

The Influence of Equity Incentive on Overinvestment in enterprises: The moderating effect based on the heterogeneity of executive team

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Abstract: This paper empirically examines the moderating effect of executive team heterogeneity on the influence of equity incentive on overinvestment behavior by using the data of Chinese A-share listed companies in Shanghai and Shenzhen from 2014 to 2018. The results show that equity incentive can restrain the overinvestment behavior of enterprises; The greater the age heterogeneity of the senior management team, the weaker the influence of equity incentive on overinvestment will be; The greater the gender heterogeneity of the senior management team, the greater the influence of equity incentive on the overinvestment of enterprises will be. The heterogeneity of executive team education and tenure has no effect on the relationship between equity incentive and overinvestment. The conclusion of this study has some enlightenment on how to construct and optimize the senior management team of listed companies, so that the senior management team can play its role fully and make reasonable and effective investment decisions.

1 Introduction

How to restrain overinvestment effectively is the core problem of modern enterprise management. According to principal-agent theory, as a kind of long-term incentive equity incentive system, and makes the management goal is consistent with the interests of the shareholders, many scholars think that the senior management team to implement equity incentive can effectively reduce the agency costs associated with investment, curb excessive investment, encourage executives to choose reasonable investment path, thus reducing the efficiency of investment (Belghitar & Clark, 2015). According to the existing research literature, most of them regard the characteristics of senior management team as homogeneous based on the neoclassical economic theory, focusing on the impact of independent explanatory variables of equity incentive on corporate overinvestment. However, in reality, the characteristics of executive teams are heterogeneous (Liu Yawei, 2015). According to the high-level echelon theory, differences in demographic background characteristics such as gender, age, education, educational background, tenure and work experience will lead to different cognitive biases and behavioral choices in senior management teams, and cognitive biases caused by the characteristics of senior management teams may have an impact on the investment decision-making

process and results. Therefore, this article try to TMT heterogeneity into the same model, from the perspective of TMT heterogeneity, study the effect of equity incentive excessive investment behavior of the enterprise, not only helps to enrich related research theory of equity incentive system, and excessive investment behavior of the enterprise reality and persuasive explanation, according to senior management team to implement equity incentive features for the enterprise provides the basis for policy to curb excessive investment behavior.

2 Theoretical analysis and hypothesis Proposal

2.1 The influence of equity incentive on overinvestment

In market economy developed countries most of the enterprises have to establish a relatively perfect the equity incentive system, thought of equity incentive as the company's important governance mechanism and the long-term incentive mechanism, can make the executive compensation and corporate performance, the objective function makes the interests of managers and shareholders consistency, thus effectively restrain excessive investment behavior, so the equity incentive is business visual metaphor as "golden handcuffs". Compared with before and after the share reform, the

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implementation of equity incentive can better stimulate the enthusiasm of the senior management team, make investment decisions that are beneficial to the enterprise, and pay more attention to the future investment interests of the enterprise. Equity incentive can effectively reduce the inconsistencies between executives and shareholders and help to maintain long-term convergence of interests between executives and shareholders, thus alleviating principal-agent conflicts between executives and shareholders (Sheikh S, 2012). Song Yuchen et al. (2017) examined the impact of equity incentive plans on investment efficiency of listed companies and found that equity incentive plans on the whole improved investment efficiency of listed companies and could restrain excessive investment behavior of enterprises. Wang Luping et al. (2018) found that the implementation of equity incentive can reduce the overinvestment behavior caused by principal-agent and information asymmetry. Moreover, the greater the equity incentive intensity is, the lower the absolute level of overinvestment in family enterprises will be. Although equity incentive can help enterprises improve the incentive mechanism and mobilize the enthusiasm and creativity of all aspects, it is not effective for any object at all times and is not universally applicable for any enterprise. Wang Zeyuan and Cao Yang (2020) found that equity incentive has a significant inducing effect on overinvestment. Based on this, this paper proposes the following hypothesis:

Hypothesis1: For market-oriented listed companies, reasonable equity incentive can restrain the excessive investment behavior of senior executives.

2.2 The moderating effect of heterogeneity of senior management team on the influence of equity incentive on overinvestment

The influence of gender heterogeneity of senior management team on the relationship between equity incentive and overinvestment. Equity incentive is the reallocation of rights, responsibilities, risks and benefits. The incentive target is mainly driven by human behavior, so the incentive effect is affected by gender characteristics. In the face of equity incentive, female executives tend to be cautious and conservative in making investment decisions due to their delicacy, prudence and sensitivity in dealing with things. However, male executives tend to proceed from the overall situation when facing the equity incentive, and are more adventurous than female executives, and even show overconfidence. It means that the greater the gender heterogeneity of the senior management team, the more dissonance the senior management team may have on investment decisions. Overconfident managers are more likely to increase the over-investment behavior of enterprises (Sun Yemeng and Zhang Guitong, 2020). Yang Kun et al. (2019) examined the influence of heterogeneity of executive team on corporate overinvestment behavior and found that different cognitive patterns between the sexes would bring different knowledge and experience, which would lead to

communication conflicts between male and female executives and aggravate corporate overinvestment behavior. Therefore, the difference in gender characteristics between female and male executives will lead to different investment decisions when faced with equity incentive. Based on this, this paper proposes the following hypothesis:

Hypothesis2: The greater the gender heterogeneity of the senior management team, the weaker the influence of equity incentive on corporate overinvestment.

The influence of age heterogeneity of senior management teams on the relationship between equity incentive and overinvestment. The greater the age difference among senior executives, the more likely they are to have conflicts of cognitive concepts and values. According to the theory of social identity, senior executives with a younger average age have a strong ability to learn and accept emerging things. In the face of equity incentive, they prefer to take risks and are willing to take risks. They are more inclined to obtain risks and returns, which will lead to overinvestment. Comparatively speaking, senior executives with average age pay more attention to their economic interests and career stability, are more willing to consider risk aversion when faced with equity incentives, and tend to make conservative investment decisions and invest in projects with less risk. Some scholars found that age heterogeneity of senior management team is conducive to improving the investment efficiency of enterprises and restraining the excessive investment behavior of enterprises. Age difference of senior management team members will promote enterprises to make strategic positioning that is conducive to enterprise performance (Yang and Wang, 2014). Li Duansheng and Wang Xiaoyan (2019) believe that the older the age heterogeneity of the executive team, the higher the proportion of young members will be, which is conducive to playing complementary functions and promoting enterprises' innovation and investment behaviors. Therefore, age heterogeneity of senior management team may play a moderating role in the relationship between equity incentive and overinvestment. Accordingly, the following hypotheses are proposed:

Hypothesis3: The greater the age heterogeneity of the senior management team, the greater the influence of equity incentive on corporate overinvestment will be.

Influence of educational heterogeneity of senior management team on the relationship between equity incentive and overinvestment. Grasping and decision-making is correct depends on investment opportunities in the senior executives to early to market information processing, opportunity identification and cognitive ability, and executive education background to a certain extent, reflect their cognitive ability and information processing ability, the higher the degree of managers, you can have a keen insight and enough understanding to find and solve the problems existing in the investment, develop the strategy to solve the problem, thus effectively cope with the complex investment decision-making environment; Less educated managers tend to have limited skills. The higher the level of education, the higher the ability of the senior

management team to process market information and identify opportunities. The greater the cultural differences in the senior management team, the greater the differences in investment decisions. Individuals with the same educational background are more likely to reach consensus and conduct good cooperation (Lin Chaonan and Lin Yi, 2014). Gao Changyuan and Wu Min (2019) believe that executives with higher education pay more attention to details when making decisions, and too much detailed analysis may lead to missing the best opportunity, thus affecting the decision-making efficiency of enterprises. The greater the educational heterogeneity of an executive team, the less smooth the channels of effective communication and communication among team members will be, thus increasing the possibility of friction among team members, easily causing conflicts among team members, and affecting the decision-making efficiency of the executive team. Based on this, this paper proposes the following hypothesis:

Hypothesis4: The greater the educational heterogeneity of the senior management team, the weaker the influence of equity incentive on the overinvestment of enterprises.

Influence of executive team tenure heterogeneity on the relationship between equity incentive and overinvestment. According to the theory of social identity, the difference in tenure of senior management team members in the company will lead to different decision-making behaviors. Driven by the desire for self-expression, the members of the executive team with short tenure tend to ignore the investment risks of the enterprise and make adverse investment decisions when facing the equity incentive, thus leading to excessive investment. However, the long-serving executive team members have a full understanding of the corporate culture and philosophy, can rationally weigh the advantages and disadvantages in the face of equity incentive, and make reasonable decisions between risks and investment returns, so as to curb the excessive investment behavior of enterprises (Zhang Zhaoguo et al., 2013). Therefore, an executive team composed of members with different terms can complement each other in terms of social experience and practical ability through mutual communication and learning (Bai Jingkun et al., 2017). Under the equity incentive system, it may help to

make rational decisions and thus reduce the excessive investment behavior of enterprises. Gao Changyuan and Wu Min (2019) believe that the longer a senior executive's tenure, the more skilled he or she is in the skills required for the position and the stronger his or her ability to analyze and solve problems. The heterogeneity of tenure of senior executives can inhibit enterprise risk behaviors and promote the healthy development of enterprises. Li Duansheng and Wang Xiaoyan (2019) believe that with the extension of the tenure of senior executives, the more familiar they are with the enterprise, and the greater the heterogeneity of tenure, the innovation investment activities of enterprises can be promoted to a certain extent. Based on this, this paper puts forward the following hypothesis

Hypothesis5: The greater the heterogeneity of the tenure of senior management teams, the greater the influence of equity incentive on the overinvestment of enterprises will be.

3 Empirical design and model construction

3.1 Sample selection and data sources

In this paper, data of Shanghai and Shenzhen A-share listed companies from 2014 to 2018 are selected as samples, and ST and *ST companies as well as companies with serious index missing or abnormal data in the total sample are excluded, and A total of 2993 observed values are finally obtained in 5 years. The sample data is mainly from THE CSMAR database. The statistical software for data processing and analysis in this paper is STATA 14.

3.2 Variable design

For the explained variable overinvestment, Richardson's (2006) model and method are mainly used in this paper. For the regression results of the model, the sign of the residual term is positive, that is, overinvestment. The explanatory variable, namely the measure index of equity incentive, is the management shareholding ratio (MR).

$$Inv_{i,t} = \alpha_0 + \alpha_1 Growth_{i,t-1} + \alpha_2 Lev_{i,t-1} + \alpha_3 Cash_{i,t-1} + \alpha_4 Age_{i,t-1} + \alpha_5 Size_{i,t-1} + \alpha_6 Ret_{i,t-1} + \alpha_7 Inv_{i,t-1} + \sum Year + \sum Industry + \varepsilon \quad (1)$$

Then, this paper selected four heterogeneity of senior executives' gender, age, education background and tenure to investigate their moderating effect on equity incentive and investment efficiency, and studied and designed relevant variables of heterogeneity of senior executives'

teams. In addition, this paper selects board structure, revenue growth rate, asset-liability ratio, cash flow level, listing years, enterprise asset scale, stock return rate, industry and year as control variables, and the specific variables are defined in Table 1.

Table 1 Variable definitions

variable	symbol	Variable definitions
Excessive investment	OI	Calculated according to model (1)
Equity incentive	MR	Total number of managerial holdings/total equity of the company

Gender heterogeneity	Hgen	Herfindahl index is used for calculation
Age heterogeneity	Hage	The standard deviation of the age of the executive team/the mean of the age of the executive team
Educational heterogeneity	Hedu	Herfindahl index is used for calculation
Term heterogeneity	Htime	Standard deviation of executive team tenure/mean of executive team tenure
Board structure	Dsize	The proportion of independent directors on the board of directors
Revenue growth rate	Growth	The ratio of the increase in operating income of this year to the total operating income of the previous year
Asset-liability ratio	Lev	Total liabilities/initial total assets
Cash flow level	Cash	Ending monetary capital/total assets
Fixed number of year of the listed	Age	The length of time a company has been listed
Total assets of the enterprise	Size	The natural log of the total assets, Ln(Size)
Stock return	Ret	The annual return on the company's stock
Industry dummy variable	\sum Industry	Dummy variable
Annual dummy variable	\sum Year	Dummy variable

3.3 Model construction

According to the research hypothesis of this paper, the following regression models (2) and (3) are constructed. Model (2) is used to study the influence of equity

incentive on inefficient investment. Model (3) studies the influence of equity incentive on inefficient investment with the heterogeneity of senior management team as the regulating variable.

$$OI_{i,t} = \alpha + \beta_1 MR_{i,t} + \beta_2 Lev_{i,t-1} + \beta_3 Ret_{i,t-1} + \beta_4 Growth_{i,t-1} + \beta_5 Cash_{i,t-1} + \beta_6 Dsize_{i,t-1} + \beta_7 Size_{i,t-1} + \beta_8 Age_{t-1} + \sum Industry + \sum Year + \varepsilon \quad (2)$$

$$OI_{i,t} = \alpha + \beta_1 MR_{i,t} + \beta_2 Hgen_{i,t} + \beta_3 Hage_{i,t} + \beta_4 Hedu_{i,t} + \beta_5 Htime_{i,t} + \beta_6 Hgen_{i,t} \times MR_{i,t} + \beta_7 Hage_{i,t} \times MR_{i,t} + \beta_8 Hedu_{i,t} \times MR_{i,t} + \beta_9 Htime_{i,t} \times MR_{i,t} + \beta_{10} Lev_{i,t-1} + \beta_{11} Ret_{i,t-1} + \beta_{12} Growth_{i,t-1} + \beta_{13} Cash_{i,t-1} + \beta_{14} Dsize_{i,t-1} + \beta_{15} Size_{i,t-1} + \beta_{16} Age_{t-1} + \sum Industry + \sum Year + \varepsilon \quad (3)$$

4 Empirical test and result analysis

4.1 Descriptive statistics

Table 2 Descriptive statistics

variable	Sample size	The average	The standard deviation	The minimum value	The maximum
OI	2993	0.0425	0.0462	0.000015	0.289
MR	2993	0.130	0.182	0	0.663
Hgen	2993	0.260	0.169	0	0.750
Hage	2993	0.146	0.0527	0	0.323
Hedu	2993	0.592	0.181	0	0.889
Htime	2993	0.674	0.279	0	1.637

According to Table 2, the maximum value of overinvestment is 0.289, and the minimum value is 0.000015. There is a big difference in overinvestment among different enterprises. By comparing the heterogeneity in the senior management team, it is found that the gender heterogeneity in the senior management

team is large, indicating that the ratio of male to female in the senior management team is not coordinated, and the proportion of male executives may be higher. The age heterogeneity among senior executives was the lowest, indicating that the age distribution of senior executives in the sample was relatively concentrated. The average

value was 0.592. Most of the degrees were bachelor's degree. However, there was a big difference between the maximum value and the minimum value, indicating the diversity of executive education. Tenure heterogeneity is the largest among senior management teams, with the maximum value reaching 1.637 and the minimum value only being 0, indicating that the company is constantly introducing new senior management members. Based on the above situation, we can draw the conclusion that the heterogeneity of the senior management team of listed companies in China is quite different.

4.2 Regression analysis

4.2.1 The regression result of equity incentive to inefficient investment

Table 3 Analysis of regression results of equity incentive on inefficient investment

variable	OI
MR	-0.0239** (0.00518)
Growth	0.00145 (0.00105)
Size	-0.0189** (0.00327)
Lev	-0.0184* (0.00749)

Cash	0.120*** (0.0101)
Age	-0.0664 (0.0525)
Ret	0.00582** (0.00141)
Dsize	0.0210** (0.00447)
Constant	1.043* (0.443)
Industry	Control
Year	Control
N	2,993

Table 3 shows the regression results of equity incentive and overinvestment, from which it can be seen that equity incentive and overinvestment are significantly negatively correlated, indicating that the greater the intensity of equity incentive, the more significant the inhibition effect of equity incentive on overinvestment behavior of senior executives is. Equity incentive can make the personal interests of managers and enterprise development objectives consistent, improve the efficiency of investment. It verifies that hypothesis 1 equity incentive can restrain the excessive investment behavior of senior executives.

4.2.2 Heterogeneity of executive team and regression results of equity incentive and inefficient investment

Table 4 Regression analysis of heterogeneity of senior management team, equity incentive and overinvestment

variable	OI	OI	OI	OI
MR	-0.038** (-5.57)	0.029 (1.66)	0.025 (0.61)	-0.039** (-3.49)
Hgen	-0.005 (-0.68)			
Hgen×MR	0.046* (2.43)			
Hage		-0.009 (-0.57)		
Hage×MR		-0.299* (-3.13)		
Hedu			0.007 (1.25)	
Hedu×MR			-0.073 (-1.24)	
Htime				-0.010*** (-9.74)
Htime×MR				0.024 (1.78)
Growth	0.001 (1.32)	0.001 (1.40)	0.001 (1.38)	0.002 (1.46)
Size	-0.019*** (-5.85)	-0.019** (-5.70)	-0.019** (-5.75)	-0.019** (-5.76)
Lev	-0.018* (-2.44)	-0.019* (-2.47)	-0.019* (-2.49)	-0.018* (-2.48)
Cash	0.119*** (11.28)	0.119*** (11.81)	0.119*** (12.45)	0.119*** (11.50)
Age	-0.070	-0.066	-0.063	-0.057

	(-1.21)	(-1.32)	(-1.23)	(-1.07)
Ret	0.006** (4.21)	0.006** (3.99)	0.006** (4.29)	0.006** (4.20)
Dsize	0.022** (4.72)	0.026** (4.49)	0.022** (4.60)	0.023** (5.66)
Constant	1.080 (2.19)	1.037* (2.47)	1.006* (2.39)	0.973 (2.18)
Year	Control	Control	Control	Control
Industry	Control	Control	Control	Control
N	2,993	2,993	2,993	2,993

Table 4 shows the regression results of the influence of equity incentive on overinvestment under the regulation of heterogeneity of senior management teams. The following results can be obtained from Table 4:

TMT heterogeneity of gender and equity incentive pay by a significant positive correlation with excessive investment, shows that executive team gender heterogeneity of equity incentive and overinvestment negative correlation between the positive regulatory role, namely executive gender heterogeneity, the greater the can enhance the effect of equity incentive to excessive investment, contrary to hypothesis 2. The reason may be that executives of different genders have different styles of doing things. They learn from each other and learn from each other, which strengthens the role of equity incentive on excessive investment.

Age heterogeneity of senior management teams and the cross-multiplier of equity incentive are significantly negatively correlated with overinvestment, indicating that the effect of equity incentive on overinvestment is influenced by age heterogeneity of senior management teams, and age heterogeneity of senior management teams will weaken the influence of equity incentive on overinvestment, which is contrary to hypothesis 3. The reason may be that senior executives with high age heterogeneity are prone to conflict in decision-making due to large differences in experience and knowledge, which weakens the inhibitory effect of equity incentive on overinvestment.

There was no significant regression result between the educational heterogeneity of executive team and the cross-product of equity incentive and overinvestment, indicating that there was no significant correlation between the inhibitory effect of equity incentive on overinvestment and the educational heterogeneity of executive team, which was inconsistent with hypothesis 4.

The heterogeneity of tenure in senior management teams and the cross-product term of equity incentive and the regression results of overinvestment were not significant, indicating that the inhibition effect of equity incentive on overinvestment was not significantly correlated with the heterogeneity of educational background of senior management teams, which was inconsistent with hypothesis 5.

5 Research conclusions and countermeasures

The results show that :(1) equity incentive can restrain

the excessive investment behavior of senior executives.(2) The greater the age heterogeneity of the senior management team is, the impact of equity incentive on overinvestment will be weakened.(3) The greater the gender heterogeneity of the senior management team, the greater the influence of equity incentive on overinvestment.(4) The heterogeneity of education and tenure in senior management teams did not affect the relationship between equity incentive and overinvestment. Accordingly, this paper proposes the following suggestions:

Improve the gender diversity of the company's executive team members. When selecting members of the senior management team, both male and female executives should be employed. Gender should not be too single, so that senior management team members can learn different working styles from each other, learn from each other's strengths and make joint decisions conducive to the long-term development of the company and improve the company's efficiency.

Build a senior executive team with a reasonable age. Senior executives of different ages have different understandings of the enterprise. New and old senior managers working together tend to have conflicts in thinking mode and values, which is not conducive to the internal unity of the senior management team. For the long-term and stable development of the company, senior executives of similar age can work together as much as possible, which is conducive to narrowing the thinking gap, improving the efficiency of communication, and making decisions more rational and effective, so as to better restrain the occurrence of excessive investment and improve the investment efficiency of the company.

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