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Capital Structure and Enterprise Market Value: An Empirical Analysis Based on S&P 500 Companies

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Abstract: This study explores the impact of capital structure on enterprise market value, specifically examining the influence of the debt ratio on the market valuation of S&P 500 companies. Capital structure decisions are crucial for corporate managers and investors, as they significantly affect firm performance, risk, and market perception. The research is motivated by the need to understand how financial leverage influences market valuation, particularly in large, publicly traded companies. Utilizing two-way fixed effect panel data models spanning from 2020 to 2023, we find significant evidence that higher leverage is associated with an increase in market valuation, offering a comprehensive view of the factors that influence corporate market values. Additionally, the study reveals that the impact of leverage varies across company sizes and examines sector-specific effects and the role of long-term debt. The findings provide key insights for investors and corporate managers regarding the impact of financial structure on company valuation, emphasizing the importance of optimizing capital structure to enhance firm value and strategic decision-making.

Keywords: Capital Structure, Market Value, S&P 500, Two-way Fixed Effect Model.

1. Introduction

Capital structure decisions are critical in corporate finance, influencing firm performance, risk, and market valuation [1]. Despite extensive research on capital structure, the relationship between leverage and market value remains an area with conflicting results and varying perspectives [2]. Prior studies have explored the impact of leverage on firm value, but gaps persist, particularly regarding the nuanced effects of different types of debt and industry-specific factors [3]. This study aims to investigate the influence of debt ratio on the market valuation of S&P 500 companies, addressing these gaps and contributing to a more refined understanding of capital structure implications [4]. Specifically, we seek to determine how financial leverage affects the market value of large, publicly traded companies, considering factors such as company size, long-term debt proportion, and sector-specific variations [5]. Our methodology employs two-way fixed effect panel data models spanning from 2020 to 2023, providing robust and comprehensive insights. This research is significant as it offers valuable information for investors and corporate managers on optimizing capital structure to enhance firm value, thereby informing strategic financial decision-making and contributing to the broader discourse on corporate finance

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2. Data and Methods

2.1. Data Collection and Sample Selection

The study selects Tobin's Q , a dependent variable, dependent variable to measure market value as the ratio of a firm's market value to the replacement cost of its assets [6]. The independent variable, Debt Ratio, represents financial leverage and is calculated as total debt divided by total assets [1]. The data is sourced from S&P500 companies financial data spanning from 2020 to 2023. This research conducts an empirical study through a two-way fixed effect panel data modelthrough two-way fixed effect panel data model, in which the study includes Industry Classification, using dummy variables for different industry sectors to control for industry-specific effects, and Year, using dummy variables to control for time-specific effects on market valuation [5].

2.2. Research Hypothesis

Based on the Trade-Off Theory, higher leverage, balanced by the tax benefits of debt, leads to higher market valuations [7]. The underlying economic principle here is that debt provides a tax shield that can enhance firm value, as posited by Modigliani and Miller's capital structure relevance with taxes [8]. By leveraging this theory, the analysis aims to uncover whether higher debt levels indeed correlate with increased market valuations, supporting the notion that firms can optimize their capital structure for better financial performance. This study intends to empirically test Hypothesis 1(H1):

H1: There is a positive relationship between the debt ratio and the market value (Tobin's Q) of S&P 500 companies.

According to Economies of Scale Theory, larger firms benefit more from leverage due to lower costs per unit and better access to capital markets [9]. Larger firms can spread fixed costs over a larger output, thereby reducing per-unit costs and making them more capable of handling higher leverage without proportionately increasing risk. Smaller firms may not see significant valuation benefits from leveraging due to higher relative costs and limited access to capital [10]. The Agency Theory suggests that small firms face higher agency costs, which can outweigh the benefits of debt. From this perspective, the impact of the debt ratio on a company's market value varies by company size.

High Long-Term Debt Proportion: Based on Pecking Order Theory, firms with a higher proportion of long-term debt benefit more from leverage as it is generally cheaper and less risky compared to short-term debt [11]. Long-term debt aligns better with long-term investment projects, reducing refinancing risk and interest rate exposure. Low Long-Term Debt Proportion: Firms with a lower proportion of long-term debt may not significantly benefit from changes in their debt ratio due to higher costs and risks associated with short-term debt. The Trade-Off Theory suggests that these firms might face higher costs of financial distress, offsetting the benefits of the tax shield [7]. In this view, the impact of the debt ratio on a company's market value varies by long-term debt proportion.

High-tech sectors might not rely heavily on debt due to their high intangible assets, which are less likely to be used as collateral [9]. These sectors may show distinct patterns due to differences in capital intensity and revenue models. The Resource-Based View (RBV) of the firm suggests that sectors with higher intangible assets might prefer equity financing to preserve financial flexibility. Other traditional sectors benefit from higher debt ratios according to Trade-Off Theory. These sectors often have more tangible assets that can be used as collateral, reducing the cost of debt and enhancing the positive effects of leverage on firm value [4]. Therefore, the impact of the debt ratio on a company's market value is different between high-tech sectors and other traditional sectors.

Based on the above-mentioned theoretical analysis, this study also tries to empirically investigate Hypothesis 2(H2):

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H2: The impact of the debt ratio on a company's market value varies by company size, long-term debt proportion, and industry.

2.3. Two-way Fixed Effect Model

This study utilizes two-way fixed effect model to conduct empirical analysis on whether the usage of debt leads to higher market value for S&P500 companies.

Tobin′s Q_{it} is the market value of firm i at time t, β_0 is the intercept, $\beta_{1,}$ is the coefficient in interest, λ_t is the year fixed effect, λ_i is the individual fixed effect, ε_{it} is the error term.

$$\text{Tobin′s } Q_{it} = \beta_0 + \beta_1 \text{Debt Ratio}_{it} + \lambda_t + \lambda_i + \varepsilon_{it}$$

3. Empirical Analysis

3.1. Descriptive Statistical

The descriptive analysis in table 1 shows that the average debt ratio of S&P 500 companies is 33.42% and the average Tobin's Q is 2.70, indicating that firms are generally valued at 2.7 times their replacement cost with moderate leverage.

Table 1: Variables Descriptive Statistical

	N	Mean	Std	25 percentile	50 percentile	75 percentile	max
Debt Ratio(%)	1956	0.3342	0.2478	0.1898	0.3126	0.4330	3.2781
Tobin's Q(%)	1968	2.6994	4.0767	0.7292	1.4724	3.1332	80.9776
Market Cap	1969	96365696055	2.8184E+11	18000973824	35422793728	74631970816	3.16126E+12
Total Debt(In Million)	1956	18113	37708	3347	7818	17279	436537
Total Assets(In Million)	1968	85884	279715	11565	24889	61258	3875397

3.2. Regression Analysis

The results of the regression models are presented to test the hypotheses and understand the relationship between debt ratio and market value (Tobin's Q) as shown in table 2. The two-way fixed effects models are employed to account for unobserved heterogeneity and potential endogeneity.

Column (a) represents the results based on the full sample, which shows a significant positive relationship between debt ratio and Tobin's Q, indicating that higher leverage is associated with higher market valuations, consistent with the Trade-Off Theory.

To ensure the robustness of the results, a robustness check is performed by excluding the financial sector due to their unique capital structures heavily reliant on debt [9]. Financial firms operate under different regulatory and market conditions, which can skew the overall analysis. By excluding these firms, we can verify if the observed relationships hold true across non-financial sectors, providing a more generalized understanding of the impact of debt on firm valuation. This approach is grounded in the economic principle that industry-specific regulations and market environments can significantly influence capital structure decisions, thereby necessitating a separate analysis for non-financial firms to ensure the findings are broadly applicable across diverse industries [4]. As showed in column (b), the significant positive relationship between debt ratio and market value excluding financial companies further supports this.

Column (c) and (d) represent the result of big company and small company respectively. The result indicates that larger firms have a stronger positive relationship between debt ratio and Tobin's Q, aligned with the Economies of Scale Theory. Larger firms benefit more from leverage due to lower per-unit costs and better capital market access. However, the result of small company shows no

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significant relationship between debt ratio and Tobin's Q, suggesting that smaller firms do not gain significant valuation benefits from leveraging. This can be explained by the Agency Theory, where smaller firms face higher agency costs and limited access to capital, which may offset the potential benefits of debt.

Column (e) demonstrates sector heterogeneity, with a significant positive relationship between debt ratio and Tobin's Q in traditional sectors, indicating higher leverage leads to higher market valuations, consistent with the Trade-Off Theory. Conversely, Column (f) shows no significant relationship in the high-tech sector, suggesting that higher leverage does not enhance market valuation due to the greater risks and uncertainties in these industries. This underscores the need to consider industry-specific characteristics when making capital structure decisions.

Column(g) and (h) show the effect of Proportion of Long-Term Debt. Firms with a high proportion of long-term debt benefit more from leverage, as evidenced by the significant positive relationship with Tobin's Q. This supports the Pecking Order Theory, where long-term debt is preferred due to its lower cost and reduced risk. Firms with a low proportion of long-term debt do not significantly benefit from changes in their debt ratio, likely due to the higher costs and risks associated with short-term debt. This finding underscores the importance of long-term debt in enhancing firm value by providing financial stability.

Table 2: Empirical Results

	Full Sample (a)	Non-Financial Sample (b)	Big Company (c)	Small Company (d)	Traditional Sector (e)	High-tech Sector (f)	High Proportion of Long-Term Debt (g)	Low Proportion of Long-Term Debt (h)
Debt Ratio	1.0384**	0.9969*	2.2429**	-0.0401	1.1860***	-0.0401	1.0177***	-0.4883*
	(0.4623)	(0.5089)	(0.9188)	(0.2800)	(0.2543)	(0.2800)	(0.3567)	(0.2401)
Individual Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
R Squared	0.15	0.21	0.2	0.16	0.18	0.16	0.2299	0.0896
Observations	1956	1681	977	979	1271	357	814	814

Note: T-statistics based on robust clustered standard errors in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

4. Conclusion

This study examined the impact of capital structure, particularly the debt ratio, on the market value of S&P 500 companies from 2020 to 2023 using two-way fixed effect panel data models. The findings reveal that higher debt ratios are significantly associated with higher market valuations (Tobin's Q). The impact varies by firm size, with large companies benefiting significantly from higher debt ratios, while small companies show no significant effect. Sector-specific heterogeneity indicates that the debt ratio positively impacts market value in traditional sectors rather than High-tech sectors. Firms with a high proportion of long-term debt benefit significantly from leveraging, whereas those with low long-term debt do not. These findings highlight the critical role of capital structure in firm valuation, as posited by various economic theories such as the Trade-Off Theory, Economies of Scale Theory, and Agency Theory. By understanding how leverage impacts different types of firms and sectors, managers can make informed financing decisions that align with their strategic objectives, optimize their capital structure, and enhance their market valuation.

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