

The Relationship between Managerial Overconfidence and Over-Investment of China's Manufacturing Listed Companies

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Abstract: From the perspective of behavioral finance, this paper analyzes the relationship between managerial overconfidence and over-investment, and compares the influence of different ownership concentration and shareholder nature on the relationship between them. It selects the China's manufacturing listed companies as research sample from 2013 to 2017 year. The research shows that managerial overconfidence and over-investment are significant positive correlation, the overconfidence of managers will aggravate the over-investment. Compared with companies with low ownership concentration, high ownership concentration can reduce the over-investment caused by managerial overconfidence. Meanwhile, compared with the non-state-owned holding companies, state-owned holding companies can lead to more over-investment caused by managerial overconfidence.

1. Introduction

Investment decision is one of the three most important decisions in modern corporate finance. The investment efficiency of a company has a profound impact on future development prospects. Therefore, whether the company's investment behavior is effective not only affects the economic operation but also relates to the development of enterprises. However, many listed companies blindly repeat investment and blindly diversified development. Domestic and foreign scholars have also been paying attention to the issue of non-efficiency investment. Most of the reason of inefficient investment focus on the principal-agent theory (Jensen, 1986) [1] and the asymmetric information theory (Myers, 1984) [2]. With the rise of behavioral finance theory, scholars have found that people are irrational and that psychological deviation will affect the investment activities (Roll, 1986) [3]. Managers will overestimate their operational decision-making ability. This behavior is not only related to the enterprise's value, but also affects the allocation of social resources. Therefore, it is necessary to discuss the relationship between managerial overconfidence and over-investment.

2. Hypotheses Development

Behavioral finance theory holds that people have irrational psychological biases. Business executives are generally optimistic, confident, and even overconfident because they have more power and resources than others in the company. Overconfident executives tend to overestimate expected returns and underestimate potential risks, which will lead to irrational behaviors and over-investment. March et al. (1987) [4] found that overconfident executives may have the illusion of control and continue on expanding their business empire. Based on the research of foreign scholars, Chinese scholars use various substitution variables of overconfidence to study the relationship between managerial overconfidence and inefficient investment. Hao ying et al. (2005) used changes in managers' shareholding to measure overconfidence and found that overconfident executives were more likely to cause over-investment. Under China's special economic system and the influence of traditional cultural such as authoritarianism and empiricism, some executives may

be more motivated to improve their reputations and build empires, which may lead to more serious overconfidence. Therefore, this paper proposes the first hypothesis:

H1: Managerial overconfidence is significantly positively correlated with over-investment.

The principal-agent relationship is the essence of modern company, and there are two types of agency problems. When the ownership is relative dispersion, it is easy to cause conflict between managers and shareholders because of interests. The over-investment caused by the managerial overconfidence will directly damage the absolute interests of major shareholder. With the increasing of proportion of major shareholder shares, the major shareholder will effectively supervise the manager and pay great attention to the confidence of management. The increase of ownership concentration makes major shareholder has the motivation to control and reduce the opportunism behavior of management, restrain the over-investment behavior caused by the overconfidence of the management. Based on the above analysis, hypothesis is proposed:

H2: Compared with companies with low ownership concentration, companies with high ownership concentration can reduce the over-investment caused by managerial overconfidence.

Under the China's special institutional background, the state-owned listed companies have the problem of "only one" and "the lack of owner". The largest shareholder of state-owned listed company is the "State", and government officials as the agents have limited control over the manager's decision-making. The company's executives play the dual role of manager and shareholder. The lack of supervision exacerbates managers' overconfidence. However, the non-state-owned listed companies don't lack owner, so they can supervise the behavior of management and reduce over-investment caused by managerial overconfidence. Accordingly, the following hypothesis is proposed:

H3: Compared with the state-owned holding companies, non-state-owned holding companies can restrain the over-investment caused by managerial overconfidence.

3. Research Design

3.1 Model Identification

3.1.1 Over-investment (OI)

We follow Richardson (2006) [5] to measure over-investment and combine the reality of China, the following equation is used to estimate:

$$I_{NEW_t} = \alpha + \beta_1 I_{NEW_{t-1}} + \beta_2 Cash_{t-1} + \beta_3 Lev_{t-1} + \beta_4 Eps_{t-1} + \beta_5 Size_{t-1} + \beta_6 TobinQ_{t-1} + \beta_7 Age_{t-1} + \Sigma Year + \varepsilon \quad (1)$$

I_{NEW} is the new investment, which is the difference between the total investment and the maintenance investment, and is divided by the total assets. The total investment is the difference between "cash paid for the purchase and construction of fixed assets, intangible assets and other long-term assets" and "net cash recovered from disposal of fixed assets, intangible assets and other long-term assets". The maintenance investment is the sum of depreciation of fixed assets and amortization of intangible assets.

Cash is the cash divided by total assets. Lev is defined as the asset-liability ratio. Eps is the earnings per share. Size is measured by the logarithm of total assets. Tobin Q is (equity market value + net debt market value)/ assets. Age is the years of firm listed on the stock exchange. Year is the control variables. ε is the residual, $\varepsilon < 0$, which is insufficient investment, and $\varepsilon > 0$ is over-investment.

3.1.2 Managerial Overconfidence (OC)

We use the relative ratio of executive pay to measure managerial overconfidence. Previous studies have shown that the higher the manager's salary is, the more important the manager's

position and the more overconfident (Hayward and Hambrick, 1997). Based on the scalability of data, we choose to use the sum of the top three executive annual salaries/the sum of the annual salaries of all directors, supervisors and executives. The larger the index, the stronger the overconfidence of managers.

3.1.3 Control Variable

This article selects free cash flow (FCF), return on equity (ROE), the size of the board of supervisors (Sup) and the proportion of independent directors (Ibr), annual dummy variable (Year) as control variables.

3.2 Model Identification

$$OI_t = \alpha + \beta_1 OC_t + \beta_2 FCF_t + \beta_3 ROE_t + \beta_4 Sup_t + \beta_5 Ibr_t + \sum Year + \varepsilon \quad (2)$$

Model (2) was built for studying the relationship of managerial overconfidence and over-investment. And to test hypothesis 2, this paper selects the shareholding ratio of the largest shareholder as the indicator to measure the ownership concentration. Most of the equity in China is held by the largest shareholder, the shareholding ratio of the largest shareholder reflects the absolute power of the single shareholder. The ownership concentration was divided into two groups according to the median of the shareholding ratio of the largest shareholder: the group with high ownership concentration and the group with low ownership concentration, then test the effect of ownership concentration on managerial overconfidence and over-investment in two group.

3.3 Sample & Date

We select the manufacturing listed companies which are in Shanghai and Shenzhen stock market as research sample from 2013 to 2017 year. Since the measurement of over-investment requires data from the previous year, the actual sample time is extended for one year. That is 2012-2017. The model used data from the database of CSMAR. ST, financial insurance and companies with missing values were excluded, and the variables in the over-investment model were truncated by 1% to 99%. 6123 samples were preliminarily obtained.

4. Empirical Analysis

4.1 Empirical Test of Over-investment

Table 1. The Results of Regression for Inefficient Investment.

Variables	Coefficient	t	Sig.
(Constant)	0.187	5.26	0.000
I_{NEWt-1}	0.071	5.28	0.000
$Cash_{t-1}$	0.047	8.32	0.000
Lev_{t-1}	-0.020	-3.20	0.001
Eps_{t-1}	0.012	6.45	0.000
$Size_{t-1}$	-0.006	-3.37	0.001
Tobin Q _{t-1}	0.001	1.59	0.111
Age	-0.006	-12.72	0.000
Year	Control		
Adj-R ²	0.254		
F	150.22***		
N	6123		

* p<0.1, ** p<0.05, *** p<0.01

According to the residual value obtained from the regression results of model (1), the level of inefficiency investment is measured. If the residual value is greater than zero, it is regarded as over-investment. The larger the residual, the more serious the over-investment. Based on this, the explained variable (over-investment) of model (2) can be determined. Among the 6123 samples, 3754 samples were obtained. But the actual sample number was 3671 after removing the missing values in the follow-up study of managerial overconfidence.

4.2 Descriptive Statistics

Table 2. The Description Analysis of Variables

Variable	mean	sd	median	min	max
OI	0.042	0.024	0.042	0.000	0.109
OC	0.406	0.112	0.392	0.168	0.989
FCF	0.008	0.105	0.021	-0.666	0.514
ROE	0.077	0.072	0.071	-0.396	0.450
Sup	3.252	0.781	3	1	12
Ibr	0.376	0.054	0.333	0.182	0.667

The minimum value of the explained variables (OI) is 0.000, the maximum is 0.109, and it shows that there is difference among companies. The average of managerial overconfidence (OC) is 0.406, indicating that approximately half of the executives in the sample are overconfident.

4.3 Correlation Test

Table 3 shows the Pearson correlation analysis. The correlation coefficient between managerial overconfidence (OC) and overinvestment (OI) is 0.106, which is significant at the level of 1%. It is preliminarily verified that managerial overconfidence has a positive effect on over-investment. Other control variables were significantly correlated with over-investment, and the correlation coefficients between the control variables were all less than 0.5, indicating that there is no strong multicollinearity among the control variables.

Table 3. The Correlations Analysis of Variables

	OI	OC	FCF	ROE	Sup	Ibr
OI	1					
OC	0.106***	1				
FCF	0.156***	0.024	1			
ROE	0.176***	0.005	0.094***	1		
Sup	-0.141***	-0.197***	-0.005	-0.027*	1	
Ibr	0.040**	0.172***	0.004	-0.033**	-0.114***	1

* p<0.1, ** p<0.05, *** p<0.01

4.4 Empirical Results

Column (1) in the table 4 shows the regression results of managers' overconfidence (OC) and overinvestment (OI) in the whole sample. They are positively correlated and significant at the level of 1%. Hypothesis 1 has been verified. The Column (2) and (3) are the samples with high and low ownership concentration respectively. It is found that the correlation coefficient between OC and OI is 0.011 and is significant at the level of 5% in the samples with high ownership concentration, while in the samples with low ownership concentration, the relationship between them is 0.021 and is significant at the level of 1%. This shows that high ownership concentration can reduce the over-investment caused by managerial overconfidence. This finding supports H2. To test H3, the sample was divided into state-owned and non-state-owned groups. It is found that there are both significant positive correlation between OC and OI at the 1% level. The correlation coefficient is 0.035 in the sample of state-owned holdings of column (4), it is higher than the coefficient in non-state-owned holdings of column (5). Compared with the non-state-owned holding companies,

state-owned holding companies can lead to more over-investment caused by managerial overconfidence. Hypothesis 3 is verified.

Table 4. The Results of Regression of Managerial Overconfidence and Over-Investment

	(1)	(2)	(3)	(4)	(5)
(Constant)	0.051*** (14.420)	0.059*** (11.455)	0.047*** (9.910)	0.011 (0.974)	0.053*** (13.579)
OC	0.018*** (5.270)	0.011** (2.352)	0.021*** (4.424)	0.035*** (3.227)	0.017*** (4.771)
FCF	0.026*** (7.437)	0.023*** (4.555)	0.026*** (5.469)	0.035*** (3.289)	0.022*** (6.033)
ROE	0.056*** (10.997)	0.049*** (6.717)	0.053*** (7.410)	0.063*** (4.653)	0.055*** (10.015)
Sup	-0.004*** (-8.923)	-0.006*** (-7.653)	-0.003*** (-4.940)	-0.001 (-0.926)	-0.003*** (-5.273)
Ibr	0.011* (1.662)	0.015 (1.520)	0.003 (0.273)	0.028 (1.246)	0.007 (0.928)
Year	Control	Control	Control	Control	Control
N	3671	1836	1835	407	3264
Adj-R ²	0.145	0.121	0.150	0.090	0.145
F	69.897	29.151	37.085	5.476	62.262

* p<0.1, ** p<0.05, *** p<0.01, t statistics in parentheses

5. Conclusion

The results show that: (1) the overconfidence of managers will aggravate the over-investment. (2) High ownership concentration can effectively restrain the over-investment caused by overconfidence of managers. For the purpose of safeguarding its own interests, the major shareholders will implement more effective supervision of investment decisions. (3) Compared with the state-owned holding companies, non-state-owned holding companies also can restrain the over-investment caused by managerial overconfidence.

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