV and PER display mixed contemporaneous links to profitability, reflecting their role as expectation-based indicators. Managers should prioritize margin discipline and prudent leverage choices. Policymakers may encourage transparency and cost efficiency to strengthen profitability. Future research could incorporate dynamic (panel) models, lag structures, and instrumental-variable strategies to address potential endogeneity.

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Appendix A. Additional Diagnostics

Variance Inflation Factors (ROA model):

Variable	VIF
DER	8.057222132864675
DER2	7.459833861837619
NPM	1.0585815905140026
PBV	1.2039279936865903
PER	1.040288663405338
Sharia_dummy	1.5532777138651876
Sector_Consumer Cyclicals	2.02835833355112
Sector_Consumer Non-Cyclicals	1.9300601072247645
Sector_Energy	1.652800569180192
Sector_Financials	2.1606735267228174
Sector_Healthcare	1.287489165257618
Sector_Industrials	1.4856784036362192
Sector_Infrastructures	1.4940004564957698
Sector_Properties & Real Estate	1.6361840595726238
Sector_Technology	1.4047821235360365
Sector_Transportation & Logistic	1.2909083115814501

Variance Inflation Factors (ROE model):

Variable	VIF
DER	8.057222132864675
DER2	7.459833861837619
NPM	1.0585815905140026

PBV	1.2039279936865903
PER	1.040288663405338
Sharia_dummy	1.5532777138651876
Sector_Consumer Cyclicals	2.02835833355112
Sector_Consumer Non-Cyclicals	1.9300601072247645
Sector_Energy	1.652800569180192
Sector_Financials	2.1606735267228174
Sector_Healthcare	1.287489165257618
Sector_Industrials	1.4856784036362192
Sector_Infrastructures	1.4940004564957698
Sector_Properties & Real Estate	1.6361840595726238
Sector_Technology	1.4047821235360365
Sector_Transportation & Logistic	1.2909083115814501