

## **INVESTOR SENTIMENT, MANAGERIAL OVERCONFIDENCE, AND CORPORATE INVESTMENT BEHAVIOR**

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### **ABSTRACT**

In this paper, the nonferrous metals industry as an example, based on China's Shanghai and Shenzhen A shares markets of listed companies in 2008 and 2015 data, we investigate the influence of investor sentiment on corporate investment behavior from the perspective of behavioral finance and the role the managerial overconfidence may play in. The empirical results show that investor sentiment is positively related to the level of corporate investment, and also positively correlated with managerial overconfidence. While the investor sentiment influences corporate investment behavior, part of it is influenced by managerial overconfidence. This provides us with a useful reference to the transmission mechanism of the stock market sentiment from the micro perspective of the enterprise.

**Keywords:** nonferrous Metals Industry; investor sentiment; managerial overconfidence; corporate investment behavior

### **1. INTRODUCTION**

In recent years, more and more financial scholars have begun to explore the influence of investor sentiment on corporate investment behavior. The traditional finance paradigm is based on the rational behavior hypothesis to study the financial market, but many irrational financial phenomena reflect investor sentiment is common in the stock market, which was explained as investors' systematic bias of expected future (Stein, 1996) <sup>[1]</sup>. In Chinese stock market, on the one hand, there are lack of individual investors with rich investment experience and the stock price fluctuate wildly. On the other hand, listed Chinese companies tend to meet investor preferences other than the long-term interests of the company. Therefore, the research on the impact of investor sentiment on the investment behavior of Chinese listed companies is not only the research focus of asset pricing and corporate finance theory, but also a major issue concerned by regulators and financial workers of listed companies.

In this paper, we choose the nonferrous metals industry as the research sample. On the one hand, nonferrous metals industry, together with energy industry is an important basic industry for people's livelihood and reflect a country's economic development. On the other hand, according to the historic data of Chinese stock market, we find the nonferrous metal industry was always the first industry to start a bull market and its investor sentiment is more intense. Therefore, the abnormal fluctuation of the nonferrous metals industry has a foreseeable significance for the stock market quotation and economic development. In addition, we test the relevant variables among investor sentiment, managerial overconfidence and corporate investment behavior, which examines the influence of investor sentiment on corporate investment behavior and try to find the role played by the managerial overconfidence in the process. The research will help us to understand the influence of investor sentiment on managers' decision-making, and also help us to understand how the behaviors of the stock market effect the real economy conduction.

## **2. LITERATURE REVIEW**

Under the hypothesis of information symmetry and rational person, the performance of its shares in the market will affect the investment behavior, so the new classical group put forward the famous Q theory. Information economics, based on information asymmetry between enterprises and external funds, has established the theory of financing constraints. And behavioral finance, by relaxing the rational assumption of market participants, introduces investor sentiment and managerial overconfidence to the corporate investment behavior analysis.

The theme of this paper is to study the effect of investor sentiment on corporate investment behavior and the intermediary effect of the managerial overconfidence in the process. Therefore, the literature comes from the three fields, investor sentiment, managerial overconfidence and corporate investment behavior.

Along the path of manager rationality and investor irrationality hypothesis, there are two ways to develop investor sentiment theory, which are the "equity financing channels" and "rational catering channels". Based on the equity financing channel, the researchers believe that the investor sentiment will affect the cost and quantity of equity financing and affect the investment behavior of the enterprise. Stein (1996) <sup>[1]</sup> thought that irrational investors will affect the market timing of stock issuance. Rational managers will issue shares when the share price is overvalued, and the funds raised may be used to repay loans or raise cash, not necessarily for corporate investment. In addition to the US capital market, Hao Ying (2008) <sup>[2]</sup> also proved, in Chinese capital market, the share price of the listed company that has acquired the right of refinancing will affect the company's investment behavior through the equity financing channel.

Polk & Sapienza (2009) <sup>[3]</sup> proposed rational catering channel on the basis of investor sentiment

influencing the investment behavior of enterprises. Namely, when investors are short-sighted, managers will choose to invest in a overvalued item to cater to investor sentiment to maximize short-term stock price rationally. Zhu Zhaohui (2012) <sup>[4]</sup> thought that in Chinese stock market, facing the irrational investors, managers have catering and conservative tendencies at the same time, and cater to investors' emotional investment is the main way to influence corporate investment.

Along the path of investor rationality and manager irrationality hypothesis, it mainly explores the trade-off between overinvestment and overinvestment of managers' optimism. Malmendier & Tate (2004) <sup>[5]</sup> came to similar conclusions that overconfident managers with enough cash flow tend to invest excessively, and when corporate's need for external investment increase, they will think the cost is too high and reduce investment, and in particularly for those equity financing dependent companies, when they make investment decisions, overconfident CEO is more sensitive to cash flow. Wang Xia (2008) <sup>[6]</sup> also confirmed the existing of corporation investment behavior alienation in Chinese market because of managerial overconfidence, especially when they raise large amounts of cash from the capital market, managers are more likely to underestimate risks and overestimate gains over investment and then bring losses to the enterprises.

Behavioral finance is not a negation of classical economic theory. Instead, it imports psychological theory and relaxes its hypothesis, which is closer to practice to explain the unexplained problems of classical economics. From the above literature review, we find that corporate investment theories basically develop along two paths, investor irrationality and managerial irrationality, but in capital market, the rationality of the two groups couldn't coexist. At present, there are not many researches integrating two groups' finite rationality into the same framework, but it's the correct direction that we can continue to discuss in the future.

### **3. RESEARCH DESIGN**

McLean & Zhao (2012), found that regardless of the economic cycle, corporate investment behavior is sensitive to investor sentiment by tracing some American companies for 46 years. When the economy picks up and investor sentiment is high, the enterprises will increase the external financing and they prefer to issue stocks with lower costs than to issue bonds. When the economy goes down and investor sentiment is low, the level of investment may reduce, but the rate of return on investment is generally high.

When both stock prices and investor sentiment are high, on the one hand, managers will consider issuing stocks from the perspective of reducing financing costs, so they will issue stocks and refinance. On the other hand, managers will choose to cater to investor sentiment, and pursue hot

concepts and projects to increase the level of investment. Taking China's Shanghai and Shenzhen two stock markets as an example, the average annual IPO financing for 2000-2005 years is about 63 billion yuan, which is less than 1/5 of the financing amount of the 2006 and 1/4 of the financing amount in 2007. Based on the above analysis, we put forward the hypothesis 1.

H1: There is a positive correlation between investor sentiment and the level of corporate investment. That is, when investor sentiment is high, the level of enterprise investment is also high.

Considering neither investors or managers can keep completely rational. According to the emotional appealing theory in Psychology, when people in the process of information exchange, there will be emotional immigration and regulation and they will also compare their own emotions with others emotions, and they will accept the feelings of others' if necessary. Therefore, in the capital market, the investment of listed companies is inseparable from the managers' consideration of their stock prices. High or low investor sentiment can also affect managers' psychology, make them overconfident or over pessimistic, and adjust their judgement of the profits and risks of enterprises' investment projects. Thus, we put forward the hypothesis 2.

H2: Investor sentiment can induce managers' emotions. Investor sentiment is positively related to managers' overconfidence.

What are the consequences of investor sentiment affecting business decisions? According to the theory of above literature, we believe that rising investor sentiment will contribute to managerial overconfidence, making them underestimate the corporate risk assets and overestimate the expected returns on investment projects, and even invest projects with negative net present value original when the stock price is high. However, low investor sentiment will encourage managerial over pessimistic. They will overestimate the risk of the enterprise assets, underestimate the expected returns on investment projects, and they also don't want to financing capital to invest projects with positive net present value original when the stock price is low. Accordingly, we put forward the hypothesis 3.

H3: In the process of investor sentiment affecting corporate investment behavior, managerial overconfidence will play an intermediary role. That is, when investor sentiment affects the investment behavior of the enterprise, some of them are achieved through overconfidence of the managers.

This study takes nonferrous metals listed companies of Shanghai and Shenzhen two stock markets as the sample object, and takes 2008-2015 as the research area, and considers a lag

period, so we collect 2007-2015 years total 9 years' data. Among them, according to the Commission published the listed company industry classification guidelines in 18 categories in the 90 categories at 2012, selection of non-ferrous metal mining industry and non-ferrous metal smelting and rolling processing under two major categories, we combine them into non-ferrous metal industry. Excluding the incomplete financial data company, then we get 49 samples of 768 observation group. At the same time, in order to eliminate the effect of outliers, this paper deals with the related continuous variables at the level of 1%. All Sample Firms data were from CSMAR database and RESSET database, and all the data are processed by EXCEL, EVIEWS 9 and STATA 14.

**Table 1: variable definitions**

variable	variable symbol	variable definition
capital investment	Inv	net cash, initial total assets paid by fixed assets, intangible assets, and long-term investment
investor sentiment	Sent	the monthly momentum index of half a year, that is, the monthly rate of stock monthly return with a cumulative period of 6 months
management overconfidence	Con	manager salary ratio + manager shareholding ratio, when it exceeds the median of industry, Con=1, otherwise Con=0
enterprise scale	Size	natural logarithm of total assets at the beginning of the period
asset liability ratio	Ratio	final total liabilities / initial total assets
free cash flow	Cash1	free cash flow per operating activity / initial total assets
cash Stock	Cash2	final cash and cash equivalents balance / final total assets
proportion of the 1 <sup>st</sup> largest shareholder	Top1	number of first largest shareholder / total share capital
time to market	Age	time from 2015, four RMS five
annual virtual variable	Year	control the impact of macro factors in different periods and set up 7 annual virtual variables

The theoretical analysis and the hypothesis shows that investor sentiment is the independent variable, and corporate investment behavior is the dependent variable, then managerial overconfidence is the mediator variable. In order to test this hypothesis, we refer to Polk & Sapienza's (2004) study model and the test method of the mediating effect put forward by Wen Zhonglin (2005). The following three corresponding models we designed.

$$\text{Inv} = \alpha_0 + \alpha_1 * \text{Sent} + \sum \text{Control} + \sum \text{Year} + \mu_1 \quad (\text{a})$$

$$\text{Con} = \alpha_0 + \alpha_1 * \text{Sent} + \sum \text{Control} + \sum \text{Year} + \mu_1 \quad (\text{b})$$

$$\text{Inv} = \alpha_0 + \alpha_1 * \text{Sent} + \alpha_2 * \text{Con} + \sum \text{Control} + \sum \text{Year} + \mu_1 \quad (\text{c})$$

Among them, the model (a) and the model (c) are linear regression equations, and the model (b) is the two element logical regression equation.  $\sum \text{Control}$  represent all control variables, and the specific meanings of other variables or symbols show in Table 1. In addition,  $\alpha_0$  is intercept, and  $\alpha_1$ 、 $\alpha_2$  are coefficients, and  $\mu_1$  is the residual difference.

Because the variables in the above three models are all explicit variables, we can return to three models in turn (Wen Zhonglin, 2005)<sup>[7]</sup>. According to the procedure to test the mediating effect, the regression analysis of the model (a) is carried out firstly, if  $\alpha_1$  is significantly, indicating that investor sentiment does affect investment behavior. Then we test model (b) and model (c). If  $\alpha_1$  and  $\alpha_2$  in the two models are both significantly, It shows that the mediator effect is significant. And investor sentiment is partly influenced the investment behavior of enterprises by managerial overconfidence. If  $\alpha_1$  in the model (c) isn't significant, it shows the mediating effect isn't significant, and investor sentiment is completely through managerial overconfidence to influence the investment behavior of enterprises. If there is at least one of  $\alpha_1$  in the model (b) and  $\alpha_2$  in the model (c) is not significant, we will need to do a Sobel test to test whether there is a significant mediating effect.

#### 4. EMPIRICAL RESULTS

The mean, standard deviation and correlation coefficient of the variables in this study are shown in Table 2. The average value of capital investment (Inv) is 0.0618, indicating that the overall investment level of nonferrous metals industry is maintained at 6.18% of investment rate. But the difference between maximum and minimum value of capital investment is significant, indicating that the differences of investment rate among nonferrous metals industry are huge. The mean value of investor sentiment (Sent) is 0.0767, and this means investors are optimistic about the non-ferrous metal industry after the financial crisis from 2008, which is also consistent with the overall Chinese stock market. 0.4506 is the standard deviation of investor sentiment, and it's 6 times the mean value. The maximum value of investor sentiment is 1.2515, and the minimum value is -0.8696. That shows the effect of investors' mispricing of the nonferrous metal industry enterprises really makes a great difference. The sample of managerial overconfidence (Con) shows that managers' overconfidence is common in the market, because the proportion of overconfidence is about 48.47%, which accounts for a relatively high proportion. The asset liability ratio (Ratio) was 53.75%, in line with the domestic enterprise's overall debt level is 40%~60%. The proportion of the first shareholder (Top1) was 36.73%, in accordance with the proportion of 30%~40% shares in the two stock markets of Shanghai and Shenzhen. This means

while the control of the stability of the company is fine at the same time, it is not easy to happen in the dominance condition.

**Table 2: descriptive statistics of the main variables**

variable	sample	mean	median	standard deviation	maximum	minimum
Inv	784	0.0618	0.0368	0.0734	0.4179	0.0005
Sent	784	0.0767	0.0633	0.4506	1.2515	-0.8696
Size	784	22.3408	22.3269	1.3649	25.8881	19.6802
Ratio	784	0.5305	0.5375	0.1990	1.0083	0.0588
Cash1	784	0.0264	0.0223	0.0702	0.2501	-0.1770
Cash2	784	0.1282	0.1019	0.0972	0.5181	0.0039
Top1	784	0.3673	0.3660	0.1255	0.6260	0.0745
Age	784	14.2500	14.2500	2.3049	18.0000	10.5000
Con	784	0.4847				
			value=1		value=0	
			frequency	percentage	frequency	percentage
			380	48.47%	404	51.53%

We progressively regress the models (a), (b) and (c), and the results of the empirical test are shown in Table 3.

**Table 3: empirical test of investor sentiment on enterprise investment behavior**

variable	model a	model b	model c
	Inv	Con	Inv
Constant	1.4668*** (-8.18)	-1.3236** (-2.45)	1.4637*** (-8.00)
Sent	0.0121** (-1.97)	0.3780*** (-12.17)	0.0126** (-2.06)
Con			0.0023* (-2.48)
Size	0.0037* -1.89	-0.1253** (-2.03)	0.002 (-1)
Ratio	0.0489*** (-3.66)	-0.4230** (-2.69)	0.0498*** (-3.75)
Cash1	0.0323 (-0.91)	-1.0824* (-1.70)	0.0272 (-0.77)
Cash2	0.0028 (-0.1)	-1.2002*** (-3.85)	0.0032 (-0.12)
Top1	0.0624*** (-3.03)	0.9675*** (-5.97)	0.0617** (-3)
Age	0.0794*** (-8.11)	0.01491 (-0.49)	0.0801*** (-8.21)
Year	control	control	control
Adj-R	0.1737		0.1728
F	12.75		11.9

Note: \*\*\*, \*\*, \* indicate them significant at levels of 1%, 5% and 10% respectively.

Table 3 shows that in model (a), investor sentiment (Sent) and the level of business investment (Inv) are positive correlation at 5% level. The coefficient is 0.0121, indicating that for every increase of investor sentiment in a unit, non-ferrous metal industry enterprises will be a corresponding increase in the investment of 1.21%, which verifies the hypothesis 1. Model (b) verifies the relationship between investor sentiment and managerial overconfidence, the results show that investor sentiment (Sent) is significantly positive, and the coefficient is 0.3780, which means investor sentiment has a significant positive impact on managerial overconfidence. When investor sentiment (Sent) changes each unit, managerial overconfidence (Con) the impact will be

an additional 37.8%, hypothesis 2 has been verified. At the same time, it also shows whether managers are rational or not, they are influenced by the investors' emotion, and then change the psychological state of them own.

Further, combined with the results in model (c), when we verify whether managerial overconfidence is an intermediary variable for investor sentiment and corporate investment behavior, we find investor sentiment (Sent) and managerial overconfidence (Con) both pass respectively through the significant tests of 5% and 10%, and their coefficients are positive. That means in the process of investor sentiment influence corporate investment behavior, partly through the mediating effect of managerial overconfidence effect. Rising investor sentiment will affect managerial overconfidence to promote enterprises to increase investment, so the 3 hypothesis has been verified.

To sum up, a series of regression results confirm the assumptions presented above. In Chinese stock market, especially in known as 'bull market herald', nonferrous metal industry, rising investor sentiment will indeed enhance managerial overconfidence and optimism. Managers will overestimate the returns and underestimate the risk of investment, and even increase the investment scale. On the other hand, low investor sentiment will make managers pessimistic. Managers will underestimate the benefits and overestimate the risk of enterprise investment projects, thereby reducing the scale of investment. So in the process of investor sentiment influence corporate investment behavior, managerial overconfidence indeed plays a partial mediating effect.

## **5. CONCLUSION**

In this paper, we choose nonferrous metals industry as an example. After review of three times of bull market of Chinese stock market from 2005, we find non-ferrous metal industry always launched firstly. The rise in the stock price of the industry is a sign of the start of bull market, so the investor sentiment is more intense, and it is very representative of the overall market. In the process of research on corporate investment behavior, investors and managers are both limited rational. After equity financing channels and rational catering channel, the third mediating effect channel is verified through the empirical data of non-ferrous metals industry. Investor sentiment can influence corporate investment behavior partly through managerial overconfidence. The concrete performance is managers are not completely rational, and they will be influenced by investors' emotions too, and then they will increase or reduce the investment of their enterprises accordingly. When investor sentiment is high, it will also induce managerial overconfidence. Managers tend to underestimate the risk and overestimate the benefits of enterprise' investment projects and finally increase enterprises' investment. As the same way, they will reduce

investment when investor sentiment is low. In order to reduce the economic fluctuation of the virtual impact on the real economy or the distortion of investment behavior, when investor sentiment is too high, government need to curb managers' excessive desire to cater to investors and blind expansion of investment. When investor sentiment is too low, government should encourage managers to boost confidence, such as issuing appropriate financial or industry policy to promote corporate investment.

In the process of research, in terms of space and author's ability, there are still many questions needed to be further discussed. And it also provides a reference for future research directions. First, investors sentiment and managerial overconfidence are both abstract psychological and behavioral performance, and the quantification of the index is always the focus and difficulty of the research. This paper makes a comprehensive reference to the methods of measurement of previous scholars. Although it is reasonable at present, the future is not determined to be equally reliable. Therefore, in the follow-up study, firstly we should continue to explore more comprehensive indicators to ensure accuracy. Secondly, when we study the relationship among investor sentiment, managerial overconfidence and corporate investment behavior, we only use mathematical statistics to prove the correlation between them, and there is no further study in the interaction mechanism. In the future, scholars can make more use of interdisciplinary, with the help of the research results of psychology.

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