An Empirical Study of Influential Factors of Debt Financing

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Abstract: Grouping all listed companies into two categories - companies with an average return to equity (ROE) $\geq$ 10% and companies with an average ROE <10% in three consecutive years - this paper attempts to analyze the influential factors of debt financing with step-wise linear regression. The results show that there is no significant difference between the two groups in average asset/liability ratio, representing that the qualifications for rights issue prescribed by the China Securities Regulatory Commission (CSRC) has no significant impact on the ratio of debt financing of listed companies. In the first group of companies qualifed for rights issue and with various financing channels, several non-financial indexes and industry variables are excluded out of the model, representing that the market factors play a key role in debt financing and that the debt financing decisions are more or less the same across the industries. In the second group of companies disqualified for rights issue, the industry variables become important, and their influential factors are significantly different from those of the first group of companies.

Key words: performance, debt, influential factor, step-wise linear regression

1 Introduction

There are various theories on influential factors of debt financing. The tradeoff theory (Myers, 1977), for example, argues that a company's capital structure is the result of the tradeoff between debt and non-debt tax shields and bankruptcy cost. The agency theory (Jensen and Meckling, 1976) holds that debt helps eliminate the conflict between stockholders and the management and reduce the management's disposal of free cash flow; the information asymmetry theory (Myers and Majluf, 1984) maintains that the management can use a company's capital structure to send a signal - a high asset/liability ratio often represents a company's high quality in the eyes of investors. The control rights theory (Aghion and Bolton, 1992) assumes that the financing structure influences the result of mergers and acquisitions (M&As) by affecting the distribution of voting rights and price of M&As. The study by Lu and Xin(1998)Yao and Wu(2007) reveals that there is a significant difference between different industries in capital structure, representing that industry factors must be controlled in analyzing influential factors of debt financing.

Abundant literature can be found at home and abroad on the empirical research of influential factors of debt financing. Most of the studies have taken into various factors and used the multi-variable linear regression approach. As a transition economy, China's capital market has its own features quite distinct from those of developed markets. Given the strong preference for equity financing by the Chinese listed companies, the CSRC promulgated in 1997 the qualifications for rights issue - an average weighted ROE $\geq$ 10% in three consecutive years. Based on this threshold, this paper divides all listed companies into two groups - companies with an average ROE $\geq$ 10% and companies with an average ROE <10%, studying which factors have a significant impact on debt financing of the two.

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As there is a huge volume of non-negotiable shares in the Chinese stock market, this paper uses the book value of listed companies to calculate their asset/liability ratios. Like most studies, the index of total asset/liability ratio is used to reflect the ratio of debt financing of listed companies.

2   Influential factors of debt financing and research hypotheses

Many studies indicate that there are numerous factors influencing debt financing. Based on these studies, this paper makes a number of important hypotheses, and uses industry as a dummy variable to analyze the asset/liability ratio, verifying which industries have a significant impact on the liability/asset ratio.

Table 1: Names and Symbols of Variables

Symbols	Names	Calculation	Expected Correlation Symbol
X_1	value of secured assets	(inventory+net fixed assets) /year-end total assets	+
X_2	firm size	ln total assets	+
X_3	non-debt tax shields	accumulated depreciation/year-end total assets	−
X_4	growth	revenue growth of core business	−
X_5	asset liquidity	liquidity ratio	−
X_6	ability to generate internal resources	cash flow from operations/year-end total assets	+
X_7	profitability	net income/total assets	−
X_8	dividend policy	current dividend payable/current profit available for dividend	−
X_9	% of state-owned shares	Number of state-owned shares/total equity	+
D_i (i=1∼17)	industry dummy variable		

3   Sample selection and descriptive statistical analysis

To reduce the deviation caused by volatility of variables across the years, all data are based on the means of 2002, 2003 and 2004, and are taken from the annual reports of listed companies compiled by Shenzhen Securities Information Co., Ltd. The selected samples are companies listed on Shanghai and Shenzhen Stock Exchanges for three consecutive years. Out of the need of data analysis, the following categories of companies are excluded: (1) financial and insurance companies because of their peculiarities of asset/liability ratio; (2) companies with zero ROE, zero value of secured assets, or lacking the ability to generate internal resources; and (3) companies in an industry that has a sample size smaller than 15. The final sample size is limited to 1,129 listed companies. This paper adopts the "Industry Classification of Listed Companies" issued by the CSRC in April 2001, grouping industries into 18 categories to reflect the huge sample size of the manufacturing industry (over 60% in the total) and significant differences between different subcategories within the industry. As industry is a qualitative factor, the industry variable is set as D_i(i=1∼7) according to the theory of econometrics.

Based on the above analysis, the final model is expressed as follows:

$$Y = a_0 + \sum_{i=1}^{9} a_i X_i + \sum_{i=1}^{17} b_i D_i + \varepsilon$$

in which X_i is the independent variable of the asset/liability ratio, and ε is random interference.

Descriptive statistics (completed with Excel): All the listed companies of 18 industries are categorized into two groups: companies with an ROE $< 10\%$, and companies with an ROE $\geq 10\%$. According to the regulations of the CSRC issued in 1997, only companies with an average ROE $\geq 10\%$ in three consecutive years are qualified for rights issue. In theory, such companies should have a low asset/liability ratio; however, this study shows that only 50% of (9) industries coincide with the deduction. Additionally, no obvious difference is found among them, representing that the qualifications for rights issue prescribed by the CSRC have no significant impact on a company's debt financing ratio.

4   Model variables and data analysis

This paper involves a number of independent variables, some of which are quantitative such as $X_i(i=1...9)$, and some of which are qualitative such as $D_i(i=1...17)$. Do these independent variables have a significant impact on dependent variables? If not, which variables are significant? To eliminate multicollinearity between variables, this paper uses a step-wise regression, where independent variables are introduced in the equation only when F value is smaller than 0.05. The samples are divided into two major groups: companies with ROE $\geq 10\%$ and companies with ROE $<10\%$. The regression results are shown in the following tables.

Table 2: Companies with ROE $\geq 10\%$

Variable	Regression Coefficient	Standard Deviation	t	Pr
Intercept	73.47798	1.92231	38.22**	<.0001
D_3 electronics	7.19715	3.03842	2.37*	0.0187
D_6 machinery, equipment and instrument	-8.82060	2.74230	-3.22**	0.0015
D_7 construction	3.89170	1.91101	2.04*	0.0429
D_9 metal and non-metal	6.20778	2.71226	2.29*	0.0230
D_{15} IT	-12.03003	5.17992	-2.32*	0.0211
D_{16} pharmaceuticals and biology	9.55254	3.23845	2.95**	0.0035
X_5 asset liquidity of assets	-3.50972	0.60584	-5.79**	<.0001
X_7 profitability	-257.99743	24.86326	-10.38**	<.0001
X_8 dividend policy	-15.11861	4.38810	-3.45**	0.0007
X_9% of state-owned shares	-5.82757	2.71439	-2.15*	0.0329

The coefficient of independent X_i shows that in companies with an ROE$\geq 10\%$ there are 7 independent variables with a coefficient >0.3, among which 1 with a coefficient >0.5 (i.e. 0.52), and there are 15 independent variables with a coefficient <0.1. In companies with an ROE $<10\%$, there are 4 independent variables with a coefficient >0.3 (the highest is 0.4), and there are 23 independent variables with a coefficient <0.1, representing that the multicollinearity is not grave between variables. Due to the limit of space, the coefficient table is not included.

From Tables 2 and 3, it can be concluded that all the variables entering the model are highly significant with P value <0.05, representing that these factors have a significant impact on the asset/liability ratio of listed companies.

5   Analysis of regression results

For companies with an average ROE $\geq 10\%$ in three consecutive years, only 4 independent variables enter the equation - the liquidity of assets, profitability, dividend policy, and percentage of state-owned shares - among which the percentage of state-owned shares is negatively correlated with the asset/liability ratio. This is somewhat contrary to the expectation, and one explanation is that safety of loans becomes the

Table 3: Companies with ROE $<10\%$

variable	Regression coefficient	Standard deviation	t	Pr
Intercept	-51.45259	12.06289	-4.27**	<.0001
D_3 electronics	10.73316	2.58879	4.15**	<.0001
D_5 textile, clothing and furs	5.74198	1.36508	4.21**	<.0001
D_6 machinery, equipment and instrument	13.92163	3.00690	4.63**	<.0001
D_8 transportation and ware-housing	6.79976	1.70274	3.99**	<.0001
D_{10} agriculture, forestry, and fishery	8.64708	1.74656	4.95**	<.0001
D_{12} social services	4.83936	1.48209	3.27**	0.0011
D_{14} food and beverage	4.10804	1.97130	2.08*	0.0375
D_{15} IT	5.04484	1.87118	2.70**	0.0072
D_{16} pharmaceuticals and biology	13.06855	3.30919	3.95**	<.0001
D_{17} paper and printing	6.55781	1.90551	3.44**	0.0006
X_1 value of secured assets	5.62720	2.83214	1.99*	0.0472
X_2 firm size	4.74928	0.56980	8.33**	<.0001
X_3 non-debt tax shields	-16.75903	4.14530	-4.04**	<.0001
X_5 asset liquidity of assets	-3.10913	0.21982	-14.14**	<.0001
X_7 profitability	-137.37007	9.64724	-14.24**	<.0001

priority of banks after the implementation of risk management. Companies with a higher percentage of state-owned shares are more likely to have a poor corporate governance and financial performance, and therefore, banks would be more prudent in making loans to these companies. The increased difficulty in bank loans leads to the negative correlation between the percentage of state-owned shares and asset/liability ratio. The adjusted R-square is 0.62, and the goodness of fit is relatively low. This is probably because the threshold for the entry of independent variables is too high, excluding 5 variables from the model. Opposite to this standard, the value of secured assets, firm size, non-debt tax shields, growth and ability to generate internal resources have no significant impact on the asset/liability ratio. It can be concluded that good companies qualified for rights issue would often give up their loan plans simply because of various financing channels and the hard constraint of loan and interest payment. Variables excluded out of the model are basically non-financial indexes, representing that variables affecting a company's debt financing are performance indexes - in other words, the market factors are playing a primary role. Among the 18 industry dummy variables, only 6 variables enter the model, revealing that industry is not a important factor when banks make a loan as long as the company has a good performance.

For companies with an average ROE $<10\%$ in three consecutive years, the number of industry dummy variables entering the model has increased from 6 to 10, representing that, for bad performers, type of industry becomes an important factor for loans. 5 independent variables enter the model, and each of their coefficient symbol is consistent with the expectation. The adjusted R-square is 0.42, and the goodness of fit is relatively low, representing that there are various factors affecting debt financing. 4 independent variables are excluded out of the model, including dividend policy andthe percentage of state-owned shares. This can be explained by the widespread phenomenon that Chinese listed companies are stint in dividend distribution. The CSRC requires profit companies to explain to investors if they decide not to distribute dividends, but for loss companies, it seems natural for them not to distribute any dividends. Therefore, it is not strange that companies with ROE $<10\%$ have paid out very few cash dividends. The percentage of state-owned shares is excluded out of the model, possibly because the ownership type is not an important factor for banks to decide credit volume.

What is common in these two groups of companies is that both the variables of asset liquidity and prof-

itability have entered the model, representing that they have a significant impact on debt financing regardless of a company's performance. However, the variables of growth and ability to generate internal resources are excluded out of the model. Out of the concern for the loss of "position benefits", the management is reluctant to risk their position to invest in high-risk and high-return projects with bank loans. Therefore, the "asset replacement effect" is not obvious in China; even with the replacement effect, creditors cannot control their loans by raising the interest rate, as it basically has no elasticity. The outcome is that the correlation between growth and asset/liability ratio is not significant. According to the tradeoff theory, the ability to generate internal resources is positively correlated with debt, but companies have a preference for endogenous financing when there is an information asymmetry. Only when endogenous financing is inadequate, companies would choose to issue debts. Therefore, the ability to generate internal resources should be negatively correlated with debt. The empirical results show that both factors are playing a role, with the positive effect offset by the negative effect - consequently, the correlation between the ability to generate internal resources and debt is not significant.

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