Research on the Impact of Capital Structure on Enterprise Value

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Abstract. Capital structure refers to the proportional relationship between various long-term funding sources of an enterprise. A reasonable capital structure that can meet the funding needs of the enterprise while balancing risks and benefits, maximizing the value of the enterprise. However, due to the differences in the industrial environment, market environment and their own business conditions where enterprises are located, it is difficult to determine the optimal capital structure. This article selects Chinese A-share listed companies from 2014 to 2023 as the research object. By collecting annual report information and using a fixed effects model for empirical testing, it is found that there is an inverted U-shaped relationship between capital structure and enterprise value. A reasonable capital structure can provide a stable source of capital for enterprises, reduce financial risks, enhance investment flexibility and autonomy, thereby maximizing the value of the enterprise. On the contrary, if a company's capital structure is unreasonable, the debt ratio is too high, debt pressure is high, and the financial risks are high, its investment decisions will be subject to many constraints, which will hurt the company's value.

1 Introduction

Current market dynamics, marked by fierce competition, create multiple barriers to effective capital structure management for businesses. The fluctuations in the economic environment, intensified industry competition, and constantly changing policies and regulations make it increasingly difficult for companies to predict their future capital needs and income. As a key component of the economic system, enterprises play a crucial role in driving economic development. Financial management, as the core link of enterprise management, is an important foundation and guarantee for ensuring the sustained and stable development of enterprises. Among them, capital structure is an important component of corporate financial decision-making, directly affecting the financing cost, risk, and market value of the enterprise. Corporate capital structure represents the composition and relative weights of different long-term financing instruments employed by a firm. A reasonable capital structure that can meet the funding needs of enterprises while balancing risks and benefits [1].

Modern capital structure theory began with the Modigliani and Miller Proposition (MM theory) and subsequently underwent a series of revisions and expansions. Firstly, the MM theory proposes that the value of a company is independent of its capital structure under a

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series of strict assumptions. However, when considering corporate income tax, due to the tax-deductible effect of debt interest, the value of the enterprise will increase with the increase of the debt ratio. This theory lays the foundation for subsequent research, but due to its overly strict assumptions, there is a significant gap between the actual situations. Secondly, the trade-off theory introduces financial distress costs and agency costs based on the MM theory. When enterprises use debt financing, although they can obtain tax shield benefits, as the debt ratio increases, the financial distress cost and agency cost will also increase. When the marginal tax deduction benefit of debt is equal to the sum of the marginal financial distress cost and marginal agency cost, the enterprise reaches the optimal capital structure. Thirdly, the theory of prioritized financing holds that companies will follow a certain order in financing, starting with internal financing, followed by debt financing, and finally equity financing.

At present, the methods for optimizing the capital structure of listed companies in China mainly include the earnings per share indifference method, the comparative cost of capital method, and the enterprise value analysis method. Among them, the enterprise value is determined by the sum of equity value and liability value. Under different capital structures, the value of the enterprise is calculated to select the largest capital structure. Due to the different industrial and market environments in which enterprises operate, as well as their business situations, it is difficult to determine the optimal capital structure. Given this, this article selects Chinese A-share listed companies from 2014 to 2023 as the research object. By collecting annual report information and using a fixed effects model for empirical testing, it attempts to explore the specific impact of capital structure on corporate value.

2 Literature review and hypothesis formulation

Enterprise value reflects the level of business performance, which is not only a reflection of the input and output benefits of enterprise factors, but also the degree of recognition of enterprises by capital market investors [2]. Most studies suggest that the following factors will harm corporate value: company size [3], tax avoidance behavior [4], and corporate hypocrisy [5], which can bring randomness and uncertainty to business operations, erode investors' trust perception, cause cognitive confusion in the market, and reduce corporate value. However, intellectual capital and a more diversified board of directors can bring more perspectives, viewpoints, knowledge, and information to the enterprise, enhance the consulting ability of directors, and thus create higher corporate value [6,7]. In addition, factors such as the salary gap in recruitment and the level of voluntary information disclosure by companies also have a positive impact on the value of companies [8,9].

According to the trade-off theory, there is an optimal asset liability ratio. Moderate debt will bring tax benefits to the enterprise, but as debt increases, the possibility of the enterprise falling into financial difficulties and facing bankruptcy also increases. On the one hand, moderate debt can enable enterprises to obtain tax credit benefits to increase their value, and can obtain more financing opportunities by transmitting signals of good business operations to the outside world. It can also leverage the amplification effect of financial leverage, which is conducive to expanding their own scale [10]. Moreover, the effect of capital structure and profitability on increasing company value is more pronounced at larger company scales [11]. On the other hand, a high asset liability ratio may trigger financial crises and exacerbate bankruptcy risks [12]. It may also lead to many investment projects with positive net present value being abandoned, resulting in underinvestment [13]. It is also possible for shareholders to pursue high-risk investment projects at the expense of creditors' interests, leading to asset substitution issues [14]. Therefore, when the asset liability ratio is low, enterprises can obtain more financing opportunities, financial support, etc. At this time, an increase in the asset liability ratio is beneficial to the development of the enterprise and has a more promoting effect on the value of the enterprise; When the asset liability ratio is high, the cost and difficulty of financing increase, and the liquidity of funds decreases, which restricts the development of the enterprise and has a more inhibitory effect on its value. Based on this, this article proposes hypotheses.

H1：There is an inverted U-shaped relationship between capital structure and enterprise value.

3 Research design

3.1 Sample selection and data sources

Based on the availability of data, this article selects Chinese A-share listed companies from 2014 to 2023 as the research object and collects annual report data of listed companies. Process the sample data as follows: exclude samples from the financial industry, companies with abnormal operations, and samples with missing or abnormal financial data. In addition, this article truncated all continuous variables at the 1% and 99% levels. After the above processing, 35045 sample data were finally obtained.

3.2 Variable measurement

This article uses the asset liability ratio to measure capital structure. The core of capital structure research is the ratio of debt to equity in a company's long-term financing. The asset liability ratio directly reflects the extent to which a company's assets cover its liabilities. Using the Tobin Q ratio to measure enterprise value. The Tobin Q ratio, as an evaluation indicator, can not only reflect the current profitability of a company, but also its future development potential [15]. To minimize the impact of other factors on enterprise value, this article introduces enterprise size (size), profitability (ROE), growth ability (growth), and asset structure (fixed) as control variables. Meanwhile, this article employed a fixed effects model while controlling for both industry and year. The specific variable definitions are shown in Table 1.

Table 1 Variable Symbols and Explanations

Variable Properties	Variable	Symbol	Variable Definition
Explained Variable	Enterprise Value	tobinq	Tobin's Q ratio
Explanatory Variable	Capital Structure	lev	Asset liability ratio
Control Variable	Enterprise Size	size	Natural logarithm of annual total assets
	Profitability	roe	Return on equity
	Growth Ability	growth	Revenue growth rate
	Asset Structure	fixed	Proportion of fixed assets

3.3 Hausman inspection

This article conducts a Hausman test by performing fixed effects and random effects regression on variables, and uses the P-value of the Hausman test to determine the model used for this set of data. According to the test results, the P-value is less than 0.05, rejecting the null hypothesis and indicating that a fixed effects model should be used in this study.

3.4 Model Settings

To test H1, this article constructs the following regression model:

$$tobinq_{i,t} = \alpha_0 + \alpha_1 \cdot \mathrm{lev}_{i,t} + \alpha_2 \cdot \mathrm{lev^2}_{i,t} + \alpha_3 \cdot Controls_{i,t} + \varepsilon \qquad (1)$$

Among them, i represents the enterprise, t represents the year, and α _0 is a constant. The tobinq is proxy variable for enterprise value, and lev is proxy variable for capital structure. The Controls_(i,t) are the control variables involved in regression analysis. This study uses industry fixed effects and annual fixed effects, among that ε as a random interference term.

4 Empirical result analysis

4.1 Descriptive statistics

Table 2 summarizes the descriptive statistical analysis of the research variables. It can be seen that the minimum value and the maximum value of enterprise value are 0.795 and 15.607 respectively, indicating a significant gap in enterprise value among different listed companies. The minimum value of capital structure is 0.049, the maximum value is 0.925, the mean is 0.408, and the median is 0.397. According to public data, the debt ratio of non-financial enterprises in A-shares is usually in the range of 40% -50%. The debt ratio of around 40% in this article is in line with the general level of Chinese listed companies, indicating that the sample has a certain representativeness. The remaining control variables are consistent with existing literature, and there is no significant difference.

Table 2. Descriptive statistics

VarName	Obs	Mean	SD	Median	Min	Max
tobinq	35045	2.048	1.366	1.623	0.795	15.607
lev	35045	0.408	0.203	0.397	0.049	0.925
size	35045	22.245	1.305	22.048	19.630	26.444
fixed	35045	0.199	0.152	0.166	0.002	0.721
growth	35045	0.144	0.383	0.089	-0.648	3.705
roe	35045	0.058	0.139	0.071	-0.962	0.415

4.2 Correlation analysis

Table 3 shows the correlation coefficients between the main variables in this article, with a correlation coefficient of -0.224 between enterprise value (tobinq) and capital structure (lev).At the same time, enterprise value (tobinq) is significantly negatively correlated with enterprise size and fixed asset structure, and significantly positively correlated with growth ability. This study will further test the hypothesis through regression analysis while incorporating time and industry fixed effects.

Table 3. Correlation analysis results

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) tobinq	1.000					
(2) lev	-0.224***	1.000				
(3) growth	0.067***	0.036***	1.000			
(4) fixed	-0.087***	0.096***	-0.045***	1.000		
(5) roe	0.055***	-0.245***	0.257***	-0.046***	1.000	
(6) size	-0.359***	0.504***	0.047***	0.126***	0.083***	1.000

4.3 Inspection results

Table 4 displays the benchmarking outcomes examining the linkage between capital structure and enterprise valuation. The first column illustrates the findings without variable controls, incorporating only industry and year-specific fixed effects, whereas the second column presents results with controlled variables alongside these fixed effects.

The coefficients of the first and second terms of capital structure in column (2) of Table 4 are significant at the 1% level, indicating a non-linear relationship between capital structure and enterprise value. The presence of an optimal capital structure point is investigated using Haans et al.'s rigorous analytical approach for identifying concave relationships [16]. This kind of relationship between two variables must meet the following three conditions: ① The primary term's coefficient should be positive, while the squared term's must be negative, both statistically significant; ② At the minimum independent variable value, the curve's slope must be positive, whereas at the maximum value, it should be negative; ③ The value of the stationary point (i.e. axis of symmetry) is within the range of the independent variable values.

According to column (2) of Table 4, ① The coefficient of $lev_{i,t}$ is positive (1.564), while the coefficient of $lev_{i,t}^2$ is significantly negative (-1.657), meeting the first condition. ② Given that this study examines the curvilinear relationship between capital structure and firm value—and considering that the control variables do not alter the curve's shape—Equation (1) can be simplified to Equation (2) for curve analysis. Taking the first derivative of the independent variable in Equation (2) yields the curve's slope (Equation (3)).Based on the descriptive statistics (Table 2) and regression results (Table 4, column (2)), the derivative is positive at the independent variable's minimum value (slope > 0) but negative at its maximum value (slope < 0), thus satisfying the second condition. ③ The stagnation point is the value when the slope of the curve is 0, so equation (3) can be set to zero to obtain the stagnation point of the curve, as shown in equation (4). Substituting the regression results, it can be seen that the stationary point values are within the range of the independent variable values, satisfying the third condition. Therefore, the relationship between capital structure and enterprise value follows an inverted U-shaped curve, and H1 is validated.

$$tobinq_{i,t} = \alpha_0 + \alpha_1 \cdot lev_{i,t} + \alpha_2 \cdot {lev^2}_{i,t} \quad (2)$$

$$tobinq'_{i,t} = \alpha_1 + 2\alpha_2 \cdot lev_{i,t} \quad (3)$$

$$tobinq'_{i,t} = \alpha_1 + 2\alpha_2 \cdot lev_{i,t} \quad (4)$$

Table 4. Benchmark Inspection Results

Variable	(1)	(2)
	tobinq	tobinq
lev	1.350***	1.564***
	(9.00)	(10.63)
lev^2	-2.717***	-1.657***
	(-20.10)	(-12.58)
Controls	NO	YES
Constant	2.876***	10.181***
	(106.41)	(80.09)
Industry	YES	YES
Year	YES	YES
Observations	35,045	35,045
R-squared	0.126	0.212

4.4 Robustness test

Table 5 shows the results of the robustness test, where the price to book ratio (pb) was chosen to replace the Tobinq ratio (tobinq) as the measurement method for enterprise value. The stock price is greatly affected by market sentiment in the short term, but the change in net asset book value is relatively slow. The price to book ratio can smooth short-term fluctuations and reflect the market recognition of the long-term asset value of the enterprise. Based on the theory of cost value, net assets are an important reference for the reset cost of enterprises, and the price to book ratio can reflect the market's expectation of the profitability of enterprise assets. Substitute the robustness test results into the relationship between capital structure and enterprise value, and the regression results remain consistent with the previous text. Indicating that changing the measurement method of enterprise value does not affect the core research conclusion of this article.

Table 5. Results of robustness test

Variable	(1)	(2)
	pb	tobinq
lev	11.911***	1.564***
	(34.54)	(10.63)
lev^2	-6.624***	-1.657***
	(-21.45)	(-12.58)
Controls	YES	YES
Constant	30.886***	10.181***
	(103.61)	(80.09)
Industry	YES	YES
Year	YES	YES
Observations	35,045	35,045
R-squared	0.282	0.212

5 Conclusion

This article selects non-financial listed companies on the Shanghai and Shenzhen A-shares from 2014 to 2023 as the research object, using Tobin's Q ratio as the measure of enterprise value and asset liability ratio as the measure of capital structure. Regression analysis demonstrates that enterprise value peaks at moderate leverage ratios, exhibiting an inverse U-pattern. A reasonable capital structure can provide a stable source of capital for enterprises, reduce financial risks, and enhance investment flexibility and autonomy. When the debt ratio in a company's capital structure is moderate, its debt-paying ability is stronger, its credit rating is higher, and it is easier to obtain more financing channels, thereby providing sufficient capital support for the company's investment projects. This makes enterprises more willing to pursue projects with high returns and controllable risks in investment project selection, thereby maximizing the value of the enterprise. On the contrary, if a company's capital structure is unreasonable, the debt ratio is too high, debt pressure is high, and financial risks are high, its investment decisions will be subject to many constraints. To avoid bringing greater economic burden to the enterprise and even causing a break in the capital chain, the enterprise has to give up some investment projects with promising prospects but requiring a large amount of funds.

The research outcomes suggest the following measures for consideration: the strategic configuration of debt and equity financing serves as a pivotal determinant of corporate development. When enterprises are already heavily indebted, increasing debt financing will face higher financing costs and difficulties. At this time, equity financing can be chosen to adjust capital structure and reduce financial risks. When the equity ratio of a company is too high, debt financing can be appropriately increased to reduce capital costs and increase financial leverage. In addition, in terms of dividend distribution, when the debt ratio of a company is too high, to ensure the company's debt-paying ability and capital liquidity, the company can maintain its development by reducing dividend distribution to retain more profits. On the contrary, when the capital structure is relatively stable, companies can distribute dividends to shareholders to reward their investment. In short, optimizing the capital structure of enterprises is a long-term and complex process, which requires enterprises to fully recognize this challenge, take practical and feasible measures to adjust and optimize the capital structure, to achieve the goal of sustainable development. At the same time, with the continuous development of the economy and the advancement of financial innovation, the theory and practice of corporate financial decision-making and capital structure optimization will also be further enriched and improved, providing stronger support and guidance for the development of enterprises.

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