



The Relation Between Profitability and Capital Structure: Evidence from Chinese Listed Companies

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Abstract. This study empirically examines the relationship between financial leverage and corporate performance in China's A-share market, using data from 273 publicly traded firms between 2014 and 2019. The analysis evaluates the effects of leverage ratios, operational scale, and firm maturity on profitability, measured by ROE. The findings indicate that lower leverage, characterised by a lower debt-to-equity ratio, is associated with lower profitability due to increased financial distress risk and agency costs. In contrast, companies with more moderate levels of debt benefit from the tax shield effect of debt financing, which positively impacts profitability. Revenue has a significant positive relationship with ROE, emphasising the importance of sales growth in driving profitability, while company age shows no significant effect. The study further explores segmented regression analysis, revealing that capital structure decisions, particularly leverage, impact profitability in different segments. These findings offer crucial perspectives on how decisions related to capital structure affect profitability among Chinese listed firms, presenting practical guidance for investors and corporate executives in optimizing their financing strategies. The study contributes to the ongoing debate on the optimal balance between debt and equity financing, especially within China's unique market and regulatory environment.

Keywords: corporate finance, capital structure, profitability, regression analysis

1 Introduction

Capital structure describes a firm's chosen combination of debt and equity financing used for operational needs and expansion. It includes financial instruments such as bonds, preferred shares, and common stocks employed to fund assets and capital investments. Firms can opt for various capital structures, including lease financing, convertible bonds, and forward contracts. Choosing an optimal capital structure is crucial because it directly influences the firm's financial risk and profitability.

Building upon the seminal contributions of Modigliani and Miller [1], under idealized market conditions—absent taxes and market frictions—A firm's valuation and earning capacity remain unaffected by whether it opts for debt or equity financing. However, in the real world, factors such as taxes, information asymmetry, and agency costs complicate the relationship between capital structure and profitability. A firm's

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capital structure can significantly impact its profitability in imperfect markets. Jensen and Meckling introduced agency theory, which suggests that capital structure decisions can influence the relationships between shareholders, managers, and debt holders. Agency costs arise from conflicts of interest between these groups. For instance, shareholders and managers may have differing goals, with managers sometimes pursuing personal interests that do not align with shareholder wealth maximisation.

Additionally, debt holders may be concerned about the firm's ability to repay its debts. These conflicts create agency costs, which can reduce profitability if not carefully managed. According to Jensen and Meckling, higher leverage increases the potential for conflicts between shareholders and debt holders, raising agency costs and potentially decreasing profitability. While Modigliani and Miller argue that capital structure does not impact profitability in a tax-neutral environment [2], Jensen and Meckling add an important perspective: capital structure decisions can affect agency costs, which, in turn, influence profitability [3]. Firms relying heavily on debt financing may face higher agency costs due to the increased risk of financial distress and conflicts between managers and debt holders. In contrast, firms with more equity financing may face lower agency costs but could encounter different managerial incentives.

This paper examines the link between capital structure choices and profitability within the specific context of Chinese listed enterprises. China's market offers distinct attributes, such as specialized regulatory conditions and diverse ownership patterns, which significantly impact corporate financing strategies. In particular, state-owned enterprises (SOEs) often have different capital structure choices than private firms, as they may rely more on bank loans and less on equity financing. This paper will analyse the impact of capital structure on profitability by examining data from a sample of Chinese-listed companies over six years (2014-2019). The study will provide empirical insights into how different capital structures affect profitability in China's unique economic and market conditions.

2 Literature Review

2.1 Capital Structure and Profitability: Theoretical Foundations

The link between a company's financial leverage and its earnings performance has long been a central topic in the field of corporate finance. Financial leverage, or capital structure, denotes the proportion of borrowed funds and shareholder equity used to support business activities. Profitability is often assessed using indicators such as Return on Assets (ROA) and Return on Equity (ROE). Throughout the years, scholars have proposed various theoretical frameworks to interpret how different financing strategies may influence a firm's ability to generate profits.

Modigliani and Miller proposed the irrelevance theory, asserting that in an ideal, frictionless market environment, a firm's capital structure choices would not affect its valuation or profitability [1].

Nevertheless, the initial formulation of this theory is based on idealized conditions—it overlooks factors such as taxation, transaction expenses, and uneven access to information, all of which are prevalent in actual financial environments. In a subse-

quent refinement published in 1963, Modigliani and Miller addressed one of these limitations by incorporating the tax implications of debt. They highlighted that interest expenses on borrowed capital can be deducted from taxable income, thereby enhancing the appeal of debt financing and potentially boosting a firm's net returns under specific circumstances.

The Trade-off Theory, introduced by Kraus and Litzenberger in 1973, posits that firms strive to achieve an optimal capital structure by balancing the tax benefits gained from debt financing against the risks and costs linked to financial distress. This perspective suggests that using a moderate amount of debt can improve firm profitability by reducing the weighted average cost of capital.

Myers's Pecking Order Theory argues that firms prioritise internal financing over debt and debt over equity [4]. This theory explains that profitable firms often prefer equity financing when their stock is undervalued, whereas less profitable firms may rely more on debt.

2.2 Empirical Evidence on Capital Structure and Profitability

Numerous studies have empirically examined the impact of capital structure on profitability across different markets and industries. The findings are mixed; some studies show a positive relationship, while others find a negative or insignificant one.

Abor's analysis of Ghanaian listed firms revealed that short-term debt positively correlates with ROE, whereas long-term debt exhibits an inverse relationship with profitability." [5] Subsequent research by Gill et al. corroborated these patterns in the U.S. context, noting that industries such as manufacturing and services benefit more from short-term debt utilization [6]. Singh and Bagga analysed Indian firms listed on the NSE. They found a significant positive relationship between capital structure (debt-to-equity ratio) and profitability (ROA and ROE) [7]. This study highlighted that firms with higher debt levels tended to exhibit better profitability, likely due to the tax benefits associated with debt. In contrast, a study by Shubita and Alsawallah on Jordanian industrial firms found a negative relationship between debt and profitability [8]. The study suggested that profitable firms in Jordan tend to rely more on equity financing, possibly due to the risks associated with high debt levels.

2.3 Capital Structure in the Context of China

China's economic landscape is shaped by distinctive institutional factors, including state-controlled enterprises (SOEs), regulatory frameworks tailored to domestic priorities, and market behaviors diverging from Western norms [9, 10]. These factors can significantly influence corporate financing decisions, especially regarding the debt-equity mix.

Due to their easier access to credit, state-owned enterprises (SOEs) in China tend to rely more heavily on debt financing, particularly bank loans [11, 12]. In contrast, private firms are more likely to rely on equity financing or hybrid instruments [13, 14].

The Chinese market has undergone significant reforms, and firms increasingly face pressure to optimise their capital structure [15]. This is particularly important as China

shifts towards a more market-driven economy where firms are encouraged to operate more efficiently and reduce their reliance on excessive debt.

3 Methodology

3.1 Data Source

This research utilizes financial data sourced from the GTJA (Guotai An) database, covering 273 Chinese A-share listed companies across various sectors between 2014 and 2019. The data includes the companies' financial statements, such as balance sheets and income statements.

3.2 Variable Selection

Dependent Variable. This study uses ROE (Return on Equity) as the dependent variable to measure company profitability. ROE is an important financial indicator that reflects the profit earned by the company with shareholders' equity.

Independent Variables. This study selects the following independent variables to reflect the company's capital structure.

Debt-to-Equity Ratio. This variable represents the proportion of total debt to shareholders' equity and measures the extent of the company's financial leverage.

Revenue. This variable reflects the size of the company's revenue and may influence profitability.

Company Age. This variable measures the number of years since its establishment and could relate to the company's management experience and market position, thus potentially affecting its profitability.

This study employs t-tests and regression analysis to test the hypotheses, examining the correlation and impact of the independent variables on the dependent variable. The study aims to validate the influence of different capital structure variables on company profitability through these tests.

3.3 Analysis

Descriptive Statistics. The descriptive statistics of the variables used in the study are summarised as follows:

ROE (Return on Equity). The average ROE across sampled firms stands at about 0.1248, suggesting generally moderate levels of profitability during the observed period.

Debt-to-Equity Ratio. An observed mean of roughly 0.60 reflects that the sampled firms typically adopt a proportionate allocation between borrowed funds and shareholder equity in their financial structuring.

Revenue. The average revenue is 24.5, indicating considerable variation in the revenue size among the sample companies. This suggests that companies with different scales are included in the study, which may affect profitability.

Company Age. The average company age is 20.39 years, showing that the companies vary in maturity and market experience.

Table 1. Full Sample Regression Results: The Impact of Capital Structure, Firm Age, and Operating Revenue on ROE

Variable	Coefficient	Std. Error	t-Statistic	p-value
Constant (C)	-20.0730	9.8111	-2.0460	0.0417*
X1	-0.1357	0.0389	-3.4904	0.0006***
X2	0.2617	0.1132	2.3118	0.0215*
X3	1.4381	0.4229	3.4006	0.0008***
Observations	273			
R ²	0.0704	Adj. R ²	0.0600	
F-statistic	6.7884	Prob(F)	0.0002	

In this study, Return on Equity (ROE), denoted as Y , is used as the dependent variable. The independent variables include the debt-to-asset ratio ($X1$), firm age ($X2$), and total operating revenue ($X3$). A multiple linear regression model is constructed to investigate the impact of these factors on the profitability of firms. The table presents the regression results based on the full sample, serving as a benchmark for the subsequent subgroup analysis of high- and low-leverage firms.

Specifically, the debt-to-asset ratio ($X1$) reflects a firm's capital structure, firm age ($X2$) captures the firm's operational experience and development stage, and total operating revenue ($X3$) represents the scale of business operations and market performance. The coefficients in the regression results indicate the marginal effects of each explanatory variable on ROE, while the t-statistics and p-values are used to test their statistical significance.

To clearly indicate the level of statistical significance, asterisks are used in the table: *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level. A smaller p-value indicates a more robust effect of the variable on ROE. This baseline regression result provides a foundation for comparison in the following subgroup analyses. (Table 1)

Correlation Analysis. In order to explore the associations between the outcome variable and the predictors, this research carried out a correlation assessment, yielding the following findings:

Debt-to-Equity Ratio. There is a significant negative correlation between the debt-to-equity ratio and ROE, meaning that as the debt-to-equity ratio increases, return on equity tends to increase, particularly in the high-leverage group where higher leverage may lead to higher returns.

Revenue. There is a significant positive correlation between revenue and ROE, indicating that an increase in revenue helps to improve profitability. This further validates the idea that larger companies typically perform better in profitability.

Company Age. The relationship between company age and ROE is not significant, suggesting that company age has little direct impact on profitability. This may be due to external factors such as industry dynamics and market conditions, which may play a more important role.

Regression Analysis. To gain deeper insights into how capital structure influences profitability, this research utilized several regression techniques—namely Pooled OLS, Fixed Effects, and Random Effects models. The outcomes are presented below:

Debt-to-Equity Ratio. Regression outcomes suggest that for companies in the high-leverage group, a higher debt-to-equity ratio notably enhances ROE. This indicates a positive correlation between increased financial leverage and profitability. High-leverage companies may better utilise the tax shield effect of debt financing, leading to higher profitability. In the low-leverage group, the debt-to-equity ratio significantly negatively affects ROE, suggesting that too little leverage may prevent the company from fully exploiting the advantages of debt financing, thus limiting profitability.

Revenue. The revenue variable has a significant positive effect on ROE, indicating that its profitability also tends to increase as a company's revenue increases. This highlights the importance of revenue generation in driving profitability.

Company Age. Company age has no significant effect on ROE, suggesting that age may not play a major role in profitability, and other factors, such as industry factors and management practices, might be more important.

Segmented Regression Analysis. This study further integrates capital structure theory by proposing a segmented regression design. Based on the dual perspective of capital

structure theory, high debt levels increase financial distress risk (Financial Distress Risk), leading to a higher probability of debt default. In contrast, low debt implies that a company has not fully utilised the relatively low-cost debt financing advantages (Cheaper Finance Hypothesis), leading to inefficiency in capital costs. To test this theoretical expectation, this study used the median split method, dividing the sample into high-debt (>50%) and low-debt ($\leq 50\%$) groups, and constructed regression models for each group.

The segmented regression results shows the following outcomes. In the high-leverage group, ROE is significantly positively correlated with the debt-to-equity ratio, indicating that profitability significantly increases as financial leverage increases, supporting the potential advantages of high leverage. In the low-leverage group, ROE is significantly negatively related to the debt-to-equity ratio, suggesting that low leverage may not fully harness the potential of debt financing, leading to lower profitability. In the high-debt group, a significant positive correlation exists between ROE and debt-to-equity ratio, confirming the financial risk premium effect of excessive debt. (Table 2).

Table 2. High-Leverage Group Regression: Effects of Capital Structure, Age, and Revenue on ROE

Variable	Coefficient	Std. Error	t-Statistic	p-value
Constant (C)	-45.1949	14.1695	-2.0460	-3.1896
X1	0.0432	0.0823	0.5253	0.6000
X2	0.1755	0.1394	1.2594	0.2095
X3	1.9982	0.5912	3.3800	0.0009***
Observations	190			
R ²	0.0926	Adj. R ²	0.0779	
F-statistic	6.3256	Prob(F)	0.0004	

In the low-debt group, ROE shows a strong inverse association with the debt-to-equity ratio, indicating that moderate leverage helps to realise the tax shield effect of debt financing and capital cost advantages. (Table 3).

Table 3. Low-Leverage Group Regression: Effects of Capital Structure, Age, and Revenue on ROE

Variable	Coefficient	Std. Error	t-Statistic	p-value
Constant (C)	14.24002	12.71347	1.1201	0.2661
X1	-0.32087	0.08242	-3.8933	0.0002***
X2	-0.11460	0.21734	-0.5273	0.5995
X3	0.59567	0.49554	1.2021	0.2329
Observations	83			
R ²	0.1764	Adj. R ²	0.1452	
F-statistic	5.6417	Prob(F)	0.0015	

This structural difference confirms the existence of an optimal capital structure range, where when a company's leverage level deviates from the moderate range, its return on equity undergoes systematic changes.

Robustness Check. To ensure the robustness of the results, the regression analysis was checked for multicollinearity using Variance Inflation Factor (VIF) tests, and autocorrelation was assessed using the Durbin-Watson test. The results show no significant issues with multicollinearity or autocorrelation, supporting the reliability of the regression results.

Summary of Findings. The findings of the analysis reveal that capital structure has a significant impact on profitability. Regression coefficients indicate that elevated leverage ratios exert a downward pressure on ROE, likely attributable to heightened financial risks such as default probabilities and agency conflicts. Revenue positively impacts ROE, emphasising the importance of increasing sales to improve profitability. Company age does not show a significant relationship with ROE, indicating that other factors might be more influential in determining profitability.

These results contribute to understanding how capital structure decisions, particularly the use of debt, affect the profitability of Chinese listed companies and provide valuable insights for investors and corporate managers when making financing decisions.

4 Conclusion

This paper investigated the association between capital structure and profitability among Chinese A-share listed firms. Empirical findings demonstrate that capital structure substantially influences profitability, particularly highlighting the impact of leverage ratios on Return on Equity (ROE). The study found that high-leverage companies (i.e., the high-debt group) correlate significantly positively with higher profitability, indicating that high leverage can enhance profitability by fully utilising the advantages of debt financing.

In the low-leverage group, moderate increases in leverage show a significant negative correlation with ROE, suggesting that low-leverage companies fail to fully exploit the potential of debt financing, leading to lower profitability. However, there is no significant relationship between company age and ROE, indicating that external factors such as industry dynamics and market conditions may be more important in determining profitability.

Through segmented regression analysis, this study reveals significant structural differences in the impact of capital structure on profitability. The regression results from the high-debt and low-debt groups show that a company's profitability undergoes systematic changes with varying leverage levels, emphasising the importance of balancing debt and equity financing in financing decisions.

The findings underscore the critical role of leverage optimization in enhancing corporate performance, equipping stakeholders with actionable evidence to refine financing strategies within China's evolving market context.

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