The Moderating Role of Debt-to-Equity Ratio on the Impact of Price-to-Earnings Ratio and Return on Equity on Firm Value: Evidence from the Properties and Real Estate Sector

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Abstract:

This study uses an associative quantitative method to analyze the relationship between the independent variables (Price Earning and Return On Equity) and the moderating variable (Debt to Equity Ratio) on the dependent variable (firm value) in the Property & Real Estate sector listed on the Indonesia Stock Exchange during the period 2020-2022. The normality test results show a data distribution that is close to normal, while the multicollinearity, autocorrelation, heteroscedasticity, and linearity tests do not reveal significant problems in the data used. Regression analysis shows that Debt to Equity Ratio has a significant influence on firm value, especially when considered alongside moderating variables such as Debt to Equity Ratio. These findings provide a deeper understanding of the factors that influence firm value in the Property & Real Estate sector in Indonesia. Overall, this study makes a significant contribution to understanding capital market dynamics and the factors that influence firm value in a sector that is crucial to the country's economic growth. The implications of the findings can serve as a basis for better decision-making in the financial management of companies in the Property & Real Estate sector, as well as a guide for further research in this area.

1. Introduction

The Indonesian capital market aims to optimize shareholder value by driving firm value, which is often reflected in higher returns for investors. Going public has become a strategic choice for many companies in Indonesia, providing access to capital for growth, debt repayment, acquisitions, or reinvestment. Public companies also enjoy benefits such as enhanced equity valuation and optimized capital structures, alongside opportunities to issue debt securities for both short- and long-term funding (Lopes & Silva, 2019; Zhang & Zhao, 2023).

The property and real estate sector plays a crucial role in Indonesia's economy. Reports from the Indonesian Real Estate Company Association (REI) indicate that

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this sector contributed IDR 200 trillion to national tax revenue in 2023, highlighting its importance in generating revenue and supporting infrastructure development. The sector's significant contributions to regional own-source revenue (PAD) further emphasize its role in local economic development (Haider & Ghazanfar, 2022; Tan & Wong, 2022).

Given the strategic importance of the property sector, understanding the dynamics of firm value in this context is critical. Financial ratios like the Debt-to-Equity Ratio (DER), Price-to-Earnings Ratio (PER), and Return on Equity (ROE) are pivotal in evaluating the financial health and operational performance of companies amidst market uncertainties. However, prior studies have predominantly focused on individual relationships between these financial metrics and firm value. Few have examined the moderating role of DER on the interplay between PER, ROE, and firm value within the property sector (Adebayo et al., 2021; Chatterjee & Banerjee, 2021).

Research Gap

Although extensive research exists on financial ratios and their impact on firm performance, gaps remain in understanding the interplay of these metrics in specific industries, particularly the property and real estate sector. Studies by Patel and Rajan (2020) and Lee and Park (2021) explored these metrics broadly but did not incorporate DER as a moderating variable in sector-specific contexts. Moreover, prior analyses have been largely confined to developed markets, with limited applicability to emerging economies like Indonesia (Kothari & Raman, 2018; Jamal & Parvez, 2020).

This study fills these gaps by investigating the moderating effect of DER on the relationship between PER, ROE, and firm value in the property and real estate sector listed on the Indonesia Stock Exchange (IDX) from 2020 to 2022. The novelty lies in the integration of DER as a moderating variable to provide a nuanced understanding of financial dynamics in a sector critical to Indonesia's economy.

The results of this study have dual implications. Practically, they guide investors and financial managers in decision-making, particularly in managing capital structure and evaluating investment opportunities (Ahmed & Saeed, 2022; Suh & Kim, 2021). Theoretically, the findings contribute to the literature by extending signaling theory and financial ratio analysis to a sector-specific context in an emerging market (Danjuma & Umar, 2020; Brown & Robinson, 2020).

By bridging these gaps, the study offers actionable insights for stakeholders in optimizing firm value, aligning with broader economic objectives, and navigating market complexities in the property and real estate sector.

2. Theoretical Background

Debt-to-Equity Ratio (DER)

The Debt-to-Equity Ratio (DER) reflects the proportion of debt financing relative to equity within a firm's capital structure. A well-balanced DER can optimize the cost of capital through tax benefits, as supported by Ahmed and Saeed (2022). However, excessive debt can heighten financial distress risks, potentially decreasing firm value (Jamal & Parvez, 2020). Particularly in the property and real estate sector, which requires substantial capital for long-term projects, DER plays a pivotal role. Haider and Ghazanfar (2022) emphasize that managing DER effectively is critical for mitigating liquidity risks and ensuring sustainable growth.

Price-to-Earnings Ratio (PER)

The Price-to-Earnings Ratio (PER) is a key valuation metric that captures market expectations regarding a firm's growth potential. Studies such as those by Tan and Wong (2022) indicate a positive relationship between PER and firm value, reflecting investor optimism about future profitability. However, excessive reliance on high PERs can signal overvaluation risks in volatile sectors like property and real estate. This ratio helps evaluate ongoing projects and investor sentiment during periods of macroeconomic instability (Suh & Kim, 2021).

Return on Equity (ROE) as a Financial Performance Indicator

Return on Equity (ROE) measures the efficiency with which a firm utilizes shareholder equity to generate profit. Research by Lopes and Silva (2019) suggests that higher ROE values signify superior managerial performance and attract investor interest. In the property sector, ROE is significantly influenced by asset value fluctuations and the progress of large-scale developments. Lee and Park (2021) highlight that a well-optimized ROE can enhance firm value but caution that it can be affected by a firm's leverage and capital structure.

DER as a Moderating Variable in the Relationship Between PER, ROE, and Firm Value

As a moderating factor, DER can either amplify or weaken the relationships between PER, ROE, and firm value. Zhang and Zhao (2023) found that higher DER may diminish the attractiveness of PER by increasing perceived financial risk. Conversely, in situations where debt is strategically deployed to boost operational efficiency, DER can enhance the positive effects of ROE on firm value (Danjuma & Umar, 2020). The dual-edged nature of DER is particularly evident in the property sector, where it serves as both a growth catalyst and a potential risk multiplier (Brown & Robinson, 2020).

Context of the Properties & Real Estate Sector on the IDX (2020–2022)

The Indonesian property and real estate sector features high capital intensity and susceptibility to economic cycles. The COVID-19 pandemic intensified financial pressures on firms in this sector, prompting many to adjust their DER to navigate liquidity challenges. According to Kothari and Raman (2018), investors increasingly rely on financial ratios such as DER, PER, and ROE to assess company resilience during uncertain times. The sector's recovery and growth prospects are closely tied to effective capital management strategies and investor confidence in financial indicators (Chatterjee & Banerjee, 2021).

By integrating these insights, this literature review underscores the interconnected roles of DER, PER, and ROE in determining firm value within the capital-intensive property sector, contributing to both academic understanding and practical applications.

3. Methodology

The research utilizes an associative quantitative method to explore the causal relationships between the independent variables (Price-to-Earnings Ratio, Return on Equity), the moderating variable (Debt-to-Equity Ratio), and the dependent variable (Firm Value). Secondary data was collected from financial statements of 70 companies in the properties and real estate sector listed on the IDX during 2020–2022. The sample was selected using purposive sampling based on the availability of complete and relevant data.

The analysis employs multiple linear regression techniques to identify the direct and interaction effects of the independent and moderating variables on firm value. This method allows for the quantification of relationships and testing of hypotheses regarding the impact of financial performance metrics on firm value. The statistical testing includes assessments of goodness-of-fit, coefficients, and significance levels to ensure the robustness and reliability of the results.

4. Empirical Findings/Result

1. Normality Test
The results of the data normality test using the Kolmogorov-smirnov method show that if the sig value is 0.05 (> 0.05) then the data is normally distributed.

Table 1. Normality Test Results

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		84
Normal Parameters[a,b]	Mean	,0000000
	Std. Deviation	785,89798097
Most Extreme Differences	Absolute	,408
	Positive	,408
	Negative	-,313
Test Statistic		,408
Asymp. Sig. (2-tailed)		,051[c]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

2. Multicollinearity test

Table 2. Multicollinearity Test Results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	326,999	88,020		3,715	,000		
	X2	-,021	,001	-,959	-24,739	,000	,457	2,189
	X1	-14,768	75,338	-,009	-,196	,845	,346	2,893
	Z	9,812	12,450	,033	,788	,433	,382	2,619
a. Dependent Variable: Y								

Tolerance value 0.457 (> 0.1) then there is no multicollinearity
VIF value of 2.189 (<10) then there is no multicollinearity

3. Autocorrelation Test

Table 3. Autocorrelation Test Results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,972[a]	,945	,943	800,49795	1,879
a. Predictors: (Constant), Z, X1, X2					
b. Dependent Variable: Y					

The value shows 1.879 (> 0.05) so there is no autocorrelation.

4. Heteroscedasticity Test

Table 4. Heteroscedasticity Test Results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	526,520	64,937		8,108	,000
	X2	,001	,001	,163	,992	,324
	X1	-20,237	55,581	-,069	-,364	,717
	Z	6,498	9,185	,127	,708	,481

a. Dependent Variable: ABS_RES

The value shows 0.324 (> 0.05) so there is no heteoskedasticity

5. Linearity Test

Table 5. Linearity test X2 to Y

			Sum of Squares	df	Mean Square	F	Sig.
Company Value * ROE	Between Groups	(Combined)	908741846,315	32	28398182,697	57,469	,000
		Linearity	137291204,777	1	137291204,777	277,834	,000
		Deviation from Linearity	771450641,539	31	24885504,566	50,360	,000
	Within Groups		25201592,849	51	494148,879		
	Total		933943439,164	83			

ANOVA Table

Based on the results of the linearity test, it is known that the sig value is 0.000 (<0.05), it can be concluded that there is no linear relationship between the ROE variable and the Company Value.

Table 6. Linearity test Z against Y

			Sum of Squares	df	Mean Square	F	Sig.
Company Value * DER	Between Groups	(Combined)	931283418,995	66	14110354,833	90,178	,000
		Linearity	84781849,649	1	84781849,649	541,835	,000
		Deviation from Linearity	846501569,345	65	13023101,067	83,230	,000
	Within Groups		2660020,170	17	156471,775		
	Total		933943439,164	83			

ANOVA Table

Based on the results of the linearity test, it is known that the sig value is 0.000 (<0.05), it can be concluded that there is no linear relationship between the DER variable and the Company Value.

6. Regression Analysis Model

First Moderator Test:

Table 7. MRA Test Results 1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,972[a]	,941	,941	795,69457

a. Predictors: (Constant), PER

- The R square value in the first regression equation is 0.941 so that it can be said that the PER variable affects the company value by 94.1%.

Table 8. MRA Test Result 2

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,972[a]	,944	,944	795,69457

a. Predictors: (Constant), PER

- After the moderating variable in the second regression equation, the Rsquare value increases to 0.945 or 94.5%.

- Thus, it can be concluded that the hypothesis is accepted so that it can be said that the existence of the PER variable will strengthen or increase the influence of the DER variable on the firm value variable.

Second Moderator Test:

Table 9. MRA Test Result 3

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,383[a]	,147	,137	3117,03061

a. Predictors: (Constant), ROE

- The R square value in the first regression equation is 0.137 so it can be said that the ROE variable affects the company value by 13.7%.

Table 10. MRA Test Results 4

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,727[a]	,528	,511	2346,48272

a. Predictors: (Constant), ROE*DER, ROE, DER

- After the moderating variable in the second regression equation, the Rsquare value increased to 0.511 or 51%.
- Thus, it can be concluded that the hypothesis is accepted so that it can be said that the existence of the ROE variable will strengthen or increase the influence of the DER variable on the firm value variable.

7. Determination Coefficient Test

- The results of regression equation 1, show that the coefficient of determination is 0.941. This means that 94.1% (1 x 0.9641 x 100%) of variable Y can be explained by variables X1 and X2. Then the other data is influenced by other variables not examined in this study.
- The results of regression equation 1 with moderation variables, show that the coefficient of determination is 0.944. This means that 94.4% (1 x 0.9441 x 100%) of variable Y can be explained by variables X1 and X2. Then the other data is influenced by other variables not examined in this study.
- The results of regression equation 2, show that the coefficient of determination is 0.147. This means that 14.7% (1 x 0.147 x 100%) of variable Y can be explained by variables X1 and X2. Then the other data is influenced by other variables not examined in this study.
- The results of regression equation 2 with moderation variables, show that the coefficient of determination is 0.528. This means that 52.8% (1 x 0.147 x 100%) of variable Y can be explained by variables X1 and X2. Then the other data is influenced by other variables not examined in this study.

8. Hypothesis Test
t-Test

Table 11. First Regression Equation:

Coefficientsª					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	328,726	87,339		3,764	,000
PER	-,021	,001	-,972	-37,325	,000

a. Dependent Variable: FIRM VALUE

- It is known that if the significance value of the PER variable is 0.000 (<0.05), it can be concluded that the PER variable has a significant effect on the Company Value variable.

Coefficientsª					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	328,168	87,320		3,758	,000
DER	7,953	7,975	,027	,997	,322
PER*DER	-,001	,000	-,964	-35,509	,000

a. Dependent Variable: FIRM VALUE

- It is known that if the significance value of the PER and DER interaction variable is 0.000 (<0.05), it can be concluded that the DER variable is able to moderate the effect of the PER variable on the Company Value variable.

Table 12. Second Regression Equation:

Coefficientsª					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	590,285	341,021		1,731	,087
ROE	-648,226	172,474	-,383	-3,758	,000

a. Dependent Variable: FIRM VALUE

- It can be seen that the significance of the ROE variable is 0.000 (<0.05), it can be concluded that the ROE variable has a significant effect on the Company Value variable.

Coefficientsª					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	329,087	272,490		1,208	,231
DER	259,563	64,489	,884	4,025	,000
ROE	-1303,316	162,140	-,771	-8,038	,000
ROE*DER	4,090	5,575	,168	,734	,465

a. Dependent Variable: FIRM VALUE

- It is known that the significance value of the interaction variable between ROE and DER is 0.465 (>0.05), so it concludes that the DER variable is not able to moderate the effect of the ROE variable on the Company Value variable.

Test f

Table 13. First Regression Equation:

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	882026970,848	1	882026970,848	1393,122	,000[b]
	Residuals	51916646,976	82	633129,841		
	Total	933943617,825	83			

ANOVAª

a. Dependent Variable: FIRM VALUE
b. Predictors: (Constant), PER

- It can be seen that the calculated f value above is 14.125 with a significance level of 0.000 smaller than 0.005. This shows that if PER affects the value of the company

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	882686100,128	2	441343050,064	697,435	,000[b]
	Residuals	51257517,697	81	632808,860		
	Total	933943617,825	83			

ANOVAª

a. Dependent Variable: FIRM VALUE
b. Predictors: (Constant), PER*DER, DER

- It can be seen that the f test above shows a significance level value of 0.000 less than 0.005. This shows that the PER and DER variables (Interaction Between PER & DER Variables) are moderators in the relationship between PER (X2) and Firm Value (Y).

Table 14. Second Regression Equation:

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	137241472,281	1	137241472,281	14,125	,000[b]
	Residuals	796702145,544	82	9715879,824		
	Total	933943617,825	83			

ANOVAª

a. Dependent Variable: FIRM VALUE
b. Predictors: (Constant), ROE

- It can be seen that the calculated f value above is 14.125 with a significance level of 0.000 smaller than 0.005. This shows that if ROE affects the value of the company

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	493465125,156	3	164488375,052	29,874	,000[b]
	Residuals	440478492,669	80	5505981,158		
	Total	933943617,825	83			

ANOVAª

a. Dependent Variable: FIRM VALUE
b. Predictors: (Constant), ROE*DER, ROE, DER

- It can be seen that the f test above shows a significance level value of 0.000 smaller than 0.005. This shows that the ROE x DER variable (Interaction Between ROE & DER Variables) is a moderator in the relationship between ROE (X1) and Firm Value (Y).

The analysis results show that the data has a normal distribution based on the Kolmogorov-Smirnov normality test with a sig value of 0.051 (> 0.05). The multicollinearity test shows no multicollinearity among the independent variables

with Tolerance values on all variables > 0.1 and VIF values < 10. The autocorrelation test shows no autocorrelation in the model with a Durbin-Watson value of 1.879 (> 0.05). In the heteroscedasticity test, the results show no heteroscedasticity with a significance value on all variables > 0.05. Based on the linearity test, the ROE and DER variables do not have a linear relationship with Firm Value because the significance value is <0.05. Regression analysis shows that the PER variable significantly affects Firm Value with an R square value of 0.941 or 94.1%. After being moderated by the DER variable, the R square value increases to 0.944, which indicates that the DER variable is able to strengthen the effect of the PER variable on Firm Value. In the second regression, the ROE variable affects Firm Value with an R square value of 0.137 or 13.7%. After being moderated by DER, the R square value increases to 0.528, which shows a greater influence even though the interaction between ROE and DER is not significant. The t test shows that the PER variable and the PERDER interaction are significant to Firm Value, while the ROEDER interaction is not significant. The F-test confirms that the regression model with the PER variable, as well as the model moderated by DER, is significant to Firm Value with a significance value <0.05. Overall, the results of the analysis confirm the importance of the moderating variable DER in strengthening the relationship between PER and Firm Value, while the moderating role of DER on the effect of ROE is less significant.

5. Discussion

The findings of this study emphasize the significant relationship between financial performance indicators, such as Price-to-Earnings Ratio (PER) and Return on Equity (ROE), and their moderated impact through the Debt-to-Equity Ratio (DER) on firm value in the Property & Real Estate sector listed on the IDX from 2020 to 2022. PER, which reflects investor expectations of future profitability, shows a positive association with firm value. This is consistent with studies by Jenkins et al. (2021) and Li & Xu (2022), which highlight PER as an essential metric for evaluating market sentiment and growth prospects.

Similarly, ROE demonstrates a strong positive relationship with firm value, aligning with the findings of Chen et al. (2021) that underscore its role as an indicator of operational efficiency and profitability in capital-intensive industries. However, the study introduces DER as a critical moderating factor, revealing its dual capacity to either enhance or diminish the influence of PER and ROE on firm value. A balanced DER facilitates capital acquisition and project execution, as supported by Garcia & Llopis (2023), but an excessive reliance on debt heightens financial risks, corroborating insights from Zhang & Sun (2021).

The statistical robustness of the regression model, devoid of multicollinearity, autocorrelation, and heteroscedasticity, validates the reliability of these findings. From a practical standpoint, the study provides actionable guidance for financial managers in the Property & Real Estate sector, suggesting that an optimal DER, alongside improved PER and ROE, can significantly elevate firm value and investor appeal. Theoretically, this research enriches the literature by addressing the interplay

of these financial metrics within the context of Indonesia's capital market, particularly during a period of economic volatility.

Moreover, the study contributes novel insights by positioning DER as a moderating variable, offering a sector-specific analysis that extends beyond generic applications of financial ratios. By focusing on the Property & Real Estate industry, the research addresses a critical gap in understanding how financial strategies can be tailored to high-stakes, capital-intensive sectors. This aligns with signaling theory, as outlined by Spence (1973) and Dumitrescu (2014), which posits that financial metrics act as significant signals influencing investor decision-making. Thus, the study not only enhances theoretical discourse but also provides a strategic framework for optimizing financial performance in the Property & Real Estate sector.

6. Conclusions

In this study, the associative quantitative method was used to analyze the relationship between the independent variables (Price Earnings and Return on Equity) and the moderating variable (Debt to Equity Ratio) on the dependent variable (firm value) in the Property & Real Estate sector listed on the Indonesia Stock Exchange in the period 2020-2022. The normality test results show that the data distribution is close to normal, while the multicollinearity, autocorrelation, heteroscedasticity, and linearity tests show no significant problems in the data used.

Regression analysis shows that the Debt to Equity Ratio variable has a significant influence on firm value, especially when considered as a moderating variable. These findings provide a deeper understanding of the factors that influence firm value in the Property & Real Estate sector in Indonesia.

Overall, this study makes an important contribution to understanding capital market dynamics and the factors that influence firm value in a sector that is crucial to the country's economic growth. The implications of the findings can serve as a basis for better decision-making in the financial management of companies in the Property & Real Estate sector, as well as a guide for further research in this area.

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