How Managers' Overconfidence Affects Debt Financing Costs: The Intermediary Role of Debt Maturity Structure

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Abstract

Based on the behavioral corporate financial theory and modern capital structure theory, this paper proposes hypotheses on the relationship between managers' overconfidence, debt maturity structure, and debt financing costs. The research sample is based on the 2014-2017 Shanghai and Shenzhen A-share listed companies. It is empirically tested. The test results found that, compared with rational managers, companies with over-confident managers prefer to use short-term debt financing, and their debt maturity structure is relatively short; companies with over-confident managers have lower debt financing costs and debt The term structure has an intermediary role in this process, that is, the manager's overconfidence to some extent reduces the debt financing cost of the enterprise through a shorter debt term structure.

Keywords

Manager's overconfidence; Debt maturity structure; Debt financing cost; Intermediary role.

1. Introduction

Overconfidence has proven to be the most robust discovery of human irrational behavior in cognitive psychology. With the rise of behavioral corporate finance, more and more economists have begun to investigate whether there is a psychological phenomenon of overconfidence in managers. Mao Yu(2014) has found that overconfidence is a cognitive bias in itself, and managers have overconfidence in the company's operations and decision-making processes[1]. Since President Xi Jinping first proposed the "three reductions, one removal and one supplement" measure for supply-side structural reforms in 2015, "de-leveraging" has become one of the country's main tasks in implementing deepening supply-side structural reforms in recent years. "De-leveraging", as one of the important contents of the supply-side structural reform, is also an important measure to prevent and mitigate financial risks. It tests the ability of corporate managers to adjust the financing structure. However, behavioral corporate finance believes that corporate managers do not exist completely rationally, and some irrational behaviors of managers can adversely affect corporate financing decisions. Therefore, from the perspective of managers 'irrationality, studying the impact of managers' overconfidence on corporate debt financing decisions has certain practical significance in the context of "deleveraging".

This article proposes research hypotheses on the basis of theoretical analysis, then conducts an empirical test on the research hypotheses, and finally obtains the conclusions of this research. From the existing literature, there are two views on the impact of managerial overconfidence on the debt maturity structure. One view is that overconfident managers prefer to use short-term debt financing .Song Fengxuan & Zhang Yan(2010) and Liu Bai & Wang Yibo(2017), their research provides evidence for this view[2,3]. Another view is that overconfident managers

prefer long-term debt financing. Xiao Fenglei et al(2013) studied the issue, and his research provided evidence for the second view[4]. The literature on research from the perspective of debt financing costs is small, which also shows that debt financing costs are a relatively new perspective in the field of research on the effects of managerial overconfidence on corporate debt financing.

2. Theoretical Analysis and Research Hypotheses

2.1. Managers' Overconfidence and Debt Maturity Structure

The debt maturity structure is an internal indicator of debt financing. It divides and measures the composition of debt financing from the length of the debt maturity. Based on a review of relevant literature, this paper argues that the relationship between manager's overconfidence and debt maturity structure can be derived from the following aspects.

Firstly, based on the theory of information asymmetry , overconfident managers will choose shorter debt maturity structures to convey positive signals to the market. Liu Bo & Wang Yibo(2017) have found that compared with rational managers, over-confident managers have over-optimistic expectations about the quality of holding projects and the cash flow generated by holding projects in the future, and will use more short-term debt Matching with the over-estimated project recovery period, and at the same time reaching the market with a positive signal of good project quality[3].

Secondly, based on agency cost theory, over-confident managers tend to make over-investment behaviors, so they will choose to use short-term debt to alleviate the company's over-investment problem. In this case, on the one hand, over-confident managers will consciously choose to use more short-term debt to mitigate over-investment after realizing their over-investment behavior; on the other hand, Yu Minggui et al (2013) have found that over-confident managers underestimate project risks Underestimate the financial risks that may arise from more short-term debt [7]. Therefore, overconfident managers have a shorter debt maturity structure due to their preference for short-term debt.

Thirdly, based on the theory of trade-offs, under the operating principle of maximizing company value, overly confident managers will use more short-term debt with relatively low financing costs than long-term debt. Liu Hongqiang (2014) have found that compared with the debt repayment pressure caused by short-term debt and the risks at the refinancing and interest rate level, overconfident managers value short-term debt with the advantage of lower financing costs [8]. Therefore, over-confident managers who aim at maximizing the value of the company tend to use more low-cost short-term debt for financing, thereby giving the company a shorter debt maturity structure.

Based on the above derivation, this article proposes Hypothesis 1:

H1: Managers' overconfidence is positively related to the company's debt maturity structure, that is, the company's debt maturity structure is shorter than that of rational managers

2.2. Managers' Overconfidence and the Cost of Debt Financing

If overconfident managers have a preference for short-term debt, what causes it? Along this line of thought, this article attempts to explore the reasons for the over-confident managers' specific preference for the debt maturity structure from the perspective of debt financing costs.

Firstly, based on agency cost theory, short-term debt is conducive to reducing agency costs between shareholders and creditors, thereby reducing debt financing costs. The use of short-term liabilities helps creditors to monitor the company more flexibly, thereby greatly reducing the company's asset replacement problems and providing shareholders' benefits. At the same time, for creditors, the over-confident manager's preference for use of short-term debt is seen as a positive signal to reduce agency costs that exist between him and shareholders [3].

Therefore, overconfident managers reduce the company's debt financing costs by choosing more short-term debt.

Secondly, based on the theory of trade-offs, when over-confident managers choose debt maturity, they underestimate the increase in liquidity risk caused by the increase in short-term liabilities. In this case, short-term liabilities have a low cost. Liu Hui et al(2016) thought that the advantages will become more prominent to over-confident managers[9]. Rational managers will weigh the risks and costs associated with debt financing with different maturities to determine the appropriate debt maturity structure. However, overconfident managers appear to be overly optimistic and have the illusion of control, compared to increased risk. The cost reduction is more easily perceived by them. Therefore, over-confident managers will choose more short-term debt when choosing debt maturity, which will reduce the cost of debt financing.

Based on the above derivation, this article proposes Hypothesis 2 and Hypothesis 3:

H2: Managers' overconfidence is negatively related to the company's debt financing cost, that is, compared with the company where rational managers are, the company's debt financing costs are lower.

H3: The debt maturity structure has an intermediary role in the impact of managerial overconfidence on the cost of debt financing.

3. Research Design

3.1. Data

This article selects the Shanghai-Shenzhen A-share listed companies from 2014 to 2017 as the initial sample, and screens the initial sample according to the following rules: excluding sample listed companies in the financial industry; excluding listed companies with ST and PT marks; At the same time, this article chooses to use the personal characteristics of the general manager to measure the manager 's overconfidence, so it is necessary to exclude the sample listed companies whose general manager position changed during the inspection period. After screening, a total of 5896 sample observations were obtained, involving 1371 listed companies. Among them, the personal characteristics data of the general manager of the listed company is obtained from the RESSET database, and the financial data of the listed company is obtained from the CSMAR database. This paper uses Excel software to make preliminary arrangement of the data and Stata software for empirical analysis.

3.2. Model Setting

The research steps of this article are as follows:

The first step is to test the impact of manager's overconfidence on the debt maturity structure. We selects the appropriate control variables, and builds a model (1).

$$\text{MAT} = \beta_0 + \beta_1 \text{OVERCON} + \beta_2 \text{SIZE} + \beta_3 \text{GROWTH} + \beta_4 \text{TANG} + \beta_5 \text{PROFIT} + \beta_6 \text{STATE}$$

$$+ \beta_7 \text{TAX} + \beta_8 \text{LEV} + \beta_9 \text{FCF} + \sum \text{Year} + \sum \text{Industry} + \varepsilon \qquad \text{Model(1)}$$

Johnson (2013) research suggests that the debt maturity structure and financial leverage are endogenous [11]. In this case, regression of the model using OLS will produce biased regression results. Therefore, this paper refers to the method of Huang et al. (2016) and uses GMM estimation technology to test managers' overconfidence and debt maturity structure to overcome possible endogenous problems.

The second step is to test the impact of manager's overconfidence on the cost of debt financing. We selects the appropriate control variables and builds a model (2).

$$DFC=\beta_0+\beta_1 OVERCON+ +\beta_2 SIZE+\beta_3 GROWTH+\beta_4 TANG +\beta_5 STATE$$

$$+\beta_6 LEV+\beta_7 FCF+\beta_8 IPM+\sum Year+\sum Industry+\varepsilon \qquad Model(2)$$

The third step is to test whether the debt maturity structure has an intermediary role between the manager's overconfidence and the debt financing cost. Based on the intermediary role test method proposed by Wen Zhonglin et al. (2004)[14], We adds debt based on model (2) Term structure and model (3).

$$DFC=\beta_0+\beta_1 OVERCON+\beta_2 MAT+\beta_3 SIZE+\beta_4 GROWTH+\beta_5 TANG +\beta_6 STATE$$

$$+\beta_7 LEV+\beta_8 FCF+\beta_9 IPM+\sum Year+\sum Industry+\varepsilon \qquad Model(3)$$

Regress the above three models. If the regression coefficient$\beta_1$of the manager's overconfidence and debt financing cost in model (2) is significant, the regression coefficient β_1 of the manager's overconfidence and debt maturity structure in model (1) is also significant, and In the model (3), the regression coefficient β_2 of the debt maturity structure and debt financing cost is significant, and the regression coefficient β_1 of the manager's overconfidence and debt financing cost is also significant. The debt maturity structure is considered to be between the manager's overconfidence and debt financing cost Has an intermediary role.

3.3. Measuring the Dependent Variable

We uses the general characteristics of the general manager to construct a comprehensive indicator OVERCON that measures managers' overconfidence. The personal characteristics of the general manager concerned in this article include: gender, age, education, professional background and the combination of two positions. (1) Gender. If the general manager of the sample company is male, Gender = 1, otherwise it is 0. (2) Age. If the general manager's age is less than the sample average, Age = 1, otherwise 0. (3) Educational background. If the general manager's education level is graduate or above, Education = 1, otherwise 0. (4) Professional background. If the general manager has not studied economics and management majors, then Background = 1, otherwise 0. (5) The situation where two jobs are combined. If the general manager and the chairman are the same person, Two = 1, otherwise 0. According to the above rules, the general manager characteristic indicators of each sample observation are assigned and summed up. If the sum of the five indicators is greater than or equal to 4 (that is, the general manager has any four or more of the above characteristics), then Define it as overconfident, OVERCON value is 1, otherwise it is 0.

This article uses the short-term debt ratio to measure the debt maturity structure, and defines the debt maturity structure as the ratio of short-term debt to total debt; uses relative values to measure debt financing costs, and defines debt financing costs as the ratio of interest expenditure to total debt The relative value of debt financing costs has nothing to do with total debt, making it easy to compare them among different sample companies.

The control variables we focus on include: company size, company growth, company's tangible assets ratio, company profitability, company's equity structure, company's actual tax rate, company's free cash flow, financial leverage, and interest protection multiples. We use the company's total assets to measure the size of the company and define it as the natural logarithm of total assets. We use the growth rate of main business income to measure growth. The ratio of tangible assets is a measure of the internal attributes of the company. A company with a higher proportion of tangible assets has a stronger solvency, so the company will use more debt financing, a higher level of debt, and generally a longer maturity period. Define the ratio of tangible assets as the ratio of net fixed assets to total assets. We use the ratio of net profit to

total assets to define profitability. We use the ratio of the number of state-owned shares to the total number of shares to define the ownership structure. We define the company's actual tax rate as the ratio of the actual income tax to the total profit before tax. We use the ratio of operating cash flow to total assets to define free cash flow. We use the ratio of profit before interest and tax to interest expense to define the interest coverage multiple. We define financial leverage as the ratio of total liabilities to total assets.

4. Empirical Analysis

4.1. Descriptive Statistical Analysis

The descriptive statistical results of all the variables involved in the above three models are shown in Table 1. According to Table 1, the average value of managers' overconfidence is 0.306, indicating that the assumption of complete rationality of managers is not completely correct. As far as the sample is concerned, about 30.6% of the general managers of listed companies show overconfidence; the debt maturity structure The average value of MAT is 0.821, the maximum value is 1, and the minimum value is 0.038, which shows that the overall structure of the sample companies has a short debt maturity structure, and most companies have a large proportion of short-term debt. The average value of the DFC of debt financing costs is 0.002, the maximum value is 0.079, and the minimum value is 0. As for the sample as a whole, the performance of the observed value in this variable is relatively scattered, indicating that the operating conditions of different companies are quite different, so the debt financing costs The difference is also large. The descriptive statistical results of the remaining variables are relatively normal and will not be described again.

Table 1. Descriptive statistics of variables

variable	Mean	Max	Min	Standard deviation	N
OVERCON	0.306	1	0	0.461	5896
MAT	0.821	1	0.038	0.171	5896
DFC	0.002	0.079	0	0.005	5896
SIZE	22.21	26.42	19.21	1.052	5896
GROWTH	0.247	0.874	-0.941	1.927	5896
TANG	0.214	0.948	0.000	0.159	5896
PROFIT	0.054	0.671	-0.641	0.064	5896
STATE	0.021	0.772	0	0.085	5896
TAX	0.171	6.691	-5.427	0.800	5896
LEV	0.418	0.982	0.009	0.202	5896
FCF	0.041	0.661	-0.319	0.072	5896
IPM	17.65	229.7	-133.6	56.96	5896

4.2. Correlation Analysis

Pearson and Spearman correlation tests were performed on three main variables of this article: managerial overconfidence, debt maturity structure, and debt financing costs. The test results are shown in Table 2. From Table 2, it can be seen that the overconfidence of managers has a significant positive impact on the debt maturity structure, which indicates that companies with overconfidence in managers have a higher proportion of short-term liabilities, that is, companies with overconfidence in managers compared to companies with rational managers Has a shorter debt maturity structure; excessive self-confidence of managers has a significant negative impact on debt financing costs, which initially indicates that excessive self-confidence

of managers can reduce debt financing costs, that is, compared with the company where a rational manager is The company's debt financing cost is lower; there is a significant negative relationship between the debt maturity structure and debt financing cost, which indicates that the shorter the debt maturity structure, the lower the debt financing cost.

Table 2. Correlation analysis of main variables

variable	OVERCON	MAT	DFC
OVERCON	1	0.0281*	-0.0169***
MAT	0.0356**	1	-0.3667***
DFC	-0.0044*	-0.2871***	1

Note: *, **, and *** represent significant levels at 10%, 5%, and 1%, respectively.

4.3. Regression Analysis

In order to verify the three research hypotheses proposed above, this paper conducts regression analysis on the three models established, and the regression results are shown in Table 4. It can be known from Table 3: First, in model (1), the regression coefficient β_1 of manager's overconfidence is 0.0164, and it is significant at the level of 1%, indicating that there is a significant positive correlation between manager's overconfidence and debt maturity structure The relationship validates hypothesis 1. Secondly, in model (2), the regression coefficient β_1 of manager's overconfidence is -0.00416, and it is significant at the level of 1%, indicating that there is a significant relationship between manager's overconfidence and debt financing costs. The negative correlation of the results validates Hypothesis 2 of this article. Finally, in the model (3), the regression coefficient β_1 of managers' overconfidence is -0.00037, which is significant at the level of 5%. The regression coefficient β_2 of the debt maturity structure is- 0.00727, which is significant at the level of 1%, and the regression coefficient β_1 of the manager's overconfidence in both model (1) and model (2) is significant. Therefore, the debt maturity structure is considered to be in the manager's overconfidence and debt financing costs. There is a significant mediating effect between them, which validates the hypothesis 3 of this paper.

4.4. Robustness Test

In order to ensure the reliability of the empirical results, the corresponding robustness tests of the above three models are performed in this paper. Change the manager 's measure of overconfidence, and measure the overconfidence based on whether the manager voluntarily increased the company 's stock Transfer, etc., it is considered that it is a voluntary increase in the company's stock, that is, the manager is overconfident. The regression test of the three models using over-confident managers' overconfidence, the test results are basically consistent with the previous results, indicating that the previous regression results are relatively robust.

Table 3. Regression results

Variable	Variable symbol	Model(1)	Variable symbol	Model(2)	Variable symbol	Model(3)
Constant	β_0	1.8391*** (30.99)	β_0	-0.00918*** (-4.89)	β_0	0.00338* (1.73)
OVERCON	β_1	0.0164*** (2.17)	β_1	-0.00416*** (-3.99)	β_1	-0.00037** (-2.42)
MAT					β_2	-0.00727*** (-15.51)
SIZE	β_2	-0.443*** (-16.63)	β_2	-0.00056*** (-5.17)	β_3	-0.00018** (-2.12)
GROWTH	β_3	0.0006 (0.45)	β_3	0.00025** (2.59)	β_4	0.00011*** (2.86)
TANG	β_4	-0.1991*** (-11.27)	β_4	0.00093* (1.80)	β_5	-0.00065 (-1.29)
PROFIT	β_5	0.1467*** (3.39)				
STATE	β_6	-0.0315* (-1.81)	β_5	-0.00292*** (-3.12)	β_6	-0.00301*** (-3.33)
TAX	β_7	0.0006 (0.18)				
LEV	β_8	0.0341*** (2.76)	β_6	0.00241*** (5.11)	β_7	0.00205*** (4.65)
FCF	β_9	0.0766* (1.77)	β_7	-0.00105 (-0.87)	β_8	0.00020 (0.18)
IPM			β_8	-7.25e-05*** (-3.81)	β_9	-7.19e-05*** (-3.78)
∑Year		Control		Control		Control
∑Industry		Control		Control		Control
N		5896		5896		5896
Adj-R2		0.3718		0.3651		0.2897

Note: *, **, and *** represent significant levels at 10%, 5%, and 1%, respectively.

5. Conclusion

This article uses the Shanghai and Shenzhen A-share listed companies from 2014 to 2017 as the research object to build a sample. Based on the behavioral company financial theory and modern capital structure theory, it conducts an empirical test on the relationship between

managers' overconfidence, debt maturity structure and debt financing costs. The following research conclusions and enlightenments are drawn.

Firstly, managers' overconfidence is positively related to the debt maturity structure. Overconfident managers are more inclined to use short-term debt, and thus have a shorter debt maturity structure. However, the shorter debt maturity structure caused by managers' overconfidence also increases the level of risk facing the company, which has a certain negative impact on the company's financial situation. Therefore, the company's supervisors should be alert to the over-preference behavior of short-term liabilities by managers, and promptly correct irrational behaviors made by over-confident managers that may harm the value of the company; meanwhile, the company should further improve its internal governance system Give full play to the role of internal supervision and give full play to the active role of the company's supervisors in the task of "deleveraging".

Secondly, managers' overconfidence is negatively related to the cost of debt financing. Compared with the company where rational managers are located, the companies with overconfident managers have lower debt financing costs. This shows that over-confident managers can reduce the company's debt financing costs. The reduction in financing costs to a certain extent means an increase in the value of the company. The company should face up to the positive effects of managers' over-confidence on the value of the company in this regard. Influence, give full play to the positive role of over-confident managers in the "deleveraging" task.

Thirdly, the debt maturity structure has an intermediary role between the manager's overconfidence and the cost of debt financing, that is, at least part of the impact of the manager's overconfidence on the debt financing cost is achieved through the debt maturity structure. Because of their preference for short-term debt, managers have reduced the cost of debt financing. The intermediary role of the debt maturity structure also explains to some extent the reasons why over-confident managers prefer to use short-term debts—which can reduce debt financing costs. Therefore, managers' overconfidence through the impact of debt maturity structure and debt financing costs on corporate debt financing is multifaceted and complex, not completely negative or completely positive. Companies should combine their own level of risk-taking and financial goals to assess the impact of managers' overconfidence on the value of the company, formulate appropriate risk assessment standards to regulate the behavior of managers, and better complete the "deleveraged" task.

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