

The Effect of Firm Size, solvency and Efficiency ratios on firm value with profitability as mediating variable: Evidence from the basic chemical subsector in Indonesia (2019-2023)

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ABSTRACT

The firm value of manufacturing companies, particularly in the basic chemical subsector, plays a critical role in reflecting market perception and investment potential. This study aims to examine the effect of firm size, solvency, and efficiency on firm value, with profitability as a mediating variable. The research employed a Quantitative approach using panel data from 14 companies listed in the Basic Chemical subsector (B111) on the Indonesia Stock Exchange during 2019–2023 as a sample. The data were analyzed using panel regression via EViews 12. Firm size was found to significantly influence profitability and firm value. However, solvency and efficiency showed no significant effect on either profitability or firm value. Mediating analysis indicated that profitability mediates the effect of firm size on firm value, but not for solvency or efficiency. Firm size is a strategic factor in improving both profitability and firm value in the basic chemical industry. The mediating role of profitability is limited and not applicable across all financial variables analyzed.



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1. INTRODUCTION

The basic chemical industry (IDX-IC B111) is a strategic and capital-intensive sector that supplies essential raw materials to various downstream industries. Despite its critical role, firms in this sector face significant challenges such as volatile raw material prices, energy costs, and regulatory pressures. These factors impact profitability, which is crucial for maintaining competitiveness and supporting sustainable operations. Firm valuation, measured by Price to Book Value (PBV), is often

used by investors to assess company performance. However, data from 2019–2023 reveal inconsistent PBV trends across firms in this subsector, with some recording extreme fluctuations and others persistently undervalued. These disparities suggest that financial fundamentals alone may not fully explain market valuation. Previous studies have explored the effects of firm size, solvency (DER), and efficiency (TATO) on PBV and profitability (ROA), but findings remain inconclusive. Some show significant relationships, while others do not, especially regarding ROA's mediating role.

This research addresses that gap by investigating the influence of those financial indicators on PBV, mediated by ROA. The study aims to answer: (1) Do firm size, DER, and TATO affect PBV directly and indirectly through ROA? (2) Does ROA significantly mediate these relationships?

The novelty of this research lies in examining the mediating effect of profitability on firm value in a high-capital, underexplored industrial subsector. The results are expected to offer strategic insights for managers, investors, and regulators.

2. LITERATURE REVIEW

Trade-Off Theory explains how companies balance the benefits and costs of debt in their capital structure decisions. According to Brigham and Daves (2018:293), “The trade-off theory states that firms strive to find an optimal capital structure that balances the tax benefits of debt financing with the increased bankruptcy and agency costs associated with more debt.” In this study, DER (Debt to Equity Ratio) reflects the firm's financial leverage, where higher leverage may signal tax advantages, but excessive debt may reduce profitability and firm value due to increased financial risk.

Signaling Theory, as developed by Spence (1973) and extended by Ross (1977), emphasizes that financial decisions act as signals to investors. According to Brigham and Houston (2016:499), “Signals are actions taken by management that are intended to provide clues to investors about how management views the company's future prospects.” A firm's financial performance, especially its profitability (e.g., ROA), acts as a signal to reduce information asymmetry. A consistent ROA or increasing PBV may indicate a credible growth outlook.

Firm Value is often measured by the Price to Book Value (PBV), which reflects market perception relative to the book value of equity. Brigham

and Houston (2016:143) define PBV (market-to-book ratio) as “The ratio of a stock’s market price to its book value gives another indication of how investors regard the company.” Higher PBV reflects investor optimism about the company’s profitability and risk.

Profitability, particularly Return on Assets (ROA), is a key financial ratio that captures a firm's ability to generate income from its asset base. It integrates operational efficiency, asset management, and capital structure decisions (Fahmi, 2014).

Firm Size is typically measured using the natural logarithm of total assets (Hartono, 2013). Larger firms tend to have more stable earnings, better access to funding, and greater resilience in volatile markets.

Solvency, represented by DER, measures a company’s long-term financial health. A moderate DER may support firm growth, but excessive leverage can increase default risk and reduce investor confidence (Ross et al., 2013).

Efficiency, reflected in the Total Asset Turnover (TATO), measures the firm's ability to generate sales from its asset base. Higher TATO indicates better asset utilization, which contributes to profitability and potentially to firm value.

Several studies have examined the influence of firm size, DER, TATO, and ROA on firm value (PBV), with mixed and often contradictory results. For example, Gunawan and Simbolon (2024) found that firm size, DER, and ROA all had significant positive effects on PBV. In contrast, Iriyanti et al. (2022) found that firm size negatively affected PBV, while DER had no significant effect. Meanwhile, Ayuningrum et al. (2021) reported that firm size had no significant impact on PBV, although ROA had a positive one.

Regarding the effect of DER on ROA, Pangestika et al. (2021) and Ayoush et al. (2021) found a significant negative relationship, suggesting that higher leverage reduces profitability. On the contrary, Rais Gunawan et al. (2022) reported a positive relationship between DER and ROA, implying that debt usage could enhance performance through tax advantages. Similarly, Aloshaibat (2021) concluded that DER had no significant effect on ROA, indicating the inconsistency of leverage effects across industries and contexts.

In terms of efficiency, Meita (2021) and Gunawan et al. (2022) found that TATO positively and significantly affects ROA, while studies by Cahayati and Prasetyo (2024) as well as Agustina and Pratiwi (2021) found either negative or non-significant relationships. The impact of TATO on PBV also

varies, with Dewi et al. (2022) finding a positive effect, while Astri et al. (2023) and Hendrick (2020) found otherwise.

The mediating role of ROA also remains underexplored. Astri et al. (2023) examined ROA as a mediating variable but found no significant mediation between DER or TATO and PBV. Meanwhile, Hairina Natsir and Yusbardini (2019) confirmed that ROA mediates the relationship between firm size and PBV, as well as between DER and PBV.

These varied results indicate a research gap in understanding how internal factors affect firm value through profitability, particularly within the Indonesian basic chemical industry (B111). Most previous studies either focused on other industries (textiles, mining, consumer goods) or used earlier data.). This study aims to address that gap by examining the mediating role of ROA in the relationship between financial structure and firm value using panel data from 2019 to 2023.

3. METHODS

This study adopts a quantitative approach to examine the effect of firm size, solvency, and asset efficiency on firm value, with profitability as a mediating variable. The research targets companies in the basic chemical sub-industry (IDX code B111) listed on the Indonesia Stock Exchange (IDX) from 2019 to 2023. Using purposive sampling, 14 companies were selected based on data availability.

Firm value is measured by Price to Book Value (PBV), while the independent variables include firm size (log of total assets), solvency (Debt to Equity Ratio/DER), and efficiency (Total Asset Turnover/TATO). Profitability is proxied by Return on Assets (ROA) as a mediating variable.

Secondary data are obtained from audited financial reports. Panel data regression analysis is employed using EViews 12, including classical assumption testing, model selection via Chow and Hausman tests, and Sobel test to examine mediation. The research hypothesizes that ROA mediates the effect of internal financial indicators on firm value.

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4. RESULTS AND DISCUSSION

This study investigates the effects of Firm Size, Debt to Equity Ratio (DER), and Total Asset Turnover (TATO) on firm profitability (ROA) and firm value (PBV), with ROA also tested as a mediating variable. The analysis was

conducted using panel data regression from companies in the basic chemical manufacturing sub-sector (B111) listed on the Indonesia Stock Exchange for the period 2019–2023.

4.1. Sample and Population

The population of this study comprises all manufacturing firms in the basic chemical sub-sector (B111) listed on the Indonesia Stock Exchange (IDX). A purposive sampling method was applied using the following criteria:

- Companies consistently listed under sub-sector basic chemical (B111) during 2019–2023,
- Companies that published complete and audited financial statements during the observation period,

Based on these criteria, 14 companies were selected as the sample, with 5-year observations per company, resulting in a total of 60 panel data observations. This sampling approach ensures data consistency and reliability, particularly when applying panel data regression and classical assumption tests.

Table 1. Sampling Process

No	Criteria	Total
1	Companies consistently listed under sub-sector B111 during 2019–2023	19
2	Companies that published complete and audited financial statements under sub-sector B111 during 2019–2023	(5)
Total Sample		(14)

Source: Secondary data processed, 2025

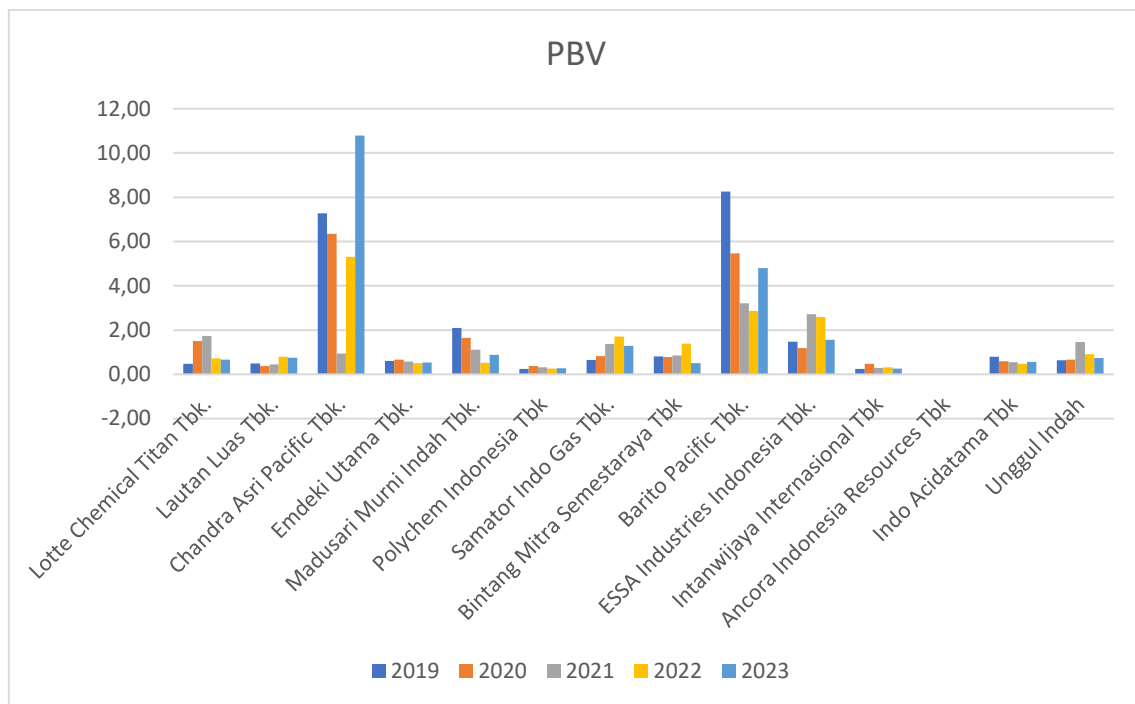


Figure 1. Firm value period 2019-2023
Source: Secondary data processed, 2025

4.2. Regression Results

Two regression models were applied. Model 1 examined the determinants of ROA using the Fixed Effect Model, while Model 2 analyzed the determinants of PBV using the Random Effect Model. The following tables summarize the key results from both models:

Table 2. Summary of Regression Results: Model 1 (ROA as Dependent Variable)

Variable	Coeff.	Std. Error	T Statistic	P Value
Constant	-228.7278	67.60342	-3.383	0.0014
Firm Size	14.9322	4.3442	3.437	0.0012
DER	0.0022	0.0216	0.100	0.9204
TATO	4.4418	2.9864	1.487	0.1429
R ²	0.632			
Model	Fixed Effect Model			

Source: Secondary data processed, 2025

These results indicate that Firm Size has a statistically significant positive influence on ROA, while DER and TATO do not show significant effects. This suggests that scale is an important factor in achieving profitability, while capital structure and asset efficiency require more context-specific interpretation in capital-intensive industries like chemicals.

Table 3. Summary of Regression Results: Model 2 (PBV as Dependent Variable)

Variable	Coeff.	Std. Error	T Statistic	P Value
Constant	-13.1891	3.1084	-4.243	0.0001
Firm Size	0.9533	0.1938	4.919	0.0000
DER	0.0003	0.0052	0.050	0.9606
TATO	0.1287	0.3293	0.391	0.6973
ROA	0.0105	0.0269	0.392	0.6963
R²	0.299			
Model	Random Effect Model			

Source: Secondary data processed, 2025

As shown in Table 2, Firm Size also significantly affects firm value (PBV), while DER, TATO, and ROA have no significant direct effect. These findings suggest that the market views large firms as more stable and valuable, possibly due to better governance, asset control, and business resilience.

4.3. Discussion of Findings

The significant influence of Firm Size on both ROA and PBV highlights the strategic role of scale in enhancing financial performance and market perception. Larger firms typically enjoy economies of scale, more professional management, and stronger market positioning, which contribute to their profitability and valuation. This supports theory, where firm size reduces uncertainty making the firm more attractive to investors.

The lack of significance in DER and TATO across models reflects the unique capital structure dynamics in the basic chemical industry, which is capital intensive and often faces delayed returns on long-term assets. Profitability (ROA) was found to mediate the relationship between Firm Size and PBV, but not for DER or TATO. This confirms that size enhances firm value both directly and indirectly through better profitability, while efficiency and leverage alone are insufficient without profit realization.

Overall, these findings emphasize that investors in the chemical manufacturing sector prioritize firm fundamentals particularly firm size over financial ratios that do not immediately translate into value creation.

5. CONCLUSION

This study concludes that firm size plays a pivotal role in enhancing both profitability and firm value in the basic chemical manufacturing sub-sector in Indonesia. The research findings reveal that larger firms tend to achieve higher market valuation through improved operational efficiency and stronger investor confidence, supported by better governance and strategic capacity. In contrast, leverage and asset efficiency indicators do not consistently influence profitability or firm value, particularly in capital-intensive industries where long asset cycles and delayed returns are common. Profitability is confirmed to mediate the relationship between firm size and firm value, strengthening the argument that financial performance is an important transmission channel for value creation. These conclusions support the relevance of agency and signaling theories in emerging markets and provide practical insight for financial decision-makers to prioritize scale, profitability, and long-term positioning over short-term ratio optimization.

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