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Study on Whether the Enterprise is More Profitable by Inclining to Loan or to Being Listed

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Abstract—**"More profitable" measures good profitability. "Inclining to loan" measures preference to debt financing in the capital structure. "Incline to be listed" refers to preference to equity financing in the capital market. The performance of the enterprise will influence the capital structure of the listed company. The factors affecting the dynamic performance of the enterprise performance are bound to be radiated to the capital structure. The research and analysis for the influencing factor of the listed corporation's capital structure does not only promote the standardization process for the financing behavior of the industry, besides the selection and optimization of correct assessment for the capital structural itself, in addition to that, it carries forward the steady development of national economy. The article chooses all of the 3610 corporations listed on A share market as example, adopting the public financial statements' data from 2013 to 2018 of the corporations listed in stock markets of Shanghai and Shenzhen, the exploring the influencing factors of capital structure, selecting ten factors from the initial sixteen factors, appraising if the corporations more profitable inclines to loan or to be listed, which turns to examine the relationship between four categories financial indexes and capital structure.**

Keywords: profitability, listed company, capital structure, influencing factors, principal component analysis

I. INTRODUCTION

The profitability of listed companies is one of the core issues concerned by stakeholders (Zhang Hong, 2010). The past profitability of enterprises, that is, the amount of profits that can be retained, should be an important decision of the existing capital structure of enterprises (Titman, S. & R. Wessels, 1988). The profitability of an enterprise determines whether it can operate effectively, expand reproduction, research and development, and open up new markets in the fierce competition. From the financial point of view, whether the reason behind the strong profitability depends on debt financing or equity financing remains to be explored. There are many factors affecting the capital structure of an enterprise. This paper mainly starts with four dimensions of financial indicators: profitability, solvency, operation ability and growth ability, examining which indicators have more impact on the capital structure, and then studies whether profitability is closely related to the capital structure, and vice versa?

A. Overview of studies abroad

David Durand (1952) divided the capital structure theory into net income theory and net operating income theory. Modigliani and Miller (1958) assumed that the ratio of equity financing to bond financing in the capital structure will not affect the owner's earnings under market conditions without transaction costs, taxes and arbitrage freedom. Baxter, N.D. 1970; Taub, A.J.1975; Taggart, 1977, et al. puts forward another viewpoint different from the capital structure theory — the theory of determinants of capital structure. They think that the size of enterprises and the market value of enterprises equity are the determinants of capital structure. Jensen and Meckling (1976) put forward agency theory. They believed that the active and passive agency relationship between shareholders and managers, shareholders and creditors would bring about two costs of equity and debt agency. However, debt ratio and debt agency cost fluctuated in the same direction and fluctuated in the opposite direction with equity agency cost, so the sum of them can affect the value of the company. Titman and Wessels (1988) believed that factors that may affect capital structure include: 1) profitability; 2) Size; 3) Collateral Value of Assets; 4) Growth; 5) Non-Debt Tax Shields; 6) Volatility. They took the non-debt tax shield as an example, if depreciation and other non-debt tax shield account for a higher proportion of its expected cash flow, enterprises will not need to take too much account of the benefits of debt tax savings, which will lead to a reduction in the debt ratio. Trade-off theory proposed from Dangelo and Masulis (1980) increased the costs of insolvency and agency of debt financing. It was believed that capital structure decision-making is to balance the tax revenue of debt with the costs of bankruptcy and agency so as to maximize the value of enterprises. Myers & Majluf (1984) put forward information asymmetry theory, that was, information asymmetry between insiders and external investors about enterprises, existing assets and investment opportunities was asymmetric, which may lead to over-investment and under-investment when enterprises choose financing methods. The companies spontaneously formed the theory of preferential order in project financing, guiding the dividend policy through the theory of preferential order, so as to maximize the value of the enterprise and reasonably control the change and choice of capital structure.

B. Overview of Chinese study

Chinese scholars' analysis of the factors affecting the capital structure is also dimensional. Zhan Weihong (1993) found that the debt ratio has a positive trend with the size of the company and a reverse trend with the return rate. At the same time, it has an inseparable relationship with the ownership structure and organizational form of the company. Shen Genxiang and Zhu Pingfang (1999) made use of financial data of 180 listed companies in 1995 ,concluding that the debt ratio of the company is positively correlated with the company size, that is, the larger the company size, the higher the debt ratio; on the contrary, the smaller the company size, the lower the debt ratio. Shen Yifeng (1999) expressed the evolution path of corporate capital structure theory in a relatively comprehensive way, that is, from traditional capital structure theory to signal model. Zhu kaixi (2001) explored the insufficiency of the optimal capital structure under the maximization of the return on net assets. It clarified the functional relationship between the return on total assets and the distribution density, the financing interest rate, the proportion of interest-bearing liabilities and the debt rate. Xiao Zuoping (2003) used multiple linear regressions to analyze the factors affecting the capital structure and concluded that there was a positive correlation between the ratio of tangible assets and debt, and between the ratio of non-debt tax shield and debt based on the data of 109 companies in Shenzhen Stock Exchange from 1996 to 1999. As for the other factors, there was a positive correlation between the ratio of tangible assets and debt. Wang Yurong (2005) overlaps the data of A-share non-financial listed companies from 1998 to 2003. Empirical results show that the asset-liability ratio of Chinese listed companies is negatively correlated with their profitability, non-debt tax shield and income volatility, but positively correlated with company size, growth, tangible assets ratio and non-tradable shares ratio.

II. CAPITAL STRUCTURE THEORY AND THE CHARACTERISTICS OF CAPITAL STRUCTURE OF LISTED COMPANIES

A. The introduction of capital structure theory

The essence of capital structure theory is the theory of owner's equity structure which embraces the proportion distribution of equity and creditor's rights plus the proportion distribution of equity and creditor's rights and all assets. Generally speaking, it reflects the relative changes in the number of relevant financial indicators such as rights and interests, creditor's rights, warrants and so on. It has undergone more than half a century of revision and improvement since its formation in 1952. The modern capital theory is based on Miller and Modiglini models, and then comes into being a multi-dimensional theoretical system including MM theorem, trade-off theory, optimal financing order theory and financing choice theory of finance.

B. The characteristics of capital structure for listed companies in China

The following two characteristics exist in the fund-raising of listed companies: first, the proportion of internal fund-raising is not high, while the proportion of external fund-raising is high; "Listing" equity financing is the most effective way for enterprises to seek capital from the capital market. There are many reasons for this financing situation: the phenomenon of high debt operation is common in Chinese enterprises, especially in large state-owned enterprises. The policy of bank loan position is inclined to state-owned enterprises, which leads to the low proportion of internal financing, the government intervenes in the operation of economic lifeline, and the state-owned banks control enterprises directly. The private capital participation is not obvious. In order to reduce the ratio of assets to liabilities, equity financing is an effective way to upgrade the capital structure of listed companies, and the financial data are more transparently monitored by investors. But in the real capital market, whether the enterprises are more inclined to equity financing? Whether the enterprises with better profitability rely more on equity market or more on debt market? That is to say, whether the four financial indicators (solvency, operating capacity, profitability, growth capacity) are positively related to the asset-liability ratio.

III. PRINCIPAL COMPONENT ANALYSIS IN INFLUENCING FACTORS OF CAPITAL STRUCTURE FOR LISTED COMPANIES

A. Hypothesis and premise

1) Hypothesis: The capital structure of Listed Companies in China's automotive industry maybe closely related to their own performance indicators, namely, operational capacity, profitability, growth ability and debt-paying capacity based on the above analysis. Myers, Mujluf (1984) put forward the theory of orderly financing, believing that if an enterprise carries out equity financing, it will be interpreted as a decline in performance indicators by the outside world, and the cost of equity financing is higher than that of debt financing.So the company is more inclined to finance according to the order of financing cost from low to high: internal financing, debt financing and equity financing which is positively correlated with capital structure. Therefore, this paper proposes that:

Hypothesis 1: Listed companies with good operational capability are more inclined to use debt financing to reduce capital costs and make effective use of financial leverage ratio. Good indicators of operational capability will lead to the improvement of profitability indicators. These enterprises usually use financial leverage to achieve the growth of profitability. A similar conclusion was drawn from Margaritis and Psillaki's (2007) study of New Zealand companies, which found that the leverage ratio of companies was proportional to profitability. Tsuruta (2015) also found that firms with high leverage perform better than those with low leverage through a study of Japanese SMEs. Therefore, this paper proposes:

Hypothesis 2: Listed automobile companies with better profitability usually use debt to achieve profitability. The improvement of profitability can drive the return of funds and improve the solvency. So the solvency is usually negatively related to the capital structure, thus forming a virtuous circle. In order to meet the bank's lending conditions, the companies can obtain a new round of loan funds and grab more lucrative profits for them.

Hypothesis 3: Listed automobile companies with better solvency can effectively reduce the asset-liability ratio.

2) Premise: This paper excludes the interference of some abnormal capital market phenomena, such as the meltdown of the stock market in 2015, which has little effect on the integrity of data. These data can still support the conclusion of this paper.

B. Study sample selection and variable selection

1) Selection of samples and databases

a) Selecting A-share listed companies in Shanghai and Shenzhen stock exchanges

Because there are great differences among A-share, B-share and H-share listed companies in accounting standards.

So there are only 3610 stocks issued in China mainland are selected. Data sources were intercepted from January 1, 2013 to December 31, 2018.

2) Selecting variables

The article selects DAR (Debt to Assets Ratio, set as Y) as dependent variable which represents the capital structure. This paper also selected 10 relevant financial indicators, the so-called correlation is screened out by SPSS step by step, they are: ROA (Return On Total Assets, set as X1), ROE (Rate of Return on Common Stockholders' Equity, set as X2), OPR (Operating Profit Ratio, set as X3), RPC(Ratio of Profits to Cost, set as X4) , EPS (Earning Per Share, set as X5), TAR (Turnover of Account Receivable, set as X6), ER (Equity Ratio, set as X7), QR (Quick Ratio,set as X8), GRMF (The Growth Rate of Monetary Funds, as X9), IRMBR (Increase Rate of Main Business Revenue, set as X10). (As shown in "Table I")

TABLE I. COMBING THE COMPUTING WAYS OF DEPENDENT VARIABLES AND INDEPENDENT VARIABLES

Indicators	Variable	Symbol	Computational formulas
Capital Structure	DAR	Y	Total liabilities/total assets
Profitability	ROA	X_1	[(Total Profit + Interest Expenditure) / Total Average Assets]*100%
	ROE	X_2	[Net Profit/Average Shareholder Equity]*100%
	OPR	X_3	Total Profit/Total Cost
	RPC	X_4	(Net Sales Revenue-Product Cost)/Net Sales Revenue *100%
	EPS	X_5	(Net Profit - Preferred Dividend)/Weighted Average Common Stock Outside Issuance
Operational capacity	TAR	X_6	Net current sales income /[(balance of accounts receivable at the beginning of the period + balance of accounts receivable at the end of the period)/ 2]
Solvency	ER	X_7	Total Liabilities/Total Owner's Equity
	QR	X_8	Quick Assets/Current Liabilities
Growth Ability	GRMF	X_9	(Increase in monetary funds/total monetary funds last year)*100%
	IRMBR	X_{10}	(Increase in Operating Revenue/Total Operating Revenue of Last Year)*100%

3) Data processing

All the data in this paper come from the financial statements data of Listed Companies in the third-party software Wind information financial terminal. The time range and database range are the data in the 2013-2018 report. In order to synthesize the differences of five years, the average values of five time-point dependent variables and independent variables are taken.

C. Construction of influencing factor model for capital structure

Principal Component Analysis (PCA) is adapted in this study, which can simplify many complex factors into a few concentrated factors by dimensionality reduction. It combines various analysis approaches including data screening, cluster analysis, reduced dimensionality, which is the main analysis method to screen the influencing factors in econometrics.

This paper uses SPSS 21.0 to carry out KMO test, clustering, dimensionality reduction and other processing, with EXCEL to carry out the basic calculation of financial indicators in the process of building the influencing factors model of capital structure for listed companies.

1) Description for the symbols

"Table II" is a systematic summary of the symbols and their corresponding meanings that appear in the process of constructing the model.

TABLE II. DESCRIPTION FOR THE SYMBOLS

Symbols	Description
p_i	Primitive variable
y_i	Principal Component, namely Common Factor
b_{ij}	Linear correlation coefficient between y_i and p_i
α_{ij}	Factor Load About Common Factor of the No. i on Primitive Variable of No. j
H_i^2	Commonality to The Primitive Variables of No. i
a_i	Weight coefficients to THE original variables of No. i

$$\begin{cases} y_1 = b_{11}p_1 + b_{12}p_2 + \cdots + b_{110}p_{10} \\ y_2 = b_{21}p_1 + b_{22}p_2 + \cdots + b_{210}p_{10} \\ \cdots \\ y_m = b_{m1}p_1 + b_{m2}p_2 + \cdots + b_{m10}p_{10} \end{cases} (m \leq 10) \cdots\cdots\cdots\cdots Model1$$

b) KMO &Bartlett Sphericity test

In order to test the adequacy of samples, it is usually adapted KMO & Bartlett sphericity test. Value for KMO (Kaiser-Meyer-Olkin) is between 0 and 1. The value of the KMO closer to 1, the stronger the correlation between variables is. In this paper, we selected 10 correlative factors from 16 factors by SPSS factor analysis. As shown in Table 4-2, KMO=0.721$\in (0.7, 0.8)$, the ten factors can be used as principal component analysis.

Bartlett sphericity test is to test the correlation between independent variables. As long as the significance level is less than 0.05, it is acceptable, rejecting the zero hypothesis of Bartlett sphericity test, indicating that financial data obeys normal distribution. As shown in "Table III", Significance=0.00, so these independent variables selected in this paper are suitable for principal component analysis.

TABLE III. KMO & BARTLETT SPHERICITY TEST

Select Sufficient Kaiser-Meyer-Olkin Measure		.721
Bartlett's Sphericity Test	*Approximate Chi Square*	3409.850
	Df	45
	Sig.	.000

c) Extracting main factors

Commonality H_2^2 and common variance representing a common factor $y_1, y_2 \cdots y_m$ explaining original variables commonly in order of proportion, which is the total contribution level of common factors to a variable. Hence we use the commonality as the basis for calculating the weight, whose value is the sum of squares of the row elements of the factor load matrix.

2) Operating steps of principal component analysis
a) Establishing a preliminary model

In principal component analysis, each principal component is expressed by a linear combination of the original variables, and each principal component is not correlated with each other. Therefore, 10 original variables are $p_1, p_2, p_3, \cdots\cdots p_{10}$ the principal components are $y_1, y_2, y_3, \cdots\cdots y_m (m \leq 10)$, where b_{ij} represents the linear correlation coefficient between principal component y_i for No. i and the original variable p_j for No. j. The relationship between them is expressed as:

Commonality is shown as "Table IV" by SPSS. It is know from the "Table III" that the contribution values of most other factors are higher than 0.6, except for a few factors, such as ROE, RPC, ER and GRMF, which have poor explanatory ability to the total variance of the original variables. The top five factors with high degree of factor commonality are as follows: EPS, TAR, ROA, OPR and IRMBR; the higher the contribution value of variance, the higher the importance of factor.

TABLE IV. COMMONALITY OF VARIABLES

	Primitive	Extracting
ROA	1.000	.656
ROE	1.000	.309
OPR	1.000	.624
RPC	1.000	.453
EPS	1.000	.674
TAR	1.000	.661
ER	1.000	.446
QR	1.000	.589
GRMF	1.000	.440
IRMBR	1.000	.600

d) Extracting four main components

Using SPSS to reduce dimension, we can extracted four main components, namely four common factors, such as shown in "Table IV" Component Matrix. It is obvious from the table that the first main factor has a higher load on ROA, ROE, OPR, RPC and EPS, which reflects the company's ability to make profits. The second principal factor has a higher load on ER and QR, which reflects the solvency. The third main factor has a higher load on GRMF and IRMBR, which reflects the growth ability of the company. The fourth

main factor has a higher load in TAR, which reflects the company's operational capacity. (As shown in "Table V")

TABLE V.   ROTATING COMPONENT MATRIX

	Component			
	1	*2*	*3*	*4*
ROA	.784	.202	.022	-.022
ROE	.682	-.073	.128	.377
OPR	.731	.259	-.148	.021
RPC	.792	.295	.043	-.107
EPS	.819	-.046	-.014	-.010
TAR	-.049	-.038	-.009	.810
ER	.027	.589	.079	-.399
QR	.050	.761	.016	-.082
GRMF	.005	-.022	.650	.129
IRMBR	-.054	.033	.762	-.123

"Table VI" shows the explanations of the extracted factors for the total variance. The second column is the factor eigenvalue. The third column is the factor contribution rate, and the fourth column is the cumulative factor contribution rate. After principal component analysis, four main factors are extracted, which can explain 72.689% of the total variance of the original variables. It can be seen that the extracted four factors can reflect most of the information of the original variables.

TABLE VI.   TOTAL VARIANCE INTERPRETED

component	Initial Eigenvalue			Extract Square Sum Loading		
	Total	*Variance %*	*accumulation %*	*Total*	*Variance %*	*accumulation %*
1	2.306	23.063	23.063	2.306	23.063	23.063
2	1.956	19.560	42.624	1.956	19.560	42.624
3	1.760	17.603	60.227	1.760	17.603	60.227
4	1.246	12.463	72.689	1.246	12.463	72.689
5	.988	9.876	82.566			
6	.769	7.687	90.252			
7	.566	5.658	95.910			
8	.261	2.612	98.523			
9	.109	1.089	99.612			
10	.039	0.388	100.000			

e) Calculating the total score of factors affecting capital structure

Through the scoring options of SPSS software, 10 factor scoring coefficients can be calculated, such as "Table VII":

$$F_1 = 0.379x_1 + 0.211x_2 + 0334x_3 + 0.046x_4 + 0.444x_5 - 0.039x_6 + 0.127x_7 - 0.116x_8 - 0.024x_9 + 0.008x_{10}$$

$$F_2 = 0.017x_1 - 0.133 + 0.71x_3 + 0.434x_4 - 0.193x_5 - 0.027x_6 - 0.435x_7 + 0.615x_8 - 0.011x_9 + 0.049x_{10}$$

$$F_3 = 0.048x_1 + 0.136x_2 - 0.114x_3 + 0.058x_4 + 0.012x_5 - 0.005x_6 - 0.066x_7 + 0.027x_8 + 0.622x_9 + 0.725x_{10}$$

TABLE VII.   COMPONENT SCORING COEFFICIENT MATRIX

	Component			
	1	*2*	*3*	*4*
ROA	.379	.017	.048	-.043
ROE	.211	-.133	.136	.366
OPR	.334	.071	-.114	.000
RPC	.046	.434	.058	-.117
EPS	.444	-.193	.012	-.030
TAR	-.039	-.027	-.005	.806
ER	.127	-.435	.066	-.393
QR	-.116	.615	.027	-.087
GRMF	.024	-.011	.622	.133
IRMBR	-.008	.049	.725	-.115

The three principal components are weighted by their respective contribution rate (commonality). The total score

Component scores coefficient matrix. In order to get the total score of the four main factors, the regression model of the total score of the four main factors is constructed by using the score coefficient matrix, as follows:

function of the influencing factors of capital structure of Listed Companies in China is obtained by weighted average.

Y= (0.810632F1 + 0.255817F2 + 0.787452F3 + 0.30743F4) /2.161331

IV.   CONCLUSIONS AND SUGGESTIONS

A.   Conclusions

The coefficient of the first principal factor reflecting the profitability of a company is 0.810632, which shows that it has a great influence on the capital structure. That is to say, if the company has a strong profitability, it will prefer a higher asset-liability ratio and use financial leverage to improve the efficiency of capital turnover, so as to create more profits for the company. The conclusion coincides with "Hypothesis 1".

The second main factor reflects the company's solvency, and its coefficient is 0.255817. If the company's solvency is strong, the asset-liability ratio will be lower and the pressure of capital borrowing will be reduced more quickly. This hypothesis is in line with "Hypothesis 3". The third main factor reflects the growth ability of the company, and its coefficient is 0.787452, which has a great impact on the capital structure. If the growth ability of the enterprise is strong, it needs to expand the market scope, research and development products, expand reproduction and so on. It also prefers debt financing, using bank loans and lower capital costs to activate the capital. The conclusion is consistent with "Hypothesis 2"; the fourth main factor reflects the operation ability of an enterprise, and its coefficient is 0.30743. That is to say, the stronger the operation ability of an enterprise, the more effective it can reduce the ratio of liabilities, thus optimizing the capital structure, which is consistent with "Hypothesis 1".

In summary, the stronger the profitability of enterprises, the more inclined to debt financing, so the higher the asset-liability ratio of enterprises. As many scholars have shown, the cost of debt financing is lower than the cost of equity financing. Rational enterprises will weigh in many financing costs, thereby reducing the cost of enterprises.

B. *Suggestions on optimizing capital structure of Chinese enterprises*

There is a big gap between China and developed countries in the overall extent of the financial system. The gap is mainly manifested in the obstacles of financing methods and the limitations of the sources of investment funds. At present, there are two prominent obstacles in the debt economy of listed companies in China. One is the low coverage of assets and liabilities. Because the tax-saving effect of related liabilities and the financing channels are still hindered, the value benefit of low-debt or non-debt enterprises will be low. Therefore, the opposite is true. Reasonable debt reduces the average cost, balances the market value of enterprises, and stabilizes their pivotal position in listed enterprises. And according to the national conditions, the formation of a unique Chinese-style debt market, ultimately in order to achieve and optimize the reasonable level of debt, enrich and activate the trend of development of the debt market. Therefore, we should improve the financial system of listed enterprises from the macro environment, develop their debt market and highlight the debt leverage effect. Second, the structure of corporate liabilities is unstable and the current liabilities ratio is still rising. In order to meet the development needs of enterprises, it is easy for current liabilities to exceed budgetary standards. If the market changes too much, it will easily lead to a series of credit and investment risks caused by capital turnover failure. Therefore, a stable and reasonable proportion, combined with a variety of debt financing methods, coordinated mitigation of complex situations, alerting to the high level of debt on the low side.

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