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CAPITAL STRUCTURE AND FIRM VALUE NEXUS: THE MODERATING ROLE OF AGENCY COST

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ABSTRACT

This study aims to examine the linear and non-linear relationship between capital structure (CS) and firm value (FV) and examine the moderating role of agency costs in the CS-FV relationship. The study employs static and quadratic regression analysis on panel data consisting of 318 observations from non-financial firms to examine the linear and non-linear relationships between capital structure and firm value. The data is sourced from non-financial companies listed on the Indonesia Stock Exchange over the period of 2021-2023. Capital structure has a significant positive effect on firm value. Agency costs are significantly and negatively associated with firm value. There is a strong non-linear relationship between capital structure and firm value that supports trade-off theory and agency costs. Agency costs are an important moderator in the CS-FV relationship. Overall, the sensitivity analysis shows that the results are robust. Firms need to carefully consider the level and type of debt and equity in their CS to deal with changing economic conditions. The moderating effect of agency costs can assist firms in optimizing capital structure, emphasizing the importance of aligning interests to encourage sustainable business practices. This study enhances the existing literature by presenting new evidence concerning the non-linear relationship between capital structure and firm performance, as well as the moderating role of agency costs in this relationship, specifically within emerging capital markets, where research in this area remains limited.

Keywords: Firm value, Capital structure, Non-linear relationship, Agency costs, Moderation

INTRODUCTION

The main objective of financial management in a company is to maximize firm value, which is directly correlated with shareholder welfare (Brealey et al., 2023; Duran & Gogan, 2014; M. C. Jensen, 2001). In the pursuit of maximizing firm value, a key objective in financial management directly linked to shareholder welfare, strategic capital structure decisions take center stage (Boateng et al., 2022), particularly when viewed through the lens of agency costs (Ain et al., 2020). These costs, arising from the separation of ownership and control (C. Jensen & Meckling, 1976; M. Jensen & Meckling, 2012), influence the effectiveness of capital structure choices in enhancing firm value. Empirical evidence suggests a relationship between firm value and several factors that are specific to the firm, including capital structure (Firmansyah et al., 2023; Islami, 2022; Toni et al., 2021); corporate growth (Elmoursy et al., 2025; Muhammad & Kurniasari, 2023; Topani Suzulia & Badawi Saluy, 2020), agency costs (Bahraini et al., 2021; Moez, 2024; Yoon et al., 2024; Hoang et al., 2019), firm size (Sihombing & Astuty, 2021), profitability (Alghifari et al., 2022; Kusumowardhani, 2020; Muhammad & Kurniasari, 2023; Wahyudi, 2020), ownership (Diah Safitri et al., 2023; Fuadah et al., 2022), liquidity (Damayanti & Sucipto, 2022; Sondakh, 2019) and dividend policy (Akhmadi & Robiyanto, 2020; Bon & Hartoko, 2022). Among the numerous factors influencing firm value, the impact of capital structure remains a subject of debate, often yielding varied empirical findings across different market contexts (Rastogi et al., 2017).

In an increasingly volatile global economic landscape, the quest for optimal capital structure remains a paramount strategic challenge for firms worldwide (Pham et al., 2025; Öztekin, 2024). The decisions surrounding the mix of debt and equity directly influence a company's financial risk, cost of capital, and ultimately, its firm value—a key indicator of shareholder wealth and corporate success. This urgency is particularly pronounced in emerging markets like Indonesia, where companies listed

on the IDX continuously navigate unique economic conditions, regulatory changes, and investor expectations (Febrianti et al., 2024; Kamal, 2024; Kusumawati, 2024). Understanding the intricate dynamics between capital structure and firm value is thus not merely an academic exercise but a critical imperative for corporate sustainability and national economic growth.

Despite extensive scholarly inquiry into the relationship between capital structure and firm value, findings remain inconsistent and often contradictory (Muhammad et al., 2020; Kruk, 2021; Doorasamy, 2021; Isyaku et al., 2020; Firmansyah et al., 2023; Sihombing & Astuty, 2021). Some studies suggest a linear positive correlation, attributing it to tax benefits and debt discipline (Kruk, 2021); others propose an optimal capital structure, beyond which financial distress costs erode value, leading to a non-linear, inverted U-shaped relationship (Doorasamy, 2021). These divergences highlight a critical research gap, the direct link is likely influenced by unexamined contextual factors. Furthermore, while agency costs are acknowledged as a significant drain on firm value (Bahraini et al., 2021; Moez, 2024; Yoon et al., 2024; Hoang et al., 2019), their specific role as a moderating variable within the capital structure-firm value nexus remains largely unexplored in existing literature. Prior research has primarily treated agency costs as either an independent variable or a component within the capital structure decision-making process, rather than examining how they mediate the effectiveness of capital structure choices on firm value. This conceptual oversight is particularly evident in emerging economies such as Indonesia, where unique institutional environments and governance practices may profoundly alter these theoretical relationships, representing another critical contextual gap that our study aims to bridge.

In the context of the agency theory framework, the separation of ownership (shareholders) and control (management) can lead to conflicts of interest (Salehi et al., 2021). This conflict can trigger agency costs, which are expenses or losses arising from misaligned interests (Baral & Patnaik, 2020). These agency costs have the potential to influence managerial decisions regarding capital structure, and change the impact of these decisions on firm value (Arum et al., 2023). For example, managers may tend to take on excessive debt for "empire-building" or personal gain purposes that are not aligned with shareholder interests (Salehi et al., 2021). Therefore, the effectiveness of capital structure policy in maximizing firm value is not only determined by financial characteristics, but also by how effectively agency problems are managed.

Crucially, this study positions agency cost not as a direct determinant of firm value, but as a moderating variable that influences the nature and strength of the relationship between capital structure and firm value. This choice is rooted in the understanding that the effectiveness of a particular capital structure in enhancing firm value is often contingent upon the extent of principal-agent conflicts within the company. For instance, the disciplinary benefits of debt, as proposed by trade-off theory, may be more pronounced and impactful in firms characterized by high agency costs, where managerial discretion needs tighter control. Conversely, in firms with lower agency costs, the same increase in debt might yield different, possibly less dramatic, effects on firm value.

This study addresses a critical gap in understanding how agency costs interact with capital structure decisions in emerging markets. While prior research has largely focused on trade-off and pecking order theories, limited attention has been given to the moderating role of agency costs in shaping non-linear relationships between capital structure and firm value. To bridge this gap, the present study proposes an integrated model that combines these theoretical perspectives to provide a holistic view of firm value optimization. Specifically, the research examines the moderating effect of agency costs on the capital structure, firm value nexus in non-financial companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2023 period, a timeframe chosen to capture post-pandemic market dynamics and evolving economic conditions in Indonesia. The empirical study outlined in this paper will be guided by the following research questions:

1. Does capital structure exhibit both linear and non-linear relationships with firm value?
2. Does agency cost significantly affect firm value?
3. Do agency costs exert a moderating effect on the relationship between capital structure and firm value?

This study offers a valuable contribution to the literature on capital structure and firm value. Firstly, it expands the current discourse on the relationship between capital structure and firm value. Secondly, it presents empirical evidence from the context of developing countries, offering a perspective that may differ from that of developed economies. Thirdly, the study introduces a novel approach by incorporating moderator variables, an aspect that has been relatively unexplored in prior research.

Finally, the findings offer practical implications and recommendations for enhancing firm value for various stakeholders within developing economies.

The objectives of this study are threefold. First, to investigate the linear and non-linear relationships between capital structure and firm value. Second, to examine the impact of agency costs on firm value (Florackis, 2008). Third, to determine whether agency costs moderate the relationship between capital structure and firm value in non-financial companies listed on the Indonesia Stock Exchange.

The research is divided into five separate sections. The first section includes an outline of the gaps and research questions, as well as related objectives. Section 2 discusses the literature review. The research design is discussed in Section 3. Section 4 presents the statistical analysis and empirical results. The last section summarizes and concludes the research findings, theoretical and managerial implications, limitations, and recommendations for future research.

Literature Review

Agency Theory and Agency Cost

Agency theory is rooted in the separation of ownership (principals or shareholders) and control (agents or management) in modern corporations (C. Jensen & Meckling, 1976). This separation, coupled with information asymmetry and conflicts of interest, can lead to agency problems (Kalay, 2014). This conflict of interest arises because managers may have personal goals that differ from the shareholders' goal of maximizing company wealth. These agency problems ultimately give rise to agency costs, which can be grouped into three main categories (C. Jensen & Meckling, 1976): (1) monitoring costs: expenses borne by the principal to supervise the agent's actions; (2) bonding costs: costs borne by the agent to ensure compliance with shareholder interests; and (3) residual loss: unavoidable losses that arise despite monitoring and bonding efforts.

In this study, the asset utilization ratio (AUR) serves as a proxy for agency costs (Ain et al., 2020). This ratio quantifies a company's efficiency in generating operating revenue from its assets (Baral & Patnaik, 2020). A lower AUR may indicate the presence of agency problems, suggesting that managers are not optimally utilizing the company's assets in the best interests of shareholders. This inefficient use of assets can ultimately lead to residual losses (Ghosh & Sun, 2014). In other words, if a company isn't effectively using its assets to generate revenue, it could be a sign that managers are not working in the best interest of the shareholders. Instead, they might be mismanaging resources, leading to lower returns. Therefore, a low AUR may reflect the presence of higher agency costs.

Base on those explanation, agency theory is central to our investigation, positing that the separation of ownership and control in modern corporations can lead to conflicts of interest and associated agency costs. These costs, which diminish shareholder wealth, are critical for understanding managerial decision-making, including capital structure choices. Crucially, Agency theory serves as the foundation for incorporating agency costs as a moderating variable, enabling us to examine how the severity of principal-agent conflicts influences the relationship between capital structure and firm value.

Capital Structure Theory

Trade-off Theory

The trade-off theory of capital structure posits that companies aim to achieve an optimal capital structure by carefully balancing the advantages and disadvantages of debt financing (Ai et al., 2020). Specifically, it suggests that firms weigh the tax benefits derived from debt (i.e., the deductibility of interest expenses, also known as the debt tax shield) against the increasing costs associated with financial distress as leverage increases (Obeng, 2019). These costs may include the potential for bankruptcy, agency costs, and other indirect costs related to higher debt levels. According to this theory, an optimal level of debt exists where the marginal benefit of additional debt equals the marginal cost, thus maximizing the firm's overall value (Hunjra et al., 2020). This theory assumes a trade-off between the benefits of debt and the risk of financial distress (Geoffrey, 2020).

Pecking Order Theory

The pecking order theory, in contrast, proposes that firms follow a hierarchy when choosing their sources of financing, primarily due to information asymmetry between managers and investors (Rathnasingha & Heiyanthuduwa, 2019). This theory suggests that companies prefer internal financing (retained earnings) first, followed by debt, and lastly, external equity (Shahar & Manja, 2018). The preference for internal funds stems from the avoidance of transaction costs and the signaling effects associated with issuing new securities. When external financing is required, debt is favored over equity because debt is considered a less risky signal to investors than issuing new shares, which may be interpreted as a sign that the company's stock is overvalued. Empirical evidence suggests that the Pecking Order Theory may not universally apply, particularly to firms with very high or very low leverage (Ağca et al., 2004; Rathnasingha & Heiyanthuduwa, 2019). Some studies indicate that smaller, riskier firms with fewer liquid assets tend to rely more on debt financing, which aligns with the pecking order theory (Paseda, 2016).

Trade-off theory guides our exploration of the direct link between capital structure and firm value. It suggests that firms strategically balance the benefits of debt (e.g., tax shields, management discipline) against the costs of financial distress as leverage increases. This theoretical perspective directly supports regarding both the linear and non-linear relationships between capital structure and firm value, positing an optimal debt level beyond which increasing costs outweigh benefits.

Complementing the trade-off theory, the pecking order theory offers insights into the financing preferences of firms, emphasizing a hierarchy (internal funds, then debt, then equity) driven by information asymmetry between managers and investors. While our study primarily focuses on the impact of capital structure, this theory provides an important context for understanding the formation of capital structures observed in our sample. Its insights, particularly in modified forms, can also contribute to explaining the non-linear relationship observed in capital structure and firm value, where managerial financing choices under information asymmetry may lead to deviations from an ideal optimal structure.

Capital Structure

Capital structure refers to the strategic use of borrowed capital to magnify the potential return on investment (Albart et al., 2020). Debt-to-Equity Ratio (DER) is a widely accepted measure of capital structure, showing the proportion of a company's financing that comes from debt relative to equity. Capital structure can be defined as the decisions surrounding a company's funding composition (Nguyen & Nguyen, 2020). Funding sources are generally categorized as internal (e.g., retained earnings) and external (e.g., debt and equity) (Shahar & Manja, 2018). A company's capital structure directly influences its financial standing. Capital structure decisions impact the market price of a company's stock, thereby affecting its overall value (Kruk, 2021; Muhammad et al. 2020). An optimal capital structure, which balances debt and equity (Hunjra et al., 2020), can maximize firm value by signaling positive prospects to investors through increased stock prices (Kusumowardhani, 2020; Optimum Capital Structure, 2019). Finding the optimal capital structure can lead to a higher firm value (Nguyen & Nguyen, 2020), by minimizing the cost of acquiring funds and maximizing the company value.

Firm Value

Firm value is broadly defined as the market's perception of the overall success and future prospects of a company, which is intrinsically linked to its share price and the maximization of shareholder wealth (Permata, 2022). Maximizing firm value is recognized as the primary financial objective for any company. Firm value is a certain condition achieved by a company, which is shown in the market price of the company's shares (Sihombing & Astuty, 2021).

Firm value is a certain condition achieved by a company, as reflected in the market price of its shares (Kusumowardhani, 2020). Investors' perception of market value is the value of the company, with great profit potential depending on stock price appreciation. An increasing share price can be a reliable indicator of firm value, as a company with a high share price tends to foster market confidence in its performance, thereby increasing its attractiveness to investors (Hameedi et al., 2022). High firm

value, in turn, fosters market confidence in the company's future prospects and performance (Zulfikar et al., 2020). Firm performance can send positive or negative signals to investors, influencing their investment decisions and, consequently, affecting firm value. Effective performance can increase firm value (Alghifari et al., 2022; Rossi & Harjoto, 2020), while poor performance can decrease firm value.

Empirical Studies and Hypothesis

Relationship between Capital Structure and Firm Value

In finance literature, a positive relationship between capital structure and firm value is often observed (Muhammad et al., 2020; Kruk, 2021). This relationship is frequently attributed to the trade-off theory (Ai et al., 2020; Le & Moore, 2023), which posits that firms can increase their value through the strategic use of debt, primarily due to the tax shield benefit and the disciplinary role of debt. Firstly, debt provides a tax shield benefit (Cordes & Sheffrin, 1983; Elmoursy et al., 2025). The deductibility of interest expenses reduces a company's tax obligations (Cordes & Sheffrin, 1983), increasing net cash flow available to shareholders, in turn, can lead to an appreciation in the firm's stock market price (Rossi & Harjoto, 2020).

Secondly, debt introduces a discipline, where the obligation to make periodic interest and principal payments encourages management to operate more efficiently, reduce unnecessary expenditures, and make more prudent investment decisions (Ain et al., 2020). This discipline can mitigate agency problems and reduce agency costs (Salehi et al., 2021), ultimately enhancing efficiency and firm value. Based on this reasoning, the following initial hypothesis regarding the linear relationship can be proposed:

H_1: Capital structure has a positive influence on firm value.

Non-linear Relationship between Capital Structure and Firm Value

While debt provides benefits, the trade-off theory also acknowledges the costs associated with increasing debt levels (Ai et al., 2020). These costs include financial distress costs, such as the heightened risk of default, debt restructuring, or bankruptcy. Financial distress costs encompass direct costs (administrative costs) and indirect costs (loss of customers, decreased employee morale, and difficulty securing new financing) (Geoffrey, 2020; Sayari & Mugan, 2013). Additionally, the agency costs of debt arise when high debt levels create conflicts of interest between shareholders and creditors (Kontuš, 2021). Shareholders might be tempted to pursue high-risk projects (risk shifting) or reject positive-value investments (underinvestment) because the benefits primarily accrue to creditors, potentially harming the company's overall value.

Considering both the advantages and disadvantages of debt, the trade-off theory suggests a non-linear, inverted U-shaped relationship between capital structure and firm value (Doorasamy, 2021; Isyaku et al., 2020). Initially, the benefits of debt outweigh the costs, leading to an increase in firm value as debt increases. However, beyond an optimal point, the costs of debt begin to offset or even exceed its benefits. Consequently, further increases in debt can actually reduce firm value (Alghifari et al., 2022). Based on these considerations, the hypothesis is extended to incorporate a non-linear relationship:

H_2: Capital structure has a non-linear relationship to firm value.

Relationship Between Agency Costs and Firm Value

In the context of this research, the asset utilization ratio is employed as an inverse proxy for agency costs. AUR measures the efficiency with which a company uses its assets to generate sales or revenue (Herdinata, 2019). A high AUR indicates that the company is effectively leveraging its assets, suggesting that management is successfully managing assets in the best interests of the owners and minimizing waste or suboptimal behavior (Agarwal & Singh, 2021). Thus, a high AUR reflects low agency costs (Amin et al., 2022).

Conversely, a low AUR signals inefficiency in asset utilization, potentially indicating agency problems (Baral & Patnaik, 2020). Management may not be maximizing the use of assets, or assets

might be used for purposes that do not directly contribute to shareholder value. Therefore, a low AUR reflects high agency costs (Agha, 2016; Hsu & Liu, 2016). If agency costs reduce operational efficiency and divert resources from value-creating projects, then logically, agency costs will negatively impact firm value (Hoang et al., 2019; Linda et al., 2020; Moez, 2018; Yoon et al., 2024). Suboptimal management practices or the prioritization of personal gains over corporate objectives can diminish the cash flow available to shareholders, leading to reduced growth expectations and increase risk, ultimately resulting in a lower valuation of the company. This reflects the agency problem, where managers, acting as agents of the shareholders, may make decisions that do not maximize shareholder wealth (Baral & Patnaik, 2020). Based on this theoretical foundation, the following hypothesis can be formulated:
H_3: Agency costs has a negative effect on firm value.

The Moderating Role of Agency Costs

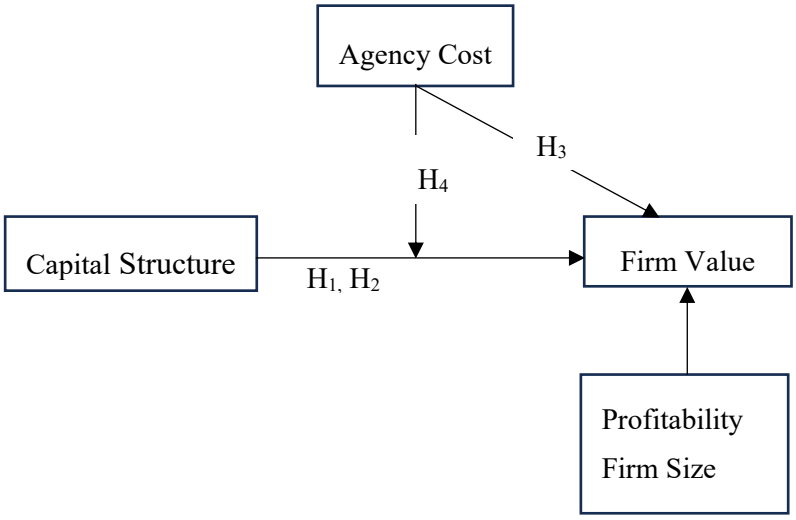
Debt, with its strict interest and principal payment obligations, can impose external discipline on management (Grinstein, 2006; M. Zhang, 2020). Managers facing the pressure of debt repayment tend to be more cautious in their investment and operational decision-making, reducing waste and focusing on projects that generate cash flow (Cheng & Tzeng, 2014; Guo et al., 2021). This discipline directly curbs managers' opportunistic behavior and reduces agency costs (Harvey et al., 2004). However, the disciplinary effect of debt is not constant (H. Zhang, 2009). Rather, its effectiveness varies depending on the severity of pre-existing agency problems within the company (Ahmed et al., 2023). When a company experiences significant agency problems (indicated by a low AUR, signifying inefficient asset utilization) (Farooq, 2015), the addition of debt becomes highly effective in enforcing discipline on management (Salehi, Sadatifar, et al., 2021). Debt reduces the free cash flow that management can misuse, thereby encouraging them to act more in line with the interests of shareholders (Ha, 2019; Staglianò et al., 2014). In this condition, the disciplinary benefits of debt are strongly felt, so the positive relationship between DER and PBV will become stronger or even create a significant value benefit that did not exist previously.

Conversely, in companies that already exhibit low agency costs (indicated by a high AUR, suggesting efficient asset utilization), management is likely already operating optimally in the best interests of shareholders (Agarwal & Singh, 2021; Baral & Patnaik, 2020). In this situation, the additional disciplinary benefits of debt become less relevant or even negligible (Ain et al., 2020). Further increases in debt may no longer generate significant value enhancement through agency cost reduction; instead, debt may only introduce additional financial risks (e.g., financial distress costs) without commensurate rewards, ultimately weakening or even reversing the positive relationship between DER and PBV (Ahmed et al., 2023; Cheng & Tzeng, 2014; Pandey & Sahu, 2019). Thus, agency costs not only directly affect firm value, but also influence how capital structure impacts firm value (Ain et al., 2020). The relationship between capital structure and firm value is moderated by the level of a company's agency costs (Ahmed et al., 2023; M. Zhang, 2020).
H_4: Agency cost moderates the relationship between capital structure and firm value.

RESEARCH METHOD

Timeframe and Statistical Analysis Model

This study uses a sample of companies listed on the Indonesia Stock Exchange (IDX) from 2021 to 2023. This study employs a quantitative explanatory research design using panel data regression to test both linear and non-linear relationships, as well as moderation effects. The research uses fixed effects panel regression models to account for firm-specific and time-specific heterogeneity. STATA software was used to obtain descriptive statistics for all variables and multivariate analysis. Research design presents below.



Picture 1. Research Design

Sample Selection

The main source of information is the annual reports from 2021 to 2023 of non-financial companies listed on the IDX. The focus on non-financial firms is essential to ensure comparability of financial structures and avoid the unique regulatory and operational characteristics of financial institutions. This study uses a purposive sampling method to select a sample of non-financial companies listed on the Indonesia Stock Exchange (IDX) during the 2021-2023 period, which is filtered from an initial population of 611 companies. This approach was carefully designed to ensure the homogeneity and comparability of financial data, which is crucial for accurately investigating the relationships between capital structure, agency costs, and firm value within a consistent economic and regulatory environment. Criteria include companies that publish financial statements as of December 31, use the Rupiah currency, and generate profits during the research period. The exclusive selection of companies reporting in Rupiah (the official currency of Indonesia) ensures consistency and eliminates potential distortions or complexities arising from currency conversions. This is particularly important for accurate cross-sectional and time-series analysis of financial ratios and firm characteristics.

Furthermore, the inclusion of only profit-making companies is applied to focus on financially stable and operational firms that exhibit normal business activities. Companies experiencing losses often face unique financial distress issues and might make capital structure and operational decisions under duress that do not reflect typical agency conflicts or long-term value maximization strategies. By focusing on profitable firms, we ensure that our sample represents companies with sufficient operational viability and stable financial reporting, thereby enhancing the reliability of our findings regarding capital structure and firm value dynamics.

After going through a series of criteria, a final sample of 106 companies was obtained, resulting in a total of 318 firm-years observations that were then used consistently throughout the regression analysis to test the research hypotheses.

Variable Measurement

Numerous proxies can be employed to measure agency costs. The operating expense ratio and asset utilization ratio are used in the literature for determining agency costs (Hoang et al., 2019; Ronoowah & Seetanah, 2024). The asset utilization ratio is used in this study to determine the agency costs. The asset utilization ratio is an inverse proxy for agency costs, which means that agency costs rise as asset utilization decreases. As a result, agency costs are used as an independent variable, playing a moderating role in influencing the relationship between capital structure and firm value.

In analyzing the nexus between capital structure, agency costs, and firm value, it is imperative to account for other firm-specific characteristics that are widely recognized in financial literature to influence firm value. The inclusion of control variables is critical to ensure that the observed effects of

capital structure and agency costs are not confounded by other underlying factors, thereby enhancing the robustness and validity of our empirical model. Following established literature (Alghifari et al., 2022, Isyaku et al., 2020, Suzulia et al. 2020), we include the following control variables:

(1) Profitability. Firms with higher profitability are generally perceived as more financially sound and attractive to investors, leading to a higher firm value (Alghifari et al., 2022). By controlling for profitability, it can isolate the effects of capital structure and agency costs from the general financial health of the company.
(2) Firm Size: Larger firms often benefit from economies of scale, greater access to capital markets, and lower risk, which can positively influence their market valuation (Isyaku et al., 2020). Controlling for firm size helps standardize comparisons across companies of different scales.
(3) Firm Growth. Companies experiencing higher growth rates are typically expected to generate greater future cash flows, which enhances their present value (Suzulia et al. 2020). Including firm growth as a control variable ensures that the perceived value attributable to growth opportunities does not obscure the relationships under investigation.

Table 2 presents the definitions and measurements of the variables used in this study.

Table 2. Variable Measurement

Variables	Description	Definition	Measurement
Dependent			
Firm value	Price to book value ratio (PBV)	Market assessment of the company's success and future growth prospects.	Market value of share to book value per share (Bahraini et al., 2021).
Independent			
Capital structure	Debt to equity ratio (DER)	A company's decision or choice regarding the composition of the company's funding.	The ratio of total debt to book value of equity (Alghifari et al., 2022).
Moderating			
Agency costs	Assets utilization ratio (AUR)	The efficiency with which a company's assets are utilized to generate revenue, reflecting potential residual losses.	The ratio of total operating sales to total assets (Bahraini et al., 2021).
Control			
Profitability	Return on equity (ROE)	Measures how well the company can make a profit in carrying out its operations.	The ratio of net income to total equity (Alghifari et al., 2022).
Firm size	SIZE	A scale that measures the size of a company.	Logaritma natural of total assets (Isyaku et al., 2020).
Firm growth	Asset's growth (GROWTH)	A situation where a company grows in size due to additional resources needed to increase sales or profits.	Change in assets (Suzulia et al. 2020).

Models Estimation

To answer the research question "Does capital structure have a linear and non-linear relationship with firm value?" the following panel regression models were developed.

$$PBV_{it} = \beta_0 + \beta_1 DER_{it} + \beta_2 AUR_{it} + \beta_3 GROWTH_{it} + \beta_4 SIZE_{it} + \beta_5 ROE_{it} + \epsilon_{it} \quad (1)$$

$$PBV_{it} = \beta_0 + \beta_1 DER_{it} + \beta_1 DER_{it} * DER_{it} + \beta_2 AUR_{it} + \beta_3 GROWTH_{it} + \beta_4 SIZE_{it} + \beta_5 ROE_{it} + \epsilon_{it} \quad (2)$$

Model 1 tests hypotheses H1 and H3. Model 2 was developed to assess the presence of any non-linear relationship between the capital structure and firm value. to test the hypothesis H2 consistent with prior studies employing the squared terms of CS (Ronoowah & Seetanah, 2024).

To answer the research question "Do agency costs moderate the relationships between capital structure and firm value?" the following regression model was developed. Model 3 tests hypothesis H_4:

$$PBV_{it} = \beta_0 + \beta_1 DER_{it} + \beta_2 AUR_{it} + \beta_1 DER_{it} * AUR_{it} + \beta_3 GROWTH_{it} + \beta_4 SIZE_{it} + \beta_5 ROE_{it} + \epsilon_{it} \quad (3)$$

Before conducting regression estimation to test the hypotheses, a series of preliminary tests were conducted to ensure the validity and reliability of the model. These tests include residual normality test and classical assumption test, followed by a significant Hausman test, which definitively indicates that the fixed effect model (FEM) is the most appropriate estimation method for the panel data of this study. Individual-specific effects, also known as fixed effects, are commonly used in panel data analysis to address unobserved and time-consistent heterogeneity across units. These effects allow the model to control for differences in characteristics between firms that cannot be measured directly. The use of fixed effects can reduce concerns related to violations of classical assumptions such as normality and homoscedasticity. In line with the approaches proposed by Januarsi et al. (2025), this study uses firm-fixed and year-fixed effects to address potential heteroscedasticity issues. In the regression model in equation (1) (2) (3), this study also includes year and firms fixed effect to account for time-specific and firm-specific heterogeneity in the regressions. This study winsorizes all continuous variables above (below) the 99th (1st) percentile of their distributions to mitigate the effect of extreme values (Januarsi et al., 2025; L. Zhang, 2022).

ANALYSIS

Description Statistic and Correlation

Table 3 presents the descriptive statistics for the variables. As indicated in Table 2, the mean value of PBV greater than 1 (mean = 2.251), implying that, on average, investors assign a market valuation is higher than their net asset value. This premium is indicative of investor expectations regarding future growth prospects and/or enhanced profitability that are not fully captured by current book values. The mean DER approximating 1 (mean = 0.867) implies that, on average, the capital structures of the firms exhibit a balanced composition of debt and equity financing. This suggests a moderate degree of financial leverage, without excessive reliance on either debt or equity. The mean AUR of 1.047 indicates that, on average, the sampled firms demonstrate reasonable efficiency in converting their asset base into revenue generation. This implies that for each unit of assets employed, the firms generate slightly more than one unit of sales. In summary, the average firm within the sample is characterized by a market valuation exceeding its book value, a balanced capital structure, and reasonable efficiency in asset utilization.

Table 3. Descriptive Statistic

Variables	N	Min	Max	Mean	Std. Dev.
PBV	318	0.260	17.57	2.251	2.596
DER	318	0.046	4.935	0.867	0.833
AUR	318	0.131	3.822	1.047	0.702
GROWTH	318	-0.192	0.922	0.079	0.127
SIZE	318	25.216	33.731	29.333	1.618
ROE	318	0.001	1.420	0.157	0.161

Note(s): where PBV denotes firm value, DER denotes capital structure, AUR denotes agency costs, GROWTH denotes firm growth, SIZE donotes firm size, ROE denotes profitability.

Source: SPSS Data Processing Results

Table 4 shows the pairwise correlations among variables used in equation (strong, moderate, weak, very weak and close to zero). The table shows a very strong positive correlation between PBV and ROE. This suggests that companies with higher profitability (measured by ROE) tend to be valued higher by the market (measured by PBV). This correlation is the strongest among all the pairs shown and is consistent with financial theory. The average correlation coefficient between variables is positive.

This indicates that overall, more pairs of variables tend to move in the same direction, although many of these relationships are weak to moderate. The strong positive relationship between PBV and ROE is the main driver of this positive average value.

Table 4. Pairwise Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) PBV	1.000						
(2) DER	0.255	1.000					
(3) AUR	0.159	0.217	1.000				
(4) GROWTH	-0.002	0.110	0.091	1.000			
(5) SIZE	0.020	0.174	-0.017	-0.014	1.000		
(6) ROE	0.793	0.331	0.223	0.019	0.059	1.000	

Note(s): where PBV denotes firm value, DER denotes capital structure, AUR denotes agency costs, GROWTH denotes firm growth, SIZE donotes firm size, ROE denotes profitability.

Multivariate Regression Result and Discussion

This section presents a discussion of the empirical results of the various panel multiregression analyses on the effects of agency costs and capital structure on firm value and therefore, aims to answer the research questions. In an effort to comprehensively understand the factors affecting firm value (measured by Price to Book Value/PBV), we conducted regression testing with two different models. The first model examines the relationship of key independent variables such as capital structure (DER and DER*DER), asset efficiency (AUR), growth (GROWTH), and firm size (SIZE) to firm value without controlling for profitability (ROE). Meanwhile, the second model extends the analysis by including ROE as a control variable.

The fundamental difference in the specification of these two models is based on logical reasons. The purpose of the first model (without ROE) is to establish a baseline model and test for initial effects. This model serves as the foundation or starting point of the analysis. The objective is to directly test the core hypotheses regarding the impact of capital structure (both linear and non-linear) and asset efficiency on firm value in the simplest setting. By not including ROE first, we are able to observe the "gross" or direct effects of these variables without accounting for potential influences that may already be explained by profitability. This helps in identifying any initial relationships before complicating the model with very strong controls.

The purpose of the second model (with ROE) is for validation, isolation of effects, and overcoming bias. ROE as the main determinant variable. Profitability (ROE) is one of the most fundamental and widely recognized drivers of firm value (Akhmadi & Januarsi, 2021; Sudiyatno et al., 2020). Therefore, ignoring it could potentially lead to omitted variable bias, where the observed effects on other variables (such as DER or AUR) are actually partially explained by or confounded by ROE. By including ROE, the coefficients of variables such as DER and AUR in the second model reflect their effects on PBV after controlling or accounting for the effect of ROE. This allows us to isolate and understand the independent or marginal effects of capital structure and asset efficiency that cannot be explained by profitability.

Effect of Capital Structure on Firm Value

Table 5 indicates that capital stucture has a significant positive effect on firm value. This suggests that at low levels of DER, there is a positive relationship between DER and PBV. This means that an initial increase in DER tends to increase firm value which supports H1. This finding supports the trade-off theory, especially in terms of debt benefits. According to the trade-off theory, the use of debt can increase firm value due to the tax shield benefit. Debt interest paid by the company can be deducted from taxable income, thus reducing the tax burden that must be borne by the company and ultimately increasing the free cash flow available to shareholders. At low debt levels, this tax shield benefit tends to dominate, leading to an increase in firm value as debt increases. In addition, this finding is also in line with the concept of debt discipline proposed by experts such as Jensen (1986). The obligation to

pay interest and principal on debt encourages management to operate more efficiently, reduce waste, and focus on profitable projects, which in turn can increase firm value.

Furthermore, the coefficient of DER*DER is statistically significant. This negative coefficient is very important as it indicates a non-linear inverted U-shape relationship between DER and PBV which supports H2. Initially, an increase in debt (DER) will increase firm value (due to tax saving benefits or management discipline). However, after reaching the optimal point, further increase in debt will start to decrease firm value (due to increased bankruptcy costs, underinvestment, or over-investment issues). This supports the modified Trade-off Theory or Pecking Order Theory, where there is an optimal capital structure that maximizes firm value, and deviations from this optimal point will decrease value. Both models consistently show that the relationship between capital structure (DER) and firm value (PBV) is non-linear, specifically an inverted U-shape. This means that there is an optimal level of debt that maximizes firm value. Using too little or too much debt from that optimal level will decrease the value of the firm.

The findings suggest support for a comprehensive trade-off theory or a modified pecking order theory. While the trade-off theory acknowledges the advantages of debt, it also posits that beyond an optimal point, the increasing costs of financial distress and potential bankruptcy outweigh the benefits of tax shields and debt-related discipline. The observed inverted U-shaped relationship implies that the initial benefits of increased debt diminish and eventually reverse as financial distress costs become more prominent, aligning with the trade-off perspective.

Effect Agency Cost on Firm Value

Table 5. Linear and Non-linear Relationship

Variables	Model 1 (without ROE)	Model 2 (with ROE)
DER	2.679***	2.565***
	(9.16e-05)	(0.000124)
DER*DER	-0.308***	-0.284***
	(0.00147)	(0.00267)
AUR	0.949***	0.572*
	(0.00369)	(0.0882)
GROWTH	0.951**	0.700*
	(0.0186)	(0.0800)
SIZE	-1.963***	-2.007***
	(1.48e-05)	(5.99e-06)
ROE		3.325***
		(0.000817)
Constant	57.86***	59.08***
	(1.22e-05)	(4.92e-06)
Number of Observations	318	318
Number of Firms	106	106
R-squared	0.158	0.203

*Note(s): where PBV denotes firm value, DER denotes capital structure, AUR denotes agency costs, GROWTH denotes firm growth, SIZE donotes firm size, ROE denotes profitability. *** p<0.01, ** p<0.05, * p<0.1*

Table 5 coefficient of AUR shows a positive and significant relationship. Increased asset utilization efficiency (higher AUR) is positively correlated with higher firm value. Therefore, companies that are more efficient in managing their assets to generate sales tend to have a better valuation in the eyes of the market. This can be interpreted that higher efficiency reduces agency costs (as managers are more effective in managing assets for the benefit of owners), which in turn increases firm value. Both models show that agency costs (measured inversely through AUR) have a positive and significant relationship with firm value. Companies that are more efficient in utilizing their assets (high AUR), which can be interpreted as an indication of lower agency costs or better management, tend to have higher firm value. This supports H3.

Relationships Between Agency Cost, Capital Structure, and Firm Value

Table 6 shows the regression results of two models that examine how the relationship between capital structure (DER) and firm value (PBV) is moderated by agency cost proxied by asset utilization ratio (AUR). In this context, AUR (the level of asset utilization efficiency) is used as an inverse proxy for agency costs. Hence, a high AUR indicates low agency costs, because management is more efficient in utilizing company assets to generate income for shareholders, while a low AUR may indicate high agency costs due to management's inability or unwillingness to manage assets optimally.

The consistently negative and significant interaction coefficient of DER*AUR in both models in Table 6 is a key finding. This indicates that agency costs (inversely proxied by AUR) significantly moderate the relationship between capital structure (DER) and firm value (PBV) in a negative manner, which supports H4. In other words, when asset utilization efficiency (AUR) increases (i.e. agency costs decrease), the relationship between DER and firm value tends to weaken positively or become more negative.

Under conditions where management is less efficient in managing assets (high agency costs), an increase in debt (DER) may still show a more positive relationship with firm value. This can happen because debt provides a disciplinary mechanism to management. With the obligation to pay interest and principal, management is "forced" to be more careful and efficient in the use of funds, thereby reducing waste and agency costs. Therefore, an increase in debt can increase firm value by suppressing management's opportunistic behavior.

In instances where a company demonstrates high operational efficiency and minimal agency costs, the addition of debt financing may not lead to improved performance and could potentially exert a negative influence. This is predicated on the notion that the advantages typically associated with debt financing are attenuated when a firm has already optimized its asset utilization. In this situation, management is already effective in managing assets and minimizing behavior that harms shareholders. Further debt additions may no longer provide significant disciplinary benefits, but instead introduce higher financial risk (default risk) that is not offset by a meaningful reduction in agency costs. Consequently, the market could perceive this incremental debt as an encumbrance that diminishes the overall value of the firm.

Table 6. Moderating Effect

Variables	Model 1 (without ROE)	Model 2 (with ROE)
DER	0.734**	0.774***
	(0.0156)	(0.00889)
AUR	0.707**	0.325
	(0.0288)	(0.326)
DER*AUR	-0.544**	-0.594***
	(0.0135)	(0.00570)
GROWTH	1.059**	0.782*
	(0.0102)	(0.0548)
SIZE	-1.649***	-1.721***
	(0.000241)	(8.64e-05)
ROE		3.549***
		(0.000451)
Constant	49.94***	51.91***
	(0.000154)	(5.58e-05)
Number of Observations	318	318
Number of firms	106	106
R-squared	0.116	0.167

*Note(s): where PBV denotes firm value, DER denotes capital structure, AUR denotes agency costs, GROWTH denotes firm growth, SIZE donotes firm size, ROE denotes profitability. *** p<0.01, ** p<0.05, * p<0.1*** p<0.01, ** p<0.05, * p<0.1*

The implication of this negative moderating effect is that the discipline provided by debt (through DER) on firm value (PBV) is more pronounced and has a greater positive impact on firms with more severe agency cost problems (low AUR). However, for firms that already have low agency costs (high AUR), the disciplinary effect of debt becomes less relevant, and additional debt may actually bring value-destroying risks. Based on both models, it can be concluded that agency costs (inversely proxied by AUR) significantly moderate the relationship between capital structure (DER) and firm value (PBV). This moderating effect is negative. Therefore, the lower the agency cost of a firm (high AUR), the weaker (or even negative) the positive relationship between debt and firm value. This supports the view that the disciplinary benefits of debt in enhancing firm value are more relevant for firms facing significant agency cost issues. In contrast, for firms that are already efficiently managed and have low agency costs, additional debt may no longer provide the same benefits and may actually reduce value due to increased financial risk.

Robustness Test

The consistency of results between the models presented in Table 5 and Table 6 enhances the confidence in the research findings, thus serving as a robustness check. Furthermore, the substantial increase in the R-squared value upon the inclusion of ROE suggests that the expanded model possesses a greater capacity to explain variations in firm value, offering a more comprehensive representation of the underlying relationships. It's important to consider both R-squared and adjusted R-squared when evaluating model fit (Baral & Patnaik, 2020). A higher R-squared indicates that the model explains a larger proportion of the variance in the dependent variable

The consistency observed across different model specifications in Table 7 reinforces the robustness of the study's core findings. Specifically, the consistent negative and significant coefficient of the DER*AUR interaction across Model 1 (without control variables), Model 2 (without ROE), and Model 3 (with ROE) provides strong evidence that the negative moderating effect of AUR on the DER-PBV relationship is robust. This suggests that the relationship between dividend policy, leverage, agency costs, and corporate governance is essential for maximizing firm value and ensuring sustainable growth. The consistently positive and significant coefficient of DER across the three models further indicates that the positive direct effect of DER on PBV is also robust to the inclusion of control variables.

The direct effect of AUR is positive and significant in Models 1 and 2. However, when ROE is added to Model 3, the coefficient of AUR becomes insignificant (0.325). This indicates that the direct effect of AUR on PBV is not robust to the profitability control. Most likely, most of the positive effect of AUR on PBV is already covered by ROE. Hence, asset efficiency (AUR) may increase firm value primarily by increasing profitability (ROE).

The GROWTH effect remains positive and generally significant, although the significance level decreases in Model 3. This suggests that GROWTH has a positive effect on PBV, and this effect is quite robust despite the slight weakening. The effect of SIZE is consistently negative and highly significant in Models 2 and 3. This suggests that the negative effect of firm size on PBV is robust. As expected, ROE has a very strong, positive, and highly significant effect on PBV. The increase in R-squared from Model 1 to Model 3 (0.041 to 0.167) indicates that the addition of control variables, especially ROE, substantially improves the model's ability to explain variations in firm value.

The robustness test results strongly support the main research findings regarding the moderation effect. Specifically, the negative moderating effect of AUR, as a proxy for agency costs, on the DER-PBV relationship demonstrates a high degree of robustness. This is a consistent and significant finding across all model specifications tested, suggesting that the level of management efficiency (agency costs) consistently affects how capital structure (DER) contributes to firm value. The direct effect of DER on PBV is also robust and positive. However, the direct effect of AUR on PBV is not robust as it becomes insignificant after controlling for ROE. This indicates that the positive effect of AUR on firm value may be largely through increased profitability (ROE), rather than a direct effect separate from ROE. Other control variables such as GROWTH and SIZE also show generally robust effects.

Table 7. Robustness Test

Variables	Model 1 without variables controls	Model 2 without ROE	Model 3 with ROE
DER	0.827***	0.757**	0.774***
	(0.00715)	(0.0127)	(0.00889)
AUR	0.738**	0.730**	0.325
	(0.0271)	(0.0243)	(0.326)
DER*AUR	-0.567**	-0.537**	-0.594***
	(0.0121)	(0.0149)	(0.00570)
GROWTH		1.099***	0.782*
		(0.00764)	(0.0548)
SIZE		-1.612***	-1.721***
		(0.000327)	(8.64e-05)
ROE			3.549***
			(0.000451)
Constant	1.347***	48.58***	51.91***
	(0.000246)	(0.000224)	(5.58e-05)
Number of Observations	318	318	318
Number of firms	106	106	106
R-squared	0.041	0.108	0.167

*Note(s): where PBV denotes firm value, DER denotes capital structure, AUR denotes agency costs, GROWTH denotes firm growth, SIZE donotes firm size, ROE denotes profitability. *** p<0.01, ** p<0.05, * p<0.1*** p<0.01, ** p<0.05, * p<0.1*

CONCLUSION

This study investigates the relationship between capital structure, measured by the Debt to Equity Ratio, asset efficiency, proxied by the Asset Utilization Ratio as an inverse measure of agency costs, and firm value, assessed using the Price to Book Value ratio. The analysis focuses on non-financial companies listed on the Indonesia Stock Exchange from 2021 to 2023, encompassing a total of 318 observations. Employing a panel data regression approach, the research examines both non-linear relationships and moderation effects.

Key findings include the identification of an inverted U-shaped non-linear relationship between DER and PBV. Specifically, at lower debt levels, an increase in DER is associated with an increase in firm value. However, beyond an optimal threshold, further increases in debt lead to a decline in firm value. This relationship remains consistent and significant across various model specifications.

Furthermore, the study highlights the moderating effect of agency costs on the DER-PBV relationship as a central and robust finding. AUR, serving as an inverse proxy for agency costs, exhibits a significant negative moderating effect. This indicates that as a firm's asset utilization efficiency increases (and agency costs decrease), the positive relationship between DER and firm value weakens or may even become negative. Conversely, in firms characterized by low asset efficiency (high agency costs), the disciplinary influence of debt becomes more pronounced, contributing positively to firm value. This aligns with agency theory, where ownership structure is seen to impact a company's financial performance.

From a theoretical standpoint, the identification of a non-linear relationship between DER and PBV strongly corroborates the trade-off theory. This research indicates that firms benefit from debt up to a certain point through tax shields and management discipline, beyond which the costs of debt, such as financial distress, outweigh these advantages, leading to a decline in firm value. This refines our understanding of the capital structure optimality curve within an emerging market context like Indonesia.

Moreover, the moderating role of agency costs reinforces the relevance of agency theory in the context of capital structure and firm value. The negative moderation effect of AUR confirms that debt's effectiveness as a disciplinary mechanism is contingent on the extent of pre-existing agency problems within the firm. For firms grappling with high agency costs, debt effectively curbs managerial actions misaligned with shareholder interests, thereby enhancing firm value. However, for firms with low agency costs, this benefit diminishes, and debt-related risks become more prominent. This contributes to a more nuanced understanding of the intricate interplay between capital structure, agency costs, and firm value, which is essential for maximizing firm value and ensuring sustainable growth.

In light of these findings, firm management should carefully consider the optimal level of debt. A balanced approach to increasing debt is crucial, weighing the advantages of tax shields and debt discipline against the potential for increased financial distress costs. Furthermore, the moderating effect of AUR highlights the significance of agency cost management. Firms with pronounced agency cost issues, indicated by low AUR, may benefit from incorporating debt into their capital structure as a monitoring mechanism. However, firms already demonstrating efficient asset utilization (low agency costs) should exercise caution when increasing debt, to avoid diminishing firm value. Finally, investors and managers should prioritize profitability, as it remains a robust determinant of firm value. An increase in AUR unaccompanied by a corresponding increase in ROE may not necessarily translate into a positive correlation with firm value.

Although this study provides important insights, several limitations should be acknowledged. First, in an effort to maintain focus and due to constraints in consistent historical data availability, our model does not fully integrate external factors such as specific macroeconomic conditions or additional corporate governance variables that might influence firm value. Second, despite the application of fixed effects models, the potential for endogeneity between capital structure and firm value remains a concern, representing an inherent methodological constraint in studies of causal relationships. Third, the proxy used for agency costs, namely the asset utilization ratio, while relevant, may not fully capture all complex aspects of agency problems.

Based on the identified limitations, future research can explore several directions. To address the issue of endogeneity, subsequent studies are encouraged to adopt more advanced instrumental variable techniques, such as the Generalized Method of Moments. Furthermore, to provide a more comprehensive understanding of agency costs, future research could expand the use of proxies, for instance, by incorporating operating expense ratios or sales, general, and administrative expenditure ratios, which might capture different dimensions of agency costs. Finally, future studies could extend the model framework by including additional control variables related to corporate governance quality or macroeconomic factors, which could be considered if data availability permits, to provide a more holistic view of firm value determinants.

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