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# *Money Supply and the Dynamic Adjustment Speed of Capital Structure*

## —Based on Unbalanced Panel Data in China

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**Abstract—Over the past years, capital structure has been one of the most important subjects in financial management. Our study aims to study the influence of macro factors on the dynamic adjustment speed of capital structure over the period of 2000 to 2015. Considering the traits of debt, this article classifies the capital structure into four categories, and then we develop a dynamic capital structure model to measure the adjustment speed of different kinds of capital structure and the effects of money supply. The results found that:(1) Different kinds of capital structure have different dynamic adjustment speed, the adjustment speed of the short-term capital structure is more sensitive than the adjustment speed of long-term capital structure; (2) Money supply will affect the adjustment speed significantly, loose monetary supply will speed up the adjustment;(3) Determinants of firm-specific will have influence on the capital structure.**

***Keywords—Capital structure; Money supply; The dynamic adjustment speed.***

## I. INTRODUCTION

Modern financial management views that capital structure will affect the value of listed companies, all the companies will adjust actual capital structure to the premium capital structure, but the adjustment of capital structure is influenced both by micro and macro factors. Particularly, the selection of financing in china for most enterprises is still limited. The debt financing focuses mainly in the bank credit at this stage, while equity financing is very difficult for enterprises, as the requirement of IPO is extremely strict, moreover, especially since China entered WTO, government has changed the monetary policy more frequently in order to stabilize the economic situation, which increased the volatility of the money supply. Hence, the objective of the paper is to study the influence between the money supply and the dynamic adjustment speed of capital structure, meanwhile the factors of company will also examined.

## II. THEORETICAL ANALYSES

In accordance with the empirical investigation of past years, the financial ratio which measures the most optimal capital structure will not be static, most scholars use the practical structure capital as the explanatory variable and the micro characteristics of company as explained variables. However, Marsh(1982) argues the determinants of firm-specific determines the optimal capital structure but not the practical capital structure[1], therefore each of the firm will adjust its actual capital structure towards the optimal capital structure of its own(Graham and Harvey 2001)[2], Drobetz and Wanzenried (2006)[3]. Cook and Tang (2010) find the adjustment speed of capital structure in America is faster when companies are in the boom period [4].

The study of this subject classifies into two categories: the first category is mainly focused on the adjustment speed of capital structure, TongYong (2004) finds the adjustment speed of capital structure in China is 0.2775[5], Xiao Ming(2016) finds the adjustment speed of capital structure in China is 0.37 through selecting the listed companies during the periods of 2005-2014[6], Li Sihai and Li Nana(2018) show the earnings information transparency of capital structure has significant effect on the capital structure adjustment speed[7]. The second category is focused on the influence of determinants of firm-specific, and macro factors such as money supply, GDP. therefore, the study in the past years is not comprehensive and sufficient; Kashyap(1993), Lemmon and Roberts(2010) find the money supply effects the decision of capital structure[8][9]. Thippayana P. (2014) tests determinants of firm-specific of Capital Structure in Thailand [10].

Summarizing, as the financing instruments of firms in China are quite limited where bond market and equity market are not fully developed. A large proportion of companies still use long-term debt which is highly affected by the money supply and the GDP. Therefore, the study classifies the capital structure according to the traits of the debt, through calculating the different adjustment speed, finally tests the effects of money supply and determinants of firm-specific on the capital structure adjustment speed.

## III. RESEARCH METHODOLOGY

This paper uses the data from A share market for the 16-year-period from 2000/1/1to 2015/12/31 which are collected from CSMAR and Wind data base, we also do the following procedures: exclude the financial company in order to avoid the volatility of the capital structure between different industries; exclude the companies that is labeled ST* and ST; and also removes the data of the year when the company is listed. Finally, gets 11307 data which belong to 803companies. Our study uses the Hausman test which rejects the random

model at the significant level, finally finds the fixed effect model is appropriate.

**Variables**

The dependent variables or leverage ratios are measured with four debt ratios definitions with regard to traits of debt. The dependent variables and explanatory variables are as following:

TABLE I. THE DEFINITION OF VARIABLES

| Variables | | Equation |
|---|---|---|
| Dependent variables | Lev | Total liabilities / total assets |
| | Clev | Current liabilities /total assets |
| | Flev | Non-current liabilities /total assets |
| | Xflev | Long-term borrowing/ total assets |
| Explanatory variables | Size | The logarithm of total assets |
| | Roa | (Net profit+ interest expenses)/ total assets |
| | Tang | Tangible assets/ total assets |
| | Dep | The accumulated depreciation of fixed assets/ total assets |
| | Se | Selling expenses/revenue |
| | Growth | Tobin's Q |
| | M1 | The effective circulation |

**Statistical Methods**

This linear function is employed to examine the relationship between the firm capital structure and the related explanatory variables, the equation are as following:

$$LEV_{i,t}^{*} = \sum_{j=1}^{L} \alpha_j X_{j,i,t-1} \quad (1)$$

Where Xj, i, t-1 is the one of determinants (SIZE, Roa, Tang, Se, Growth, M1)influencing its firm capital structure for firm i the period t. εit is an error term.

In the second step, using (2):

$$Lev_{i,t} - Lev_{i,t-1} = \delta(Lev_{i,t}^{*} - Lev_{i,t-1}) + \varepsilon \quad (2)$$

Where Levi, t* is the target capital structure firm i the period t, Levi, t is the practical capital structure firm i the period t, we use the data of period (t-1) to describe the target capital structure, in order to observe the adjustment speed ,using the above equations, we get the following equation:

$$Lev_{i,t} = (1-\delta_{i,t})Lev_{i,t-1} + \delta_{i,t}X_{j,i,t-1} + \varepsilon \quad (3)$$

Where $\delta$ is the adjustment speed.

Meanwhile, in the fourth equation, monetary supply is examined:

$$Lev_{i,t} = (1-\delta_{i,t})Lev_{i,t-1} + \delta_{i,t}X_{j,i,t-1} + \beta M1_t + \lambda Lev_{i,t-1} \times M1_t + \varepsilon \quad (4)$$

Where M1 is the effective circulation.

The predictions are as followings:

a. The adjustment speed of different type of leverage ratio will differ;

b. M1 will affect the adjustment speed positively

## IV. EMPIRICAL RESULTS

Table II, Table III presents the results of three regression models. The Durbin-Watson (DW) is about 2 which means the autocorrelation is not serious, Prob(F-statistic) is 0.000 which indicate the result is significant. According to R square adjustment coefficients, the regression line fit to data imperfectly.

TABLE II. EMPIRICAL RESULTS

| Clev | | | Lev | | |
|---|---|---|---|---|---|
| **Variable** | **Coefficient** | **Prob.** | **Variable** | **Coefficient** | **Prob.** |
| C | 6.129279 | 0.0279 | C | 6.129279 | 0.0279 |
| $Size_{i,t-1}$ | -0.165080 | 0.1098 | $Size_{i,t-1}$ | -0.165080 | 0.1098 |
| $Roa_{i,t-1}$ | -0.959891 | 0.0007 | $Size_{i,t-1}$ | -0.959891 | 0.0007 |
| $Tang_{i,t-1}$ | -2.686933 | 0.0589 | $Tang_{i,t-1}$ | -2.686933 | 0.0589 |
| $Dep_{i,t-1}$ | 2.033026 | 0.0134 | $Dep_{i,t-1}$ | 2.033026 | 0.0134 |
| $Se_{i,t-1}$ | 0.000471 | 0.9402 | $Se_{i,t-1}$ | 0.000471 | 0.9402 |
| $Growth_{i,t-1}$ | -0.000949 | 0.0160 | $Growth_{i,t-1}$ | -0.000949 | 0.0160 |
| M1 | 1.354333 | 0.2282 | M1 | 1.354333 | 0.2282 |
| $Clev_{i,t-1}$ | 0.416391 | 0.0208 | $Lev_{i,t-1}$ | 0.416391 | 0.0208 |
| $Clev_{i,t-1}$×M1 | -1.949746 | 0.0227 | $Lev_{i,t-1}$×M1 | -1.949746 | 0.0227 |
| R-squared:0.107287 | | | R-squared:0.107287 | | |
| Prob(F-statistic):0.000 | | | Prob(F-statistic):0.000 | | |
| Durbin-Watson:2.167 | | | Durbin-Watson:2.167 | | |

TABLE III. EMPIRICAL RESULTS

| Flev | | | Xflev | | |
|---|---|---|---|---|---|
| **Variable** | **Coefficient** | **Prob.** | **Variable** | **Coefficient** | **Prob.** |
| C | -0.099786 | 0.7418 | C | -0.100050 | 0.0009 |
| $Size_{i,t-1}$ | 0.008890 | 0.4285 | $Size_{i,t-1}$ | 0.006429 | 0.0000 |
| $Roa_{i,t-1}$ | -0.377562 | 0.0000 | $Roa_{i,t-1}$ | -0.002262 | 0.4619 |
| $Tang_{i,t-1}$ | -0.126288 | 0.4149 | $Tang_{i,t-1}$ | -0.013009 | 0.3995 |
| $Dep_{i,t-1}$ | 0.395546 | 0.0000 | $Dep_{i,t-1}$ | -0.043588 | 0.0000 |
| $Se_{i,t-1}$ | -0.000247 | 0.7175 | $Se_{i,t-1}$ | -6.60E-05 | 0.3330 |
| $Growth_{i,t-1}$ | -0.000493 | 0.0000 | $Growth_{i,t-1}$ | -2.31E-06 | 0.5882 |
| M1 | 0.346512 | 0.0025 | M1 | 0.112794 | 0.0000 |
| $Flev_{i,t-1}$ | 0.890273 | 0.0000 | $Xflev_{i,t-1}$ | 0.616641 | 0.0000 |
| $Flev_{i,t-1}$×M1 | -3.064891 | 0.0000 | $Xflev_{i,t-1}$×M1 | -1.078092 | 0.0000 |
| R-squared:0.286247 | | | R-squared:0.537938 | | |
| Prob(F-statistic):0.000 | | | Prob(F-statistic):0.000 | | |
| Durbin-Watson stat:2.247786 | | | Durbin-Watson :1.788330 | | |

The tests conducted in this paper show that the coefficients of $Lev_{i,\ t-1}$ are significant. The adjustment speed of Clev is 0.58, as the total liabilities mainly comprise of current liabilities, the adjustment speed of Lev is almost the same with that of Clev. However, as the cost of adjusting long-term liabilities are much higher than short-term liabilities, adjustment speed of Flev is only 0.11 which is much lower than that of Clev. Wu Zhongxin, Zhang Ya and Zhang Wen (2013) also get the similar conclusions [11]. Furthermore, the bond market is not developed thoroughly in China, large proportion of long-term liabilities is the form of long-term borrowing, and hence adjustment speed of Xflev is faster than that of Flev. The result proves the above prediction that firms in China mainly uses long-term borrowing as the main instrument when they want to get long-term capital.

As to M1, the results emphasize a significant positive relationship between M1 and capital structure (debt level), firms will be easier to get finance when the amount of M1 is increased. Moreover, the coefficient of $Lev_{i,\ t-1}$* M1is significant which indicates the greater the amount of money supply is, the faster the adjustment speed of the capital structure is. In addition, our study also suggest determinants of firm-specific such as ROA,TANG, Growth are related to the debt level while we use the LEV, Clev, Xflev, the higher the profitability is, the lower the debt level is .

The empirical evidence of the relationship between micro factors and capital structure is sought by testing the connection between capital structure and determinants of firm-specific, such as Size, Roa etc. The tests find Roa, Tang, Growth is related to the debt level positively and significantly when we use the LEV, Clev, Xflev to measure capital structure, the more profit a firm gains, the less debt uses.

## V. CONCLUSION

For listed companies in China, the research confirms that: the adjustment speed of different type of leverage ratio differs; M1 affects the adjustment speed positively; determinants of firm-specific also affect the adjustment of capital structure. As the adjustment of capital structure is both influenced by micro and macro factors, it is a complicated subject. Particularly, in a non-efficient capital market where the capital structure is distorted, the level of M1 will significantly influence adjustment speed; monetary policy makers should be extremely discreet when they have to make any policy changes with regard to effect on the capital structure which will finally influence the total value of listed companies. Meanwhile, listed companies should also take determinants of firm-specific into consideration when adjusting actual capital structure to premium capital structure.

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