

on Debt Maturity Structure of Listed Companies in Financial Engineering

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Abstract

We know that the debt maturity structure can influence the intrinsic value of listed companies. That's to say, if we want to price the capital asset, we should study the debt maturity structure of listed companies indirectly. In this paper, we employ financial engineering approach to test the influencing factors of debt maturity structure with the data of 202 listed companies distributed in 11 industries, by the simulation of single equation models and simultaneous equation model, using stepwise multiple regression analysis, and then got the result that, the endogenous relationship between capital structure and debt maturity structure matters a lot. Therefore, when the companies consider this relationship, the short-term debt maturity will not be an effective way to solve the problem of insufficient investment. In contrast, growth opportunity and leverage rate are significant negative correlation. With the role of leverage, growth opportunity will indirectly affect debt maturity structure.

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1. Introduction

Debt maturity structure is one kind of debt financing structures which reflects the long-term debt and short-term debt. The original related literature about corporate debt maturity structure was dating back to 1974. Stiglitz proposed that under the assumption of perfect market, corporate value do not related to debt structure. Since then, the academic study of corporate debt maturity structure began to follow the similar path of capital structure, introducing market imperfections factors, such as agency cost theory (Jensen and Mecklin, 1976; Myers, 1977; Ozkan, 2000); transmission of information theory (Flannery, 1986; Diamond, 1991, Danisevska, 2002), duration of matching theory (Hart and Moore, 1995) and the tax theory (Brick and Ravid, 1985, 1991) and so on. In recent years some scholars have proposed a new interpretation of the theory of debt maturity structure choice, such as market timing theory (Baker, Greenwood and Wurgler, 2003; Alexander W. Butler, Gustavo Grullon and James P. Weston, 2006), weigh thoughts (Sang -Gyng Jun and Frank C. Jen, 2006), country-specific theory (Demircuc-Kunt and Maksimovic, 1996) and so on. These theories have from a certain point made a theoretical analysis on decision-making of debt maturity structure.

In China, many scholars used the theory of foreign reference and focused on empirical study. Xiao Zuoping (2005) collected the relevant data for 1995-2002 and made an empirical analysis about the factors affecting debt maturity structure of Chinese listed companies. The results supported the agency cost theory that fewer growth opportunities, less free cash flow, longer-term assets and larger scale, then the company probably have more long-

term debt. While companies did not use debt maturity structure for transmitting signals to the market, which does not support the tax hypothesis. Results of Yuan Weiqiu (2006) showed that the trade-off thought could better explain the debt maturity structure of listed companies' choice. Yang Shenggang, He Jing (2007) compared the result of whether consider the leverage effect by empirical analysis. Also, the relationships between growth opportunities and leverage and debt maturity structure have been testified. For the endogenous problem, they just learn from someone else's model, there was no systematic analysis of the reasons for the endogenous problem.

Given the shortage of existing research, we tried to learn from foreign scholars and made emphasis on the impact of debt maturity structure of listed companies. In addition, we emphasized the endogenous relationship between capital structure and debt maturity structure, and made a summary about related theory.

2. Variables and Models

2.1. Variable selection

This paper selected eight factors that have impact on debt maturity structure, they are as follows: Leverage (LEVER), Growth opportunities (GROW), Free cash flow ratio (CASHF), Company size (SCAL), Abnormal returns (QUAL), Information asymmetry (INFORMA), Fixed assets ratio (MATCH), Debt maturity (MATUR).

2.2. Models and research method

We established multiple regression models. In order to verify the accuracy and completeness of the model, we established two models: one is single equation model, which makes the maturity structure of debt as the dependent variable, and the other is simultaneous equations, which aims to consider the endogenous relationship between debt maturity structure and leverage. The single equation model is as follows,

$$MATUR = LEVER * X_1 + GROW * X_2 + CASHF * X_3 + SCAL * X_4 + QUAL * X_5 + INFORMA * X_6 + MATCH * X_7 + ETR * X_8 + C + \varepsilon$$

Where, C is a constant, ε is the error term.

The simultaneous equations model is as follows,

$$MATUR = a_m X_m + b_m LEVER + \varepsilon_m \quad ①$$

$$LEVER = a_l X_l + b_l MATUR + \varepsilon_l \quad ②$$

Among them, debt maturity ($MATUR$) and leverage ($LEVER$) are endogenous variables. X_m and X_l are the corresponding explanatory variable, X_m including the GROW, CASHF, SCAL, QUAL, INFORMA, MATCH, ETR; X_l including the GROW, SCAL, FR, TAXS, ETR, ROA, LOSS. ε_m and ε_l are random error terms.

3. Empirical Results and Analysis

On the selection of the regression method, ordinary least squares method is used in the single equation model; the two-stage least squares is used in the simultaneous equations model, in order to solve the endogenous problem.

3.1. Results and analysis of the OLS regression in single equation model

First point, variables of the model are MATCH, LEVER, GROW and SCAL.

Second point, fit test of regression model. From the table 1, the proportion of explained variation will be raised while devoting a variable. After the last explained variable, scale, is devoted in the model, proportion will be reached at 37.3%. Actually, as the uncertainty of the factors affecting the debt limit and the differences of the companies' consideration of choosing the debt limit, the 37.3% of explanation ability is a satisfied result. Moreover, the D-W is 2.065, after the four variables are devoted in the model. It is to say that from the point of view of residual analysis, the variation of the explained variables debt maturity, which is based on the linear model, has been fully

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