Study on the Relationship Between Corporate Financial Leverage and Financial Performance Based on Linear Multiple Regression Model via Stata System

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Abstract. The size of corporate financial leverage is one of the important factors affecting corporate financial performance. The proportion of debt capital in corporate assets will bring additional benefits and risks to enterprises through the financial leverage effect, which will affect the value of the company, and then affect the performance of the company. However, scholars have not had a unified understanding of the relationship between financial leverage and enterprise performance for a long time. Based on the research of China's A-share listed companies from 2015 to 2019 from CSMAR database, this paper empirically tests the relationship between the capital structure of listed companies and their profitability by using a linear multiple regression model. Research shows that financial leverage has a significant negative impact on corporate performance. Based on the empirical results, this paper gives some suggestions on how to control financial leverage.

Keywords: Financial Leverage · Financial Performance · Listed company

1 Introduction

With the development of the market economy, the competition among enterprises is becoming more and more fierce. Corporate financial performance directly determines the position of corporates in the market. In recent ten years, the traditional equity financing method has been unable to meet the needs of enterprises for a larger amount of capital, and the scale of debt financing has been increasing. The proportion of debt capital in enterprise assets will bring additional benefits and risks to the enterprise through the financial leverage effect, thus affecting the value of the company, and then the performance of the company. Therefore, financial leverage is one of the important indicators

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to measure business risk and performance. The debt ratio and repayment ability of any enterprise will affect the normal operation and development of the enterprise. The research shows that with the reduction of the proportion of financial leverage used by enterprises, their performance and profitability will be strengthened. Some scholars also believe that fierce market competition, the increase of homogeneous products, and the reduction of industry entry threshold will lead to more significant business risks for enterprises. For these companies, although high financial leverage can bring them a lot of operating costs and cash flow support, it cannot directly improve their operating performance. On the contrary, due to the complexity of financing activities and the external environment, the introduction of a large amount of capital will make enterprises face more significant financial risks because enterprises not only need to improve their business performance in proportion but also need to pay a certain amount of financial costs. Therefore, how to use debt financing to bring more profits for enterprises while controlling the corresponding risks is of great significance to the operation and management of enterprises.

2 Literature Review

Chinese scholar Yan Yu believes that there is a negative but not close correlation between financial leverage and enterprise performance [1]. However, Xiaohong Wang and Luoren Zhou believed that financial leverage has a significant negative impact on corporate performance [2, 3]. Na Zhang concluded that the financial performance of enterprises in the gem computer service industry increased with the increase of financial leverage [4]. In the equilibrium theory, Brennan and Schwartz believe that a certain debt ratio can bring profits for enterprises, thus improving corporate performance [5]. Masulis, through a large number of data analysis, concluded that the variation range of the debt level between 0.23 and 0.45 would have a positive impact on the company's performance [6]. According to the order financing theory proposed by Myers, financial leverage is negatively correlated with enterprise performance [7]. Parmacli and Lanioglo pointed out that the operating leverage effect of an enterprise is negatively correlated with the operating safety margin [8]. This paper aims to discuss and research whether financial leverage and corporate financial performance are truly negatively correlated, and to what extent, through methodology and data analysis. Exploring the impact on the marginal benefit of the enterprise by controlling variables and other methods. In addition, it is also necessary to consider the direction of national policies in the general environment.

3 Theoretical Analysis and Research Hypothesis

As mentioned above, so far there is no unified understanding of the impact of financial leverage on enterprise performance in the theoretical circle. The main reasons for this phenomenon may lie in the differences in the types of enterprises selected by different researchers, the time of data sources and the construction of models. This paper studies the a-share listed companies in China, and concludes that the financial leverage formed by excessive debt financing will increase the financial risk of enterprises and cause adverse effects on enterprise performance. Therefore, this paper puts forward the

following hypothesis: financial leverage has a significant negative impact on corporate performance.

4   Research Methods and Data Sources

4.1   Data Source and Sample Selection

Based on the research of a-share listed companies from 2015 to 2019, this paper empirically tests the relationship between the capital structure of listed companies and their profitability. All financial data involved in the study were derived from the CSMAR Database. In addition, in order to ensure the validity of the data, the original data were screened according to the following criteria: the samples of listed companies with missing values were eliminated; Exclude samples of companies that were ST or PT during the sample period. Finally, 12,289 valid samples were obtained.

4.2   Definition of Variables

4.2.1   Dependent Variables

The dependent variable of this paper is firm performance. Economic value added (EVA), return on assets (Roa) and return on equity (Roe) are the three main indicators to measure the financial performance of enterprises. Among them, EVA can not only reflect the operating status of enterprises, but also pay attention to their long-term sustainable development ability. However, this paper gave up using Eva to measure enterprise performance, because the adjustment of this index is complicated, which affects the intuitiveness and guiding role of evaluation.

Therefore, this paper chooses Roa and Roe as two important alternative variables to measure the performance of listed companies in China. Return on assets (Roa) represents the ratio of net profit to total assets of an enterprise, reflecting the ability of total assets to create profits. Return on equity (Roe) represents the ratio of net profits to net assets (i.e. shareholders' equity), reflecting the ability of net assets to generate profits. This paper mainly uses Roa to measure corporate performance.

4.2.2   Independent Variables

The independent variable of this paper is financial leverage. Based on previous studies, this paper selects asset-liability ratio (Lev) and current debt-asset ratio (DR) as the measuring index of corporate financial leverage.

4.2.3   Control Variables

There are many factors that affect corporate profitability, not only capital structure, but also cash flow risk and internal governance structure. Therefore, this paper selected the corresponding control variables, including enterprise size, cash flow ratio, cash flow level, inventory to assets ratio, loss or not, the size of the board of directors and the proportion of independent directors and other factors. Where: (1) enterprise size, take

the natural logarithm of total assets. The larger the company is, the more complex its internal organizational structure will be, and the more difficult it will be for managers to be monitored by external stakeholders. In this way, the greater the information asymmetry between managers and shareholders will be, and the more managers will hide the actual production activities of the company, which is not conducive to the long-term development of the company. (2) Cash flow ratio, it is necessary to control the risk of cash flow, this data is mainly from the cash flow statement of "net cash flow generated by operating activities" and the balance sheet of "total current liabilities", can also be used as an index of solvency to measure its risk response ability. (3) Cash flow level, take the natural logarithm of the net cash flow from operating activities. The higher the level of cash flow, the stronger the hematopoietic ability, which is conducive to the improvement of enterprise performance. (4) Inventory assets ratio, that is, the ratio of net inventory to total assets. The higher the ratio of inventory to assets, the stronger the liquidity level of the enterprise, which is conducive to its sustainable development. (5) Loss or not, the enterprise net profit is investigated. The enterprise performance level with negative net profit is often poor. (6) Board size, i.e. the total number of people on the Board of directors. In existing studies, there is no uniform conclusion on the impact of board size on earnings management. One view holds that the larger the board of directors is, the more perfect the corporate governance mechanism will be, which can effectively limit some self-interested behaviors of senior executives and ensure the quality of corporate financial reports. Another view holds that the large scale of the board of directors will lead to low work efficiency, in addition, some members of the board of directors may also conduct earnings management, which will have a negative impact on their performance. (7) Ratio of independent Directors (Inde): it measures the extent to which external forces restrict the company's internal power, and is also one of the indicators to measure the extent to which the company's internal supervision is constrained. Independent directors are external professionals hired by the company. Generally speaking, independent directors can not only bring an independent and objective view to the company, but also prevent the opportunism of the internal management because they have no other economic relationship with the company, which is conducive to the long-term development of the company. In addition, the Year control variable is also controlled in this paper to avoid the error influence of time effect on the conclusion. Table 1 presents specific variable definitions.

4.3 Model Design

In order to test the relationship between financial leverage and corporate performance of listed companies, this paper constructs models (1)–(2). Model (1) is used to test the relationship between the asset-liability ratio of an enterprise and its return on assets, and model (2) is used to test the relationship between the ratio of current liabilities to assets of an enterprise and its return on assets. In model (1), the core variable that this paper focuses on is that if the sign of it is significantly positive, it indicates that financial leverage is significantly positively correlated with corporate financial performance. α_1 α_1 On the contrary, if it is significantly negative, it proves that debt management will reduce the level of financial performance of enterprises. α_1 For model (2), the core variable of this paper is that, if significant is positive, it indicates that there is a significant positive

Table 1. Variable definitions.

Variable types	Variable symbol	Variable declaration
The dependent variable	Roa	Return on assets, net profit/net assets
The independent variables	Lev	Asset-liability ratio, total liabilities/total assets
	DR	Current liabilities to assets ratio, total current liabilities to total assets
Control variables	Size	The size of the firm, the natural log of total assets
	CF	Cash flow ratio, net cash flow from operating activities/current liabilities
	CFO	Cash flow level, the natural logarithm of the net cash flow generated from operating activities
	IA	Inventory assets ratio, inventory to total assets
	Loss	If the net profit is less than 0, assign a value of 1, otherwise assign a value of 0
	Board	Board size, total number of board members
	Inde	Ratio of independent directors, number of independent directors/total number of directors
	Year	Year, control time effect

regression relationship between the ratio of current liabilities to assets and its return on assets; if significant is negative, it proves that there is a significant negative regression relationship between the two. $\beta_1\beta_1$

$$Roa_{i,t} = \alpha_0 + \alpha_1 Lev_{i,t} + \alpha_2 Size_{i,t} + \alpha_3 CF_{i,t} + \alpha_4 CFO_{i,t} + \alpha_5 IA_{i,t} + \alpha_6 Loss_{i,t} + \alpha_7 Board_{i,t}$$
$$+ \alpha_8 Inde_{i,t} + \sum Year \tag{1}$$

$$Roa_{i,t} = \beta_0 + \beta_1 DR_{i,t} + \beta_2 Size_{i,t} + \beta_3 CF_{i,t} + \beta_4 CFO_{i,t} + \beta_5 IA_{i,t} + \beta_6 Loss_{i,t} + \beta_7 Board_{i,t}$$
$$+ \beta_8 Inde_{i,t} + \sum Year \tag{2}$$

5 Empirical Results

5.1 Descriptive Statistics

Table 2 provides the descriptive statistical results of the main variables in this paper. It can be seen that the minimum value of enterprise performance indicator Roa is -0.129, the maximum value is 0.180, and the average value and median value are 0.047 and 0.044 respectively. The average asset-liability ratio is 0.401, indicating that the average liability level of listed companies in China is about 40% during the observation period. The ratio of current liabilities to assets is another indicator to measure the financial

Table 2. Descriptive statistical results

	sample	The average	The standard deviation	The median	The minimum value	The maximum
Roa	12289	0.047	0.051	0.044	0.129	0.180
Lev	12289	0.401	0.197	0.387	0.057	0.885
DR	12289	0.321	0.172	0.301	0.015	4.453
Size	12289	22.261	1.311	22.093	19.780	26.171
CF	12289	0.324	0.340	0.212	0.000	1.605
CFO	12289	19.287	1.618	19.207	14.556	23.433
IA	12289	0.126	0.114	0.102	0.000	0.672
Loss	12289	0.066	0.249	0.000	0.000	1.000
Board	12289	8.478	1.634	9.000	5.000	14.000
Inde	12289	0.377	0.054	0.364	0.333	0.571

leverage of an enterprise. Its minimum value and maximum value are 0.015 and 4.453 respectively. For the control variable, the average size of the firm was 22.261, and the median was 22.093. For the enterprise cash flow ratio index, the minimum value is 0.000, the maximum value is 1.605. The distribution of other control variables is in reasonable interval.

5.2 Correlation Analysis

Table 3 lists the results of correlation analysis of the main coefficients in each model. It can be seen that the correlation coefficient between the asset-liability ratio and the return on assets of enterprises is 0. −0.340, and the correlation coefficient between the ratio of current liabilities and the return on assets of enterprises is −0.117. Both of the two coefficients are negative and significant at the level of 1%, which preliminarily indicates that the debt financing of enterprises is not beneficial to the improvement of enterprise performance. In addition, from the absolute value of the correlation coefficient between the independent variable and the control variable, the absolute value of the correlation coefficient between the variables is relatively small, and multicollinearity is unlikely to occur. Therefore, theoretically, the same multiple regression model can be used for analysis.

5.3 Basic Regression Results

Table 4 shows the basic regression results of this paper. Among them, column (1)–(2) lists the results when the year is not controlled, and column (3)–(4) considers the year effect. When the time effect is not controlled, the regression coefficient of asset-liability ratio and return on assets is −0.054, which is significant at the level of 1%.The regression coefficient of ratio of current liabilities to assets and return on assets −

Table 3. Correlation analysis

	Roa	Lev	DR	Size	CF	CFO	IA	Loss	Board	Inde
Roa	0.408 * * *									
Lev	0.340 * * *	1.000								
DR	0.117 * * *	0.771 * * *	1.000							
Size	0.479 * * *	0.550 * * *	0.302 * * *	1.000						
CF	0.122 * * *	0.272 * * *	0.262 * * *	0.064 * * *	1.000					
CFO	0.092 * * *	0.370 * * *	0.225 * * *	0.747 * * *	0.214 * * *	1.000				
IA	0.585 * * *	0.297 * * *	0.277 * * *	0.121 * * *	0.186 * * *	0.014 * * *	1.000			
Loss	0.019 * *	0.133 * * *	0.137 * * *	0.071 * * *	0.154 * * *	0.096 * * *	0.025 * * *	1.000		
Board	0.030 * * *	0.144 * * *	0.047 * * *	0.284 * * *	0.002	0.247 * * *	0.030 * * *	0.034 * * *	1.000	
Inde	0.408 * * *	0.004	0.013	0.008	0.015 *	0.009	0.014 *	0.032 * * *	0.554 * * *	1.000

Table 4. Basic regression results

	(1)	(2)	(3)	(4)
	Roa	Roa	Roa	Roa
Lev	0.054 * * *		0.054 * * *	
	(21.645)		(21.453)	
DR		0.020 * * *		0.020 * * *
		(8.337)		(8.120)
Size	0.005 * * *	0.007 * * *	0.006 * * *	0.007 * * *
	(9.782)	(13.079)	(10.098)	(13.369)
CF	0.036 * * *	0.046 * * *	0.036 * * *	0.046 * * *
	(20.981)	(25.856)	(21.136)	(25.993)
CFO	0.007 * * *	0.006 * * *	0.007 * * *	0.006 * * *
	(15.809)	(13.000)	(16.099)	(13.286)
IA	0.014 * * *	0.008 * * *	0.015 * * *	0.008 * * *
	(5.114)	(2.617)	(5.159)	(2.677)
Loss	0.102 * * *	0.106 * * *	0.102 * * *	0.106 * * *
	(54.629)	(57.711)	(54.399)	(57.384)
Board	0.000 * *	0.001 * *	0.000 * *	0.001 * *
	(2.102)	(2.525)	(2.030)	(2.412)
Inde	0.017 * *	0.019 * * *	0.016 * *	0.019 * *
	(2.350)	(2.629)	(2.288)	(2.554)
_cons	0.055 * * *	0.102 * * *	0.054 * * *	0.100 * * *
	(7.691)	(15.120)	(7.503)	(14.765)
year	No control	No control	control	control
Obs.	12289	12289	12289	12289
R-squared	0.536	0.519	0.538	0.521

0.020 is also significant at the level of 1%.After controlling the year effect, the core coefficients concerned in this paper still pass the significance test, and are −0/054 and −0.020, respectively, indicating that the enterprise performance will be reduced by the debt management, and verifying the basic hypothesis of this paper.

6   Conclusion

This paper takes China's A-share listed companies from 2015 to 2019 as the research object, empiricists test the relationship between corporate financial leverage and business performance, and concludes that the higher the level of corporate debt management, the stronger the ability, its overall performance and return on investment will be severely

negatively affected. This was true whether time effects were controlled for or not. With the advent of the new economic normal era, China has issued deleveraging policies to continuously promote the supply-side structural reform. In this context, enterprises should also consider carefully when choosing financing channels. Enterprise managers need to have a clear understanding of the loan information, correctly evaluate their own situation, recognize the advantages and disadvantages of financial leverage, and make appropriate use of leverage for financing, but also consider its damage to performance and the trend of national policies.

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