INDEPENDENT JOURNAL OF MANAGEMENT & PRODUCTION (IJM&P)
http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

MANAGERS' OVERCONFIDENCE, RISK PREFERENCE, HERD BEHAVIOR AND NON-EFFICIENT INVESTMENT

Huang yi
The Business Administration At The China-ASEAN International College, Pundit University, Thailand
The College Of Economics And Management, Shandong Yingcai University, China
E-mail: hy2924669@163.com

Yang Xiugang
the business administration at the China-ASEAN International College, Dhurakij Pundit University, Thailand
E-mail: lyangxg@126.com

Submission: 23/06/2018
Revision: 28/06/2018
Accept: 04/07/2018

ABSTRACT

With the bounded rationality hypothesis, the psychological deviation of managers often leads to non-efficient investment decision-making practices. The study examines the impact of manager's overconfidence, risk-preference and herd behavior on non-efficient investment using the Chinese A-shares listed company data as the research object, and finds that: (1) managers' overconfidence and herd behavior would lead to more non-efficient investment in Chinese listed companies; and (2) managers' risk preference restrains the increase of non-efficient investment to some extent. Meanwhile, the influence of the manager's psychological deviation on the actual investment decision is a complicated process and can have a comprehensive effect resulted from the interaction of the above psychological biases, we also find that (3) managers' overconfidence is an interactive term in the effects of herd behavior and risk preference on non-efficient investment. That is, managers' overconfidence can significantly reduce the positive effect of herd behavior on non-efficient investment; and can also significantly relieve the inhibition effect of risk preference on non-efficient investment.

INDEPENDENT JOURNAL OF MANAGEMENT & PRODUCTION (IJM&P)
http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

These findings reveal that it is important to understand managers' irrational behaviors in enterprise investment decision-makings.

Keywords: non-efficient investment; irrational behaviors; overconfidence; risk-preference; herd behavior

1. INTRODUCTION

Behavioral corporate theory believes that the managers' irrational behaviors often lead to non-efficient investment, namely, managers don't choose investment projects in accordance with the goal of maximizing shareholder value, but the goal of maximizing their personal benefits. They may invest projects with a negative NPV (Net Present Value) or withdraw from projects with a positive NPV, called over-investment and under-investment respectively (JENSEN; MECKLING, 1976).

The irrational behaviors could result in low efficiency of capital allocation and large waste of social resources. With a special socio-economic environment and cultural background, managers' irrational behaviors, such as overconfidence, risk-preference and blindly herd behavior, are very common in Chinese listed companies, and have already been affecting companies' operation performance and investment efficiency (WANG, 2017; YONGZHUANG; LIJUAN, 2014).

The aim of this study is to explore the comprehensive effects of various managers' irrational behaviors on the non-efficient investment of Chinese listed companies. The results provide further understanding and empirical evidence relevant to the irrational behaviors of managers and investment efficiency. Previous studies on this topic mainly relied on the data from the US or other developed countries(KENNEDY et al., 2013; FACCIO et al., 2016; KREMER et al., 2013), and few studies reported empirical analysis with data from an emerging market. Hence, this study fills the gap in the literature by investigating the impact of managers' irrational behaviors on non-efficient investment in China, which has been regarded as the biggest developing country and the biggest emerging market in the world.

Although the influence of single irrational behavior on investment efficiency has been frequently discussed in the literature (LIN; HUANG, 2012; KANG et al., 2018; HSIEH et al., 2014), few studies focused on the effects of various irrational behaviors on non-efficient investment.

http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

However, in practice, managers may show several different irrational behaviors while decision making. For instance, we think that overconfident managers usually have a high-level risk appetite because of self-attribution, and managers who have a herd mentality are often not overconfident.

Therefore, we inspect the comprehensive impacts of manager's overconfidence, risk-preference and herd behavior on non-efficient investment, and further empirically analyze the interactive effects of managers' overconfidence on their herd behavior and risk preference to non-efficient investment. The results not only present the direction for managers' psychological quality training, but are also critical to the management of enterprise investment efficiency.

We contribute to the literature in several ways. First, we show that, when managers' multiple irrational psychology affects non-efficient investment, managers' overconfidence and herd behavior will aggravate non-efficient investment, and managers' risk preference can alleviate the non-efficient investment. Although prior analytical work suggests this possibility (e.g., MALMENDIER; TATE, 2015; HOLMES et al., 2013a; KAUFMANN et al., 2013), little empirical work exists on this topic. Second, we present evidence that managers' herding behavior is most damaging to non-efficient investment in China's listed companies.

Lastly, we empirically test the moderating role of managers' overconfidence, that is, managers' overconfidence can regulate the destructive effect of herd behavior on investment efficiency, and also can regulate the inhibition of risk preference on non-efficiency. This moderating effect has not been discussed in prior literature to our knowledge, especially in emerging countries such as China.

This paper proceeds as follows. The next section reviews prior literature and motivates our hypotheses, section three describes research design, section four presents the main results, and section five and six discuss the results and concludes this paper.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESIS

The emerging behavioral finance theory states that with the bounded rationality hypothesis, irrational mentality and behavior of managers' cognitive bias are the main factors of enterprises non-efficient investment (CALDAROLA, 2014; AHMED; DUELLMAN, 2013; RICHARDSON, 2006).

http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

2.1. Managers' Overconfidence and Non-efficient Investment

Managers' overconfidence is the psychological characteristic that managers overestimate their decision making ability and underestimate the probability of failure (GERVAIS et al., 2003).

In other words, it is a perception bias of managers that overestimates the company's future performance and underestimates future risks. Existing literature has demonstrated that managers' overconfidence will change the income and cost of enterprise cash flow, which leads to a distortion of investment behavior (HEATON, 2002; GRINBLATT; KELOHARJU, 2009). Specifically, managers often overestimate the investment profits and undervalue the risks and costs, resulting in over-investment (MALMENDIER; TATE, 2015).

Due to self-attribution cognitive bias, managers may be over-confident in their own judgment and abilities on investment. Thus, they will overvalue investment returns by setting a relatively lower discount rate and underestimating investment risks, leading to that projects with an NPV less than zero will be considered as proper target.

A more overconfident manager would be more likely to expand the investment scale. In addition, as overconfident managers tend to overestimate the likelihood of a good performance, they will overestimate company market value and believe that the external market participants would underestimate the intrinsic value of their company.

In addition, they will be reluctant to have external financing because of the higher external financing cost. Consequently, they may give up some investment projects with an NPV more than zero, resulting in under-investment.

2.2. Manager's Herd Behavior and non-efficiency Investment

Managers' herd behavior means that a manager makes his/her investment decisions based on the information of similar managers from other companies, rather than on the basis of their own information about the market in the face of uncertainty (HOLMES et al., 2013b).

It is a typical kind of blind following behavior in investment decision-makings. Due to information uncertainty, managers tend to adopt the corresponding action to

http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

other group members in order to avoid potential reputation loss caused by the failure of individual decisions and to reduce the probability of missing opportunities (QI-AN; HONGFEI, 2015).

Although herd behavior can reduce information costs and decision risks, and is beneficial to maintain a professional reputation, irrational herd behavior will lead to non-efficient investment, such as under-investment caused by conservatism or over-investment caused by blind following (DEVENOW; WELCH, 1996).

Under an uncertain environment, managers tend to imitate and pursue other managers' investment decisions, in order to maintain their reputation, salary and other personal benefits. A manager with a more intensive herd mentality would be more likely to imitate other managers in the same industry.

However, the investment direction and scale learned from other companies are not necessarily suitable for the actual situation of their own companies. Therefore, blindly following the investment decisions of other companies will usually cause a lower investment efficiency.

2.3. Managers' Risk-preference and Non-efficiency Investment

Managers' risk-preference refers to the attitude of managers toward risks in the face of many uncertain factors. Different managers often show different risk-preference modes, including risk-loving, risk-averse and risk-neutral, in investment decision-making processes. Different risk-preference modes have different effects on investment behavior, and then produce different efficiencies.

Kremer et al. (2013) and Pattillo and Söderbom (2000) both find that companies with risk-loving managers make more investments and grow faster than those with risk-averse managers. Tanaka and Sawada (2015) find that in Lao clothing industry, risk-averse managers have a tendency to invest by using their internal assets rather than borrowing from banks or informal sources. Moreover, the total investment amount of companies with risk-averse managers is often lower than that of companies with risk-tolerant managers. However, risk-averse managers have a tendency to invest more in security equipment and facilities, such as fire exits and alarms.

Bromiley et al. (2015) state that managers who have a higher risk-aversion level are usually more careful in investment and are more likely to invest low-risk and

http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

low-income projects, and when managers' risk-aversion level rises, lower risk projects are more attractive to them than those with a higher risk. Previous studies about Chinese stock market have demonstrated that risk-loving managers tend to expand investment, and are prone to excessive investment, but risk-averse managers usually have prudent and conservative investment strategies and are easy to operate as underinvestment. As a result, both risk-loving and risk-averse can lead to a lower investment efficiency (KAUFMANN et al., 2013; KONGCHEN; CHENYAN, 2016; LIQING; FEIYUAN, 2015).

In general, managers' irrational behaviors, including overconfidence, herd behavior and deviant risk preference, are positively correlated with the enterprise's non-efficient investment. These psychological deviations of managers will lead to excessive or inadequate investment in enterprises.

The psychological process of human beings is complex and changeable, and the cognitive deviation is varied. When facing uncertainty in investment decision-making process, managers will be affected by a variety of psychological biases simultaneously. Thus, impacts of managers' irrational behaviors on enterprise's non-efficient investment cannot be generally concluded, but should be analyzed with specific conditions.

Because over-confidence is regarded as a common psychological phenomenon in investment decision-making processes, this study emphasizes the importance of the interaction of managers' overconfidence with the other two kinds of psychological biases (herd behavior and deviant risk preference) on non-efficient investment.

Overconfidence has a negative impact on managers' investment efficiency because they may overvalue their true abilities and take over complex and difficult projects. Overconfident managers want to prove their excellence by success, and are more likely to invest in high-risk projects, leading to an increasing risk level of the whole enterprise and causing some projects with a negative NPV can also be implemented.

Luckily, if the investment gets a high return, overconfident managers will further confirm that their abilities are the key factor in the success, and increase their confidence and risk appetite in follow-up decisions. Therefore, managers'

http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

overconfidence and risk preference often interact with each other and finally influence the enterprise investment efficiency.

However, managers with a herd mentality will imitate other managers' investment behaviors. The causes of this are also various, including the lack of confidence, the underestimating of the success likelihood of investment projects, and the fear of failure or loss of reputation or pay.

If managers with a herd mentality can be more confident about their abilities, make investment decisions independently, revalue the influence of a successful project on their own reputation and pay growth, and correctly and objectively estimate costs and risks of investment projects, some over-investment caused by blindly following, and some under-investment caused by conservative strategies would be avoided (PIKULINA et al., 2017). In other words, managers' overconfidence can also play a positive role and can reduce non-efficient investment caused by managers' herd behavior.

To sum up, we aim to test the effects of different irrational behaviors of managers on investment efficiency. Following assumptions are proposed:

- Hypothesis 1: Managers' overconfidence, risk-preference and herd behavior are positively correlated with non-efficient investment of enterprises.
- Hypothesis 2: Managers' overconfidence negatively moderates the relationship between herd behavior and non-efficient investment.
- Hypothesis 3: Managers' overconfidence positively moderates the relationship between risk preference and non-efficient investment.

According to the hypothesis, we construct the following econometric models:

$$ABSNE_{i,t} = \beta + \beta_1 MOC_{i,t} + \beta_n Controls_{i,t} + \sum Year + \varepsilon_{i,t} \quad (1)$$

$$ABSNE_{i,t} = \beta + \beta_1 MH_{i,t} + \beta_n Controls_{i,t} + \sum Year + \varepsilon_{i,t} \quad (2)$$

$$ABSNE_{i,t} = \beta + \beta_1 MRP_{i,t} + \beta_n Controls_{i,t} + \sum Year + \varepsilon_{i,t} \quad (3)$$

$$ABSNE_{i,t} = \beta + \beta_1 MOC_{i,t} + \beta_2 MRP_{i,t} + \beta_3 MH_{i,t} + \beta_n Controls_{i,t} + \sum Year + \varepsilon_{i,t} \quad (4)$$

INDEPENDENT JOURNAL OF MANAGEMENT & PRODUCTION (IJM&P)
http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

$$ABSNE_{i,t} = \beta + \beta_1 MOC_{i,t} + \beta_2 MRP_{i,t} + \beta_3 MH_{i,t} + \beta_4 MH_{i,t} \times MOC_{i,t} + \beta_5 MRP_{i,t} \times MOC_{i,t} + \beta_n Controls_{i,t} + \sum Year + \varepsilon_{i,t} \quad (5)$$

Where ABSNE is enterprise non-efficient investment, MOC is managers' overconfidence, MRP is managers' risk preference, MH*MOC is the interaction between MH and MOC, MRO*MOC is the interaction between MRP and MOC, Controls are the control variables that affect the enterprise's non-efficient investment, and $\sum Year$ is the annual dummy variable.

3. RESEARCH DESIGN

3.1. Data Sources and Sample Selection

This study used the data of China's A-shares listed companies in Shanghai and Shenzhen Stock Exchanges as the research sample. The data were collected from Wind Database. The time frame is from 2009 to 2015. This time frame was selected, because until 2008, when the "split share" regulation released, the liquidity and fluidity of the Chinese stock market became normalized.

In addition, as the VAT (value added tax) reform of the tax system was fully implemented in 2016, data after 2016 are no longer comparable to the previous. Thus, the period from 2009 to 2015 is a proper choice. To ensure the representativeness of the research sample, we excluded financial companies because their investment behaviors are differ from those of non-financial companies, and ignored firm-year observations with incomplete data, all samples of ST (Special Treatment), PT (Particular Transfer) and the samples with negative net assets and performance deterioration, and the samples that had been on the market for less than eight years (SCHMELING, 2012), Finally, we got a sample of 8809 observations across 1363 individual companies.

3.2. Variable Measurements

3.2.1. Non-efficient Investment

Consistent with prior research of Richardson (2006), we measured non-efficient investment as deviations from expected investment using a model that predicts investment as a function of growth opportunities, leverage, the level of cash, firm age, firm size, return on assets and prior firm investment level (JUNG et al., 2014).

INDEPENDENT JOURNAL OF MANAGEMENT & PRODUCTION (IJM&P)
http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

$$I_{new,t} = \alpha + \beta_1 Growth_{t-1} + \beta_2 Lev_{t-1} + \beta_3 Cash_{t-1} + \beta_4 Age_{t-1} + \beta_5 Size_{t-1} + \beta_6 Stock\ \mathrm{Re}turn_{t-1} + \beta_7 I_{new,t-1} + \sum Year + \sum Industry + \varepsilon$$

Where $I_{new,t}$ is company's new investment expenditure; α is the constant; β is the regression coefficient for each variable; ε is the residual; *i* is the company index; *t* is the time index; $Growth_{t-1}$ is the growth of investment opportunities measured by the main business income growth rate at year *t-1*; Lev_{t-1} is the asset liability rate; $Cash_{t-1}$ is monetary capital stock; Age_{t-1} is years from listed; $Size_{t-1}$ is natural log of total assets; $Stock\ \mathrm{Re}turn_{t-1}$ is stock returns; and $I_{new,t-1}$ is new investment at year *t-1*. Year and industry are represented by dummy variables.

Following Richardson (2006), we employed the fixed effects regression models to estimate the above models. The residuals from the regression model are the deviations from the expected investment level, and can be used as the proxy variables of non-efficient investment. Positive residuals measure over-investment and negative residuals measure under-investment. Our proxy variables for non-efficient investment are the absolute value of residuals(*ABSNE*), and higher value means a higher degree of non-efficient investment.

Based on the data above, the distribution features of over-investment and under-investment are illustrated in the Table 1. It can be seen that both over-investment and under-investment existed among Chinese listed companies. Specifically, 3075 of the 8809 samples are over-investment, whereas 5733 are under-investment. Compared with the results of Gongfu (2009) and Huangyi (2016) that used similar data from 2001 to 2008 and 2010 to 2014, respectively, the ratio of underinvestment is increasing, showing that non-efficient investment of Chinese-listed companies has not been improved since 2001.

Table 1: Degree of Non-efficient Investment

Index	Sample	Max	Min	Mean	Std Dev	Rate(%)
Over-investment	3431	12.7511	0.0000	.5395	1.0646	38.95%
Under-investment	5378	0.0000	-16.4657	-.3999	1.1402	61.05%
Total	8809	-	-	-	-	-

3.2.2. Managers' Overconfidence

In this study, we employed the financial earnings forecast (FERRIS et al., 2013) to measure *MOC*. This method is currently widely used in financial studies. Overconfidence occurs when the forecast net profit growth rate is greater than the actual growth rate. In contrast, under-confidence occurs when the forecast net profit

http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

growth rate is lower than the actual growth rate.

3.2.3. Managers' Herd Behavior

Following Bo et al. (2016), we employed the deviation of the firm investment level from the industry average investment level to measure managers' herd behavior. If the deviation is higher, the difference between firm's investment level and the industry average investment level is greater and the herd investment behavior of managers is less. The *MH* is computed as follows:

$$MH_{i,t} = \frac{\left| I_{i,t} - \hat{I}_{i,t} \right|}{Ass_{i,t}}$$

Where $MH_{i,t}$ is the managers' herd behavior; *i* is firm index; *t* is the time index; $I_{i,t}$ is the new investment amount in firm's fixed assets, construction projects and intangible assets; $\hat{I}_{i,t}$ is the average value of new investment in the industry including the firm; and $Ass_{i,t}$ is the value of total assets of the enterprise. Because this index is a reverse index, in order to make the research results easier to understand, this study used the reciprocal of this index.

3.2.4. Managers' Risk Preference

We employed the most commonly used index, namely, "the proportion of risk assets to total assets" to measure managers' risk preference (CHEN et al., 2011). The principle of the index is that risk preference is linked to the composition of personal income. The income includes salary which is relatively safe and the contingent reward which is relatively risky (i.e. the company stock price volatility returns). When the proportion of contingent reward in total income is higher, managers prefer to accept more risk. The *MRP* is therefore computed as follows:

$$MRP_{i,t} = \frac{(Vp_{i,t} - Vp_{i,t-1})}{(Vp_{i,t} - Vp_{i,t-1}) + S_{i,t}}$$

Where $MRP_{i,t}$ is the risk assets ratio; *i* is the firm index; *t* is the time index; $(Vp_{i,t} - Vp_{i,t-1})$ is the contingent reward; $Vp_{i,t}$ is the firm's shares value held by managers in year *t*, $Vp_{i,t-1}$ is the firm's shares value held by managers in year *t-1*; and $S_{i,t}$ is the salary income in year *t*. When the index rises, the degree of managers' risk preference increases, and vice versa.

3.2.5. Control Variables

INDEPENDENT JOURNAL OF MANAGEMENT & PRODUCTION (IJM&P)
http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

Because the enterprise investment behavior, enterprise future profitability, performance level, enterprise risk and financially troubled possibility will be affected by other factors, according to related theories and literature (Liuyan, 2016), we set up some control variables including: company size (*Size*), financial leverage (*Lev*), growth opportunity *(Growth)*, free cash flow (*Cf*), total assets profit rate (*Roa*), Tobin Q value (*Q*), and industry category. The specific measurement method of control variables is shown in Table 2.

Table 2: the Control Variables Definition

Variable symbol	Variable name	Variable definitions
Size	Enterprise size	Log (the final total assets)
Lev	ratio of liabilities to assets	Liability/asset
Growth	Increase rate of main business revenue	(Current turnover-previous turnover)/turnover *100%
Cf	free cash flow	Net cash flow in operating activities /final total assets
Roa	returns on total assets	Net income/ final average total assets
Q	Tobin Q	(year-end liabilities + Circulating stock market value + non-tradable Stock quantity * Net assets per share) / (initial total assets + total assets) ÷2.

4. RESULTS

4.1. Descriptive Statistics

From the descriptive statistic results (Table 3), the maximum of *ABSNE* is 10.3987, and the minimum is -2.7791, showing that over-investment in Chinese listed companies is far more common than underinvestment. The average absolute value of *ABSNE* is 0.1533. Combined with the data in Table 1, it can be seen that although there are more samples of under-investment, the degree is not very large.

Table 3: Descriptive Statistics of Major Variables

Variable	Mean	Std Dev	Min	Max
NE	6.58e-11	0.4131	-2.7791	10.3987
ABSNE	0.1533	0.3836	0.0000	10.3987
MOC	70.5014	2770.41	0.0001	101375.7
MH	-0.3666	3.3012	-162.7235	0.7160
MRP	0.3039	2.0575	-19.7865	102.9913
Size	22.1086	1.3873	14.9416	28.5087
Lev	50.7675	20.2512	0.7080	99.8124
Cf	0.0451	0.0947	-1.0324	0.9319
Growth	16.8097	113.2210	-100.00	5835.6730
Roa	3.6376	6.5799	-99.8602	92.8513
Q	2.5842	6.8708	0.3374	495.7741

The average MOC is 70.5014, indicating that managers' profit forecast growth rate exceeds the company's real profit growth rate of 70.5%. In general, Chinese

http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

listed company managers tend to be overconfident. The absolute values of both maximum and minimum are relatively large, showing that the characteristics of overconfidence and under-confidence are obvious.

The average of MH is -0.3666, indicating that the average deviation of listed companies' investment from their industry average is small and the herd behavior is serious. The absolute value of the minimum is much higher than that of the maximum, indicating that the investment scales of listed companies are generally lower than that of the same industry.

The average of MRP is 0.3039, indicating that the average ratio of contingent income of Chinese listed company managers is 30.39%, and the degree of their risk preference is not high.

The average value of the natural logarithm of the total assets (Size) is 22.1086, the difference between the size of the company is hard to see from the natural logarithm, but because the original value is based on the index of e, so the scale difference between companies is quite large.

The average of leverage (Lev) maintains at 50.7675% level which is a high ratio. From a higher leverage ratio, it can be seen that most of enterprises are confident about their future development. On the other hand, companies should also be careful about financial troubles.

The net cash flow (Cf) from operating activities is accounts for 4.51% of the total assets, despite the fact that the value is small, but it reflects the net cash flow generated by the company's operating activities. However, the mean of the net cash flow is positive, indicating that the inflow company's business activities are greater than outflow. The cash situation of China's listed companies in general is relatively stable, and has the "self-hematopoiesis" function, which is the investment capital to expand the invest scale.

The overall average of the main business growth rate (Growth, the company growth Opportunity) is 16.81%, indicating that most of the company's products are in the growth period, will continue to maintain a good growth momentum, the growth of enterprises more opportunities. However, because of its high standard deviation, it shows high volatility.

The mean value of the Tobin Q value is 2.5842, indicating that the market

INDEPENDENT JOURNAL OF MANAGEMENT & PRODUCTION (IJM&P)
http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

price of the company is more than twice times its basic book value of the company. At the same time, the Q-value gap between enterprises is also very large, the smallest only 0.3374, and the maximum value of 495.7741.

In addition, to avoid the influence of outliers, we standardized each continuous variable.

4.2. Model Regression Results

Before regression modeling, we made a multicollinearity diagnosis for each variable, and the results show that all the variance inflation factors (vif) are less than 2. Thus, there is no collinearity between the variables. Then, we conducted the Hausman test, and the results demonstrated that the panel data should be analyzed with fixed effect models.

Table 4: the Results of Fix Effect Regression

models	(1)	(2)	(3)	(4)	(5)
variables	*ABSNE*	*ABSNE*	*ABSNE*	*ABSNE*	*ABSNE*
MOC	0.0586***			0.0623***	0.0429*
	(0.0204)			(0.0202)	(0.0249)
MH		0.8240***		0.8265***	0.8771***
		(0.0712)		(0.0712)	(0.0738)
MRP			-0.0086*	-0.0083*	-0.0122***
			(0.0044)	(0.0044)	(0.0047)
*MH*MOC*					-0.5540**
					(0.2378)
*MRP*MOC*					0.0475**
					(0.0224)
Size	0.0529***	0.1057***	0.0568***	0.1068***	0.1066***
	(0.0081)	(0.0092)	(0.0082)	(0.0093)	(0.0093)
Lev	-0.0557***	-0.0551***	-0.0555***	-0.0563***	-0.0560***
	(0.0045)	(0.0044)	(0.0045)	(0.0044)	(0.0044)
Growth	0.0156*	0.0139	0.0167*	0.0141	0.0147
	(0.0091)	(0.0091)	(0.0091)	(0.0091)	(0.0091)
Cf	-0.0145***	-0.0133***	-0.0139***	-0.0137***	-0.0136***
	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0030)
Roa	0.0028	0.0033	0.0028	0.0040	0.0038
	(0.0043)	(0.0042)	(0.0043)	(0.0042)	(0.0042)
Q	0.0990***	0.0676***	0.1018***	0.0708***	0.0701***
	(0.0193)	(0.0193)	(0.0194)	(0.0194)	(0.0194)
Year(*dummy*)	included	included	included	included	included
Constant	0.2764***	0.3273***	0.2582***	0.3016***	0.3045***
	(0.0052)	(0.0064)	(0.0051)	(0.0066)	(0.0067)
Observations	8,809	8,809	8,809	8,809	8,809
Number of zqdm	1,363	1,363	1,363	1,363	1,363
Adj R-squ	0.3935	0.4036	0.3932	0.4045	0.4052

Note：Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The results of Table 4 show that the adjustment R-square of each model is about 40%, showing that these models fit the data well. All the control variables have

ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

similar effects as reported in the literature except that the *Roa* is not significant. *MOC* and *MH* are positively correlated with *ABSNE* in Model 1 and Model 2, both statistically significant. The coefficient of *MH* is 0.8240.

Although the value is not very high, considering that the mean of *ABSNE* is 0.1533, the coefficient of *MH* indicates that one unit increase of *MH* leads to an average increase of about 5.38 times of *ABSNE* (0.8240 ÷ 0.1533 ≈ 5.38). In Model 3, the *MRP* is negatively correlated with the *ABSNE* and is statistically significant, which is opposite to the hypothesis.

The reason for this result may be that the risk preference level of Chinese managers is not high during the sample period. This shows that appropriate risk preference can release enterprise's non-efficient investment to a certain extent. However, from the result of Model 3, the degree of this relief is not high. One unit increase of *MRP* will only reduce 5.61% of the *ABSNE* (0.0086÷0.1533≈5.61%).

Model 4 integrates the effects of the three kinds of irrational behaviors on *ABSNE*. All the explanatory variables in Model 4 are statistically significant (P<0.05) and the directions are also consistent with the previous three models. This result shows that in China's capital market, *MOC*, *MH* and *MRP* can simultaneously influence *ABSNE*.

Model 5 verifies the interactive effects of the three irrational behaviors on *ABSNE*. The interaction coefficient of *MH***MOC* is -0.5540 and statistically significant at 5% level, indicating that *MOC* can negatively moderate the effect of *MH* on *ABSNE*. The result validates our hypothesis 2 that *MOC* is a significant negative moderating term between *MH* and *ABSNE*.

The result of Model 5 also shows that the interaction coefficient of *MRP***MOC* is 0.0475 and statistically significant at 5% level, indicating that *MOC* can positively moderate the effect of MRP on ABSNE. The result also validates our hypothesis 3 that *MOC* is a significant positive moderating term between *MRP* and *ABSNE*.

5. DISCUSSION

A large and growing body of evidence suggests that a substantial share of managers exhibit symptoms of overconfidence in their decisions (ANTONIOU et al., 2013, DUELLMAN et al., 2015). In this study, the main measure of managers' overconfidence is whether the forecast net profit growth rate is greater than the

http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

actual growth rate (FERRIS et al., 2013), the risk preference of managers is measured by the proportion of risky assets to total assets (BO et al., 2016), and the managers' herd behavior is measured by the deviation of the level of investment and the average investment level of the industry (CHEN et al., 2011).

This study has examined whether managers' overconfidence, risk preference and herd behavior have positive effects on enterprise's non-efficient investment, and results have shown that managers' overconfidence and herd behavior have positive effect on non-efficient investment.

This is consistent with the study of Malmendier and Tate (2015). Managers' overconfidence and herd behavior can lead them to make some irrational decisions of over-investment or under-investment, especially the managers' herd mentality has the greatest loss to enterprise investment efficiency.

However, the results have also shown that the relationship between managers' risk preference and non-efficient investment is just the opposite to previous views, which indicate that risk-loving managers are more inclined to increase over-investment, while risk-averse managers take more prudent and conservative investment strategies and are prone to under-investment (KREMER et al., 2013).

However, the results of this study have shown that risk preference and non-efficient investment are negatively correlated. That is, manager's risk preference can reduce the non-efficient investment to some extent, because managers who are risk-loving or risk-averse will reduce under-investment or over-investment. This finding adds to the generalisability of previous research on the relationship between managerial herd behaviors and non-efficient investment.

In investment decision-making processes, various irrational mentalities will interact with and influence each other. Rational use of these irrational mentalities can also effectively inhibit and mitigate the enterprise's non-efficient investment. And managers' overconfidence phenomenon is universal.

Therefore, this study have set managers' overconfidence as the moderator variable, to examine whether managers' overconfidence has a moderating effect on the influences of managers' risk preference and herd behavior on non-efficient investment, which has not been investigated in previous literature. The results have

http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

shown that managers' overconfidence negatively moderates the positive correlation between herd behavior and non-efficient investment, and positively moderates the negative correlation between risk preference and non-efficient investment.

That is to say, managers' overconfidence can reduce the deterioration of manager's herd behavior on non-efficient investment, and also promote the negative effect of risk preference on non-efficient investment. As a result, managers' overconfidence as a single irrational behavior will deteriorate the efficiency of enterprise investment, but it can play a positive role in alleviating non-efficient investment when it is combined with the herd mentality.

Therefore, we believe that, the managers with a herd mentality, should properly cultivate their self-confidence. They should believe that their independent investment could be more profitable than imitation of other people's investment, which could help to filter out those projects which do not fit the enterprise's strategy and to improve the efficiency of investment.

In addition, the managers with a higher risk preference level, must control their overconfidence, correctly assess their abilities, reasonably estimate the risks and costs of the project, control their over-investment desires and impulses, and finally make right investment decisions to reduce potential over-investment. Meanwhile, the managers with a higher risk aversion level, should appropriately cultivate their confidence in their abilities to avoid underinvestment.

In summary, to improve the investment efficiency, Chinese listed companies must provide necessary psychological training to their managers. Training managers learn to analyze specific issues, to take responsibility bravely, to avoid "follow suit" and "imitation" behavior, and to prevent herd behavior regardless of the target and the "doing nothing" mentality of going back and forth. Managers should adapt to the "new normal" based on the actual situation of their own enterprises, and innovate and invest scientifically and rationally to reduce the loss of investment efficiency and to maximize the value of enterprises.

6. CONCLUSIONS

On the basis of verifying the influence of managers' overconfidence, risk preference and herd behavior on the enterprise's non-efficient investment, this study has analyzed the moderating effect of managers' overconfidence between risk

http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

preference, herd behavior and non-efficient investment.

The results have shown that managers' overconfidence and herd behavior are positively correlated with non-efficient investment, and risk preference is negatively correlated with non-efficient investment, while overconfidence can negatively moderates the positive correlation between herd behavior and non-efficient investment, and can positively moderates the negative correlation between risk preference and non-efficient investment.

This study also has some limitations. There are many kinds of irrational psychological manifestations of managers, such as managers' excessive optimism certain errors, control illusion, representative, easy to take, anchor qualitative, affective, and so on, which are not mentioned in this study.

According to Tombaugh (2005), 'Optimistic leaders are more likely to see problems as challenges, exert greater effort for longer periods to reach their goals, and seek out and appreciate the positive aspects of difficult situations.' Managers' overoptimism and overconfidence are similar, but they are different from overconfidence (MOORE; HEALY, 2008).

Hilary et al. (2016) empirically examine a setting in which over-optimism is a relevant but different bias from overconfidence, emerges dynamically in a rational economic framework, and generates higher managerial effort. In addition to overconfidence and over optimism, these other psychological investment behaviors are few and immature in the current literature.

In addition, there are many measures for managers' irrational psychological indicators, but none of them can accurately quantify the "fitness" and "extreme" of these psychological characteristics.

Although this study has researched the interaction of managers of irrational psychology on the efficiency of investment, but not thoroughly analyzed the impact of these irrational psychological factors. Therefore, future studies should expand the scope to investigate the influence of more comprehensive irrational psychological factors, and the interactions of these irrational factors, to explore the most fundamental and direct source of the impact of an enterprise's non-efficient investment.

http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

REFERENCE

AHMED, A. S.; DUELLMAN, S. (2013) Managerial overconfidence and accounting conservatism. **Journal of Accounting Research***,* v. 51, p. 1-30.

ANTONIOU, C.; DOUKAS, J. A.; SUBRAHMANYAM, A. (2013) Cognitive dissonance, sentiment, and momentum. **Journal of Financial and Quantitative Analysis***,* v. 48, p. 245-275.

BO, H.; LI, T.; SUN, Y. (2016) Board attributes and herding in corporate investment: evidence from Chinese-listed firms. **European Journal of Finance***,* v. 22, p. 432-462.

BROMILEY, P.; MCSHANE, M.; NAIR, A.; RUSTAMBEKOV, E. (2015) Enterprise risk management: Review, critique, and research directions. **Long range planning***,* v. 48, p. 265-276.

CALDAROLA, R. A. L. (2014) The intersection of emotional intelligence and corporate financial decision making. **The Journal of Corporate Accounting & Finance***,* v. 25, n. 2, p. 67-72.

CHEN, S.; SUN, Z.; TANG, S.; WU, D. (2011) Government intervention and investment efficiency: Evidence from China. **Journal of Corporate Finance***,* v. 17, p. 259-271.

DEVENOW, A.; WELCH, I. (1996) Rational herding in financial economics. **European Economic Review***,* v. 40, p. 603-615.

DUELLMAN, S.; HURWITZ, H.; SUN, Y. (2015) Managerial overconfidence and audit fees. **Journal of Contemporary Accounting & Economics***,* v. 11, p. 148-165.

FACCIO, M.; MARCHICA, M.-T.; MURA, R. (2016) CEO gender, corporate risk-taking, and the efficiency of capital allocation. **Journal of Corporate Finance***,* v. 39, p. 193-209.

FERRIS, S. P.; JAYARAMAN, N.; SABHERWAL, S. (2013) CEO overconfidence and international merger and acquisition activity. **Journal of Financial and Quantitative Analysis***,* v. 48, p. 137-164.

GERVAIS, S.; HEATON, J.; ODEAN, T. (2002) Overconfidence, investment policy, and executive stock options. **The Wall Street Journal,** v. 4, p. 1-52.

GONGFU, Z. (2009) Excessive or insufficient investment of Listed Companies in China -- Based on empirical measurement of inefficient investment in Shanghai and Shenzhen Industrial Listed Companies. **Accounting Research***,* v. 5, p. 69-77+97 (in Chinese).

GRINBLATT, M.; KELOHARJU, M. (2009) Sensation seeking, overconfidence, and trading activity. **Journal of Finance***,* v. 64, p. 549-578.

HEATON (2002) Managerial Optimism and Corporate Finance[J]. **Journal of Financial Management***,* v. 31, n. 6, p. 33-45.

HILARY, G.; HSU, C.; SEGAL, B.; WANG, R. (2016) The bright side of managerial over-optimism. **Journal of Accounting and Economics***,* v. 62, p. 46-64.

HOLMES, P.; KALLINTERAKIS, V.; FERREIRA, M. (2013a) Herding in a concentrated market: a question of intent. **European Financial Management***,* v. 19, p. 497-520.

http://www.ijmp.jor.br v. 10, n. 1, January - February 2019
ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

HOLMES, P.; KALLINTERAKIS, V.; FERREIRA, M. P. L. (2013b) Herding in a concentrated market: A question of intent. **European Financial Management,** v. 19, n. 3, p. 497-520.

HSIEH, T. S.; BEDARD, J. C.; JOHNSTONE, K. M. (2014) CEO overconfidence and earnings management during shifting regulatory regimes. **Journal of Business Finance & Accounting***,* v. 41, p. 1243-1268.

HUANGYI; YUMINH, ZH. (2016). Research on investment efficiency from three angles of input, output and input output -- a case study of Listed Companies in Shandong Province. **Finance and Accounting Monthly***,* v. 15, p. 79-84 (in Chinese).

JENSEN, M. C.; MECKLING, W. H. (1976) Theory of the firm: Managerial behavior, agency costs and ownership structure. **Journal of Financial Economics***,* v. 3, p. 305-360.

JUNG, B.; LEE, W. J.; WEBER, D. P. (2014) Financial reporting quality and labor investment efficiency. **Contemporary Accounting Research***,* v. 31, p. 1047-1076.

KANG, J.; KANG, J.-K.; KANG, M. (2018) Curbing Managerial Myopia: The Role of Managerial Overconfidence in Owner-Managed Firms and Professionally Managed Firms. **Managed Firms and Professionally Managed Firms**, v.19, p. 1-61.

KAUFMANN, C.; WEBER, M.; HAISLEY, E. (2013) The role of experience sampling and graphical displays on one's investment risk appetite. **Management Science***,* v. 59, p. 323-340.

KENNEDY, J. A.; ANDERSON, C.; MOORE, D. A. (2013) When overconfidence is revealed to others: Testing the status-enhancement theory of overconfidence. **Organizational Behavior and Human Decision Processes***,* v. 122, p. 266-279.

KONGCHEN; CHENYAN (2016) The Empirical Study on the Overconfidence, Risk Appetite and Tendency for Fraud of Management of State-owned Enterprises. **Journal of Shanxi Finance and Economics University***,* v. 38, p. 77-87 (in Chinese).

KREMER, M.; LEE, J.; ROBINSON, J.; ROSTAPSHOVA, O. (2013) Behavioral biases and firm behavior: Evidence from Kenyan retail shops. **The American Economic Review***,* v. 103, p. 362-368.

LIN, S.-W.; HUANG, S.-W. (2012) Effects of overconfidence and dependence on aggregated probability judgments. **Journal of Modelling in Management***,* v. 7, p. 6-22.

LIQING, Q.; FEIYUAN, L. (2015) An Analysis of the Influence of Manager 's Background Characteristics on Investment Efficiency. **Modern commerce industry***,* v. 10, p. 94-95 (in Chinese).

LIUYAN (2016) Effect of Equity Incentive on Inefficient Investment in Chinese State-owned Enterprises. **International Journal of Economics and Finance***,* v. 8, n. 8, p. 222-228.

MALMENDIER; TATE, G. (2015) Behavioral CEOs: The role of managerial overconfidence. **The Journal of Economic Perspectives***,* v. 29, n. 4, p. 37-60.

MOORE, D. A.; HEALY, P. J. (2008) The trouble with overconfidence. **Psychological review***,* v. 115, n. 2, p. 502.

ISSN: 2236-269X
DOI: 10.14807/ijmp.v10i1.845

PATTILLO, C.; SöDERBOM, M. (2000) Managerial risk attitudes and firm performance in Ghanaian manufacturing: An empirical analysis based on experimental data. **University of Oxford,** Institute of Economics and Statistics, Centre for the Study of African Economies.

PIKULINA, E.; RENNEBOOG, L.; TOBLER, P. N. (2017) Overconfidence and investment: An experimental approach. **Journal of Corporate Finance***,* v. 18, p. 1-33.

QI-AN, L.; HONGFEI, Y. (2015) Corporate Governance, Institutional Environment, Behavioral Corporate Finance and Inefficient Investment. **Journal of Service Science and Management***,* v. 08, p. 452-459.

RICHARDSON, S. (2006) Over-investment of free cash flow. **Review of accounting studies***,* v. 11, p. 159-189.

SCHMELING, M. (2012) Investor sentiment and stock returns: Some international evidence. **Journal of empirical finance***,* v. 16, p. 394-408.

TANAKA, M.; SAWADA, Y. (2015) Risk preference of managers and firm investments in Lao PDR. In: SAWADA, Y.; S. OUM (eds.), **Disaster Risks, Social Preferences, and Policy Effects: Field Experiments in Selected ASEAN and East Asian Countries**, ERIA Research Project Report, Jakarta: ERIA, p. 265-283.

TOMBAUGH, J. R. (2005) Positive leadership yields performance and profitability: Effective organizations develop their strengths. **Development and Learning in Organizations: An International Journal***,* v. 19, p. 15-17.

WANG, Y.; ZHOU, Y. 2017. The role of managers' overconfidence on the irrational investment. In: SERVICE SYSTEMS AND SERVICE MANAGEMENT*, 7,* Dalian, China, **International Conference on Service Systems and Service Management,** Dalian, IEEE*,* 2017.

YONGZHUANG, L.; LIJUAN, L. Top managers' confidence, ultimate controller and firm value: An empirical study based on panel data of a shares on Shanghai stock exchange. 11, Beijing, China, **International Conference on Service Systems and Service Management**, Beijing, IEEE, 2014.

APPENDIX

Table 5: Variable abbreviation table

Variable symbol	Variable name
NE	Non-efficient investment
ABSNE	The abslout of non-efficient investment
MOC	The managers' overconfidence
MH	The managers' herd behavior
*MH*MOC*	The interact tem of managers' herd behavior and managers' overconfidence
*MRP*MOC*	The interact tem of managers' risk preference and managers' overconfidence
MRP	The managers' risk preference
Size	company size: Log (the final total assets)
Lev	financial leverage: ratio of liabilities to assets
Cf	The free cash flow
Growth	growth opportunity :Increase rate of main business revenue
Roa	returns on total assets: Main business growth rate
Q	Tobin Q