Incentives and Investment Efficiency: The Evidence from Listed Family Firms

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ABSTRACT
In the process of the economy in China, listed family firms have a large proportion of all the listed companies, which plays an important role in China. By selecting the statistics in the recent five years from CSMR and Wind, OLS model is used to investigate the efficiency investment. After distincting the groups of overinvestment and underinvestment, we present the figures for stock and payment incentive and exam regression with residuals respectively, as well as exploring the relationship between incentive and efficient investment. The results indicate that the level of payment and stock incentive has a negative impact on the inefficiency investment. Therefore, if family firms carry out the incentive, it could be helpful to alleviate the inefficiency, grasp a good chance, relieve information asymmetry and reduce the agency issues. The results recommend that listed family firms could implement stock and payment incentive plans, like other listed companies to motivate the managers.
Keywords: listed family firm; stock incentives; payment incentives; investment of efficiency

1. INTRODUCTION

The investment activities of listed firms influence significantely on the overall macro and micro economic environment. For companies in micro economic environment, investment activities can bring profits and cash flow in addition to production and operation, and promote the development of companies. Since the reform and opening market, the rapid development of China's market economy cannot be separated from the important role of investment activities. In Modigliani & Miller theory [1], the only factor that drives firms to make investment decisions is the profitability of investment opportunities, that is, senior executives will invest in projects with NPV greater than zero. However, in reality, due to the imperfect capital market and the existence of information asymmetry, it is easy for senior executives to make inefficient investment by incorrectly using corporate cash flow for their own interests. At this point, the interests of executives and shareholders are contrary to each other, and the agency problem also arises. The investment inefficiency carried out by senior executives is not conducive to the long-term development of firms and the increasing of firm value. Therefore, reducing investment inefficiency becomes more important for companies to improve their corporate value.
Various domestic scholars have conducted a large number of studies on reducing investment efficiency, part of which is to reduce investment inefficiency through incentive mechanism. Jensen & Meckling [2] pointed out that one of the important methods to alleviate principal-agent problem is incentive. In this paper, we specify the ways of incentive, which is splitting into monetary compensation and equity incentive. To be more specific, short-term way is monetary compensation incentive, and long-term way is equity incentive. Through the implementation of incentive mechanism, it can be bound to the interests between the shareholders and management to improve the investment efficiency.

Listed family companies are the research object in this article. We exam the relevant OLS regression residuals to distinguish over-investment and under-investment groups, and then respectively into two independent variables quadratic regression to test the significance. In addition, we test whether the implementation of incentive plans influence the investment efficiency and the robustness of the present study. The results of this paper provide a theoretical and practical reference for further improving the incentive system for senior executives of listed companies in China, as well as alleviate agency problems, strengthen the constraints on senior executives, improve corporate governance and increase the vitality of China's national economy.

The rest of the paper is as follows: Section 2 illustrates the literature review and research hypothesis. Data and methodology are listed in Section 3, and results and discussion are in Section 4.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Monetary compensation incentive and investment efficiency

According to the research on monetary compensation incentive and investment efficiency, Zhang, Wang, and Miu [3] found that the stimulation of over-investment was salary incentive, and the study was more significant in the business of state-owned companies since the business class state-owned companies by the government to monitor and control compared to the service class was smaller. Lv [4] compared the state-owned to non-state-owned companies to develop in the state-owned companies and found that executives monetary compensation for over-investment had a "U" shaped relationship and excess compensation had no inhibition to the over-investment, but executives used power for short-term interests. This point was the same as the research of Zhang et al. [3]. Wang and Peng [5] made over-investment as an independent variable and the future of the executives' monetary compensation as the dependent variable. The study concluded that over-investment was positively associated with the future monetary compensation of management, namely when managers thought that the level of incentives was low, they would choose to expand the scale of the company and increase investment to improve their future monetary compensation.

Above on the related study of executives monetary compensation incentive and investment efficiency, many of them argued that monetary compensation to a certain extent has promoted impacts on the investment efficiency. However, as a result of related literature, the selection of samples of listed companies, state-owned enterprises and private enterprises is not down to the listed family businesses. Therefore, this paper takes listed family firms as the research object to study the influence of monetary compensation incentive on investment efficiency of senior executives, and holds that the implementation of monetary compensation incentive on senior executives has the effect of restraining over-investment and alleviating under-investment.

If the managers are given a certain amount as reward when they come true to the goal of shareholders, they would consider their own interests relate to the wealth of companies since they want to obtain higher income. As a result, the higher values of the firms, the more money the manager can obtain. Managers agree to combine monetary compensation and performance since they would like to get more money and help the firm to increase the value and obtain recognition from society. When this plan is effective, it can stimulate the managers invest projects more cautiously, which can increase the firm values and their remuneration. Moreover, the rewards from cautious investment are commonly higher than the investment inefficiency. So, if companies carry out monetary compensation incentive plan, it can help to improve investment efficiency, restrain over-investment and relief under-investment. Based on the above analysis, we illustrate the hypothesis are as follows:

H1a: In listed family firms, implement payment incentives can reduce over-investment;

H1b: In listed family firms, implement payment incentives can relieve under-investment.

2.2. Equity incentive and investment efficiency

Research on equity incentive and investment efficiency is subdivided into listed family firms. Wang, Bai, and Wang [6] believes that the implementation of equity incentive in this type of firm is positively enabling some senior executives to grasp investment opportunities and improve the investment efficiency of the enterprise. Wang, Lu and Zhu [7] concluded through two-stage regression that the probability of over-investment was greater for the manufacturing companies listed on the small and medium-sized board, and the proportion of over-investment was positively correlated with the proportion of free cash flow. Tang, Zhou, Yang, and Yang [8] concluded through OLS regression that equity incentive can alleviate the under-investment behavior of senior executives, but the over-investment behavior was more serious, and senior executives will invest more. Peng and Liao [9] introduced the overconfidence of executives as an intermediary variable to the study on equity incentive plan and investment efficiency, which confirmed that this psychological phenomenon would weaken the action of equity incentive to restrain over-investment. Many foreign scholars have also done a lot of research on it. Griner & Gordon [10] concluded in his study of internal cash flow and insider shareholding that shareholders did not need to give up their ownership to senior executives when they are making investment decisions. Hadlock [11] considered the sensitivity of free cash flow and believed that executive equity incentive would lead to over-investment.

It can be concluded that most of the relationships between equity incentive and investment efficiency were a positive correlation, negative correlation and U-shaped. Scholars at home and abroad have made some achievements in the research on equity incentive and investment efficiency. However, few types of research were focusing on the types of firms. At present, the research on the incentive of family enterprises does not focus on investment efficiency, and investment efficiency articles rarely combine incentive with family firms. Through the data of listed family firms, this paper proves the influence of two incentive methods on investment efficiency.

Jensen and Meckling [2] believe that based on the stock level now, if the firms carry out equity stock incentives and manager come true the goal, shareholder can consider to increase the stock level. If the level was increased, to some extent, it can decrease the cost of adverse selection and moral hazards and relief agency conflict. At this time, it is highly possible for them to invest in some lower return rate projects because of selfishness. If companies carry out

effective equity incentives, it can come true interest convergence between family member and minority shareholder so that improve investment efficiency. Thus, hypothesis is:

H2a: In listed family firms, implement equity incentives can reduce over-investment;

H2b: In listed family firms, implement equity incentives can relieve under-investment.

3. DATA AND METHODOLOGY

3.1. Data and Variables

The sample data in this paper are from the CSMR database and Wind database. All companies that are cross-listed on multiple exchanges; In order to avoid the influence of outlines on the results, Winsorize tail reduction was carried out on the quantiles below 1% and above 99% of the continuous variables. Taking the listed family companies of China A-share from 2013 to 2018 as the research object, 9,836 samples were finally obtained.

The dependent variable is investment inefficiency, which is caused by the fact that the senior management of a company invests money in projects that cannot improve the firm value. The independent variable is monetary compensation incentives. In this paper, the average of the top three executives' compensation is adopted, and the variable of equity incentive is used by Wang [10], that is, the proportion of the number of senior executives' shareholding in the total number of shares. In the previous studies on equity incentive, most researchers used dummy variables, but the results obtained by selecting continuous variables are more intuitive than those obtained by dummy variables in general. Meanwhile, according to Zuo [11], the dominant executive compensation is mainly studied. Other controlling variables are shown in Table 1:

Table 1. Definition of variables

Variable name	Definition of variables
Investment expenditure	(cash paid for the purchase and construction of fixed assets, projects under construction, engineering materials and intangible assets + cash paid for investment)/total assets
Over-investment	The residual is greater than 0
Under-investment	If the residual is less than 0, take the absolute value
Monetary compensation incentive	The average of the top three executives' compensation
Equity incentive	The proportion of total shares held by senior executives
Company growth	Revenue growth rate
Company size	The log of the average value of a company's total assets
Debt ratio	The ratio of a company's total liabilities to its total assets
Cash ratio	Balance of cash and its equivalents/total assets in the previous statement of flows
Listed age	Take the natural log
Return rate	Return on equity
Investment expenditure	Investment expenditure of the previous year
industry	Control industry
year	Control year
dual	Dummy variable, yes =1, no =0
inddir	The proportion of the total number of independent directors on the board of directors

3.2. Equations

For the convenience of understanding, referring to the practice of Song [12], the variable that measures over-investment is the data that the residual is positive, and the variable that measures under-investment is the absolute value of the residual is negative.

$$overinv_{i,t}|underinv_{i,t}$$
$$= \beta_0 + \beta_1 Intop3_{i,t} + \beta_2 growth_{i,t-1} +$$
$$\beta_3 Insize_{i,t-1} + \beta_4 lev_{i,t-1} + \beta_5 liq_{i,t-1} + \beta_6 age_{i,t-1}$$
$$+ \beta_7 ret_{i,t-1} + \beta_8 invest_{i,t-1} + \beta_9 dual_{i,t} +$$
$$\beta_{10} inddir_{i,t} + \sum year + \sum ind + \varepsilon_{it}$$

(1)

$$overinv_{i,t}|underinv_{i,t}$$
$$= \beta_0 + \beta_1 mhold_{i,t} + \beta_2 growth_{i,t-1} +$$
$$\beta_3 Insize_{i,t-1} + \beta_4 lev_{i,t-1} + \beta_5 liq_{i,t-1} +$$
$$\beta_6 age_{i,t-1} + \beta_7 ret_{i,t-1} + \beta_8 invest_{i,t-1} +$$
$$\beta_9 dual_{i,t} + \beta_{10} inddir_{i,t} + \sum year + \sum ind + \varepsilon_{it}$$

(2)

4. RESULTS AND DISCUSSION

4.1. Correlation analysis

Before the regression analysis, all variables should satisfy the basic assumption of regression analysis, that is, there is no serious collinearity between variables, and the addition of these variables will not cause errors in the regression results. In order to avoid these problems, this paper carries out correlation analysis on the selected variables. Due to the limitation of space, this paper only focuses on the correlation analysis of independent variables and dependent variables.

In listed family companies, over-investment is negatively correlated with the compensation of the top three executives, with a correlation coefficient of 0.098 at 1%. It shows that monetary compensation incentives can restrain the over-investment of listed family firms. However, over-investment was positively correlated with the shareholding ratio of senior executives, with a correlation coefficient of 0.011 but not significant. The correlation coefficient between the under-investment and the compensation of the top three executives was 0.139, which showed an inverse correlation and was significant at 1%. In direct proportion to the shareholding ratio of senior executives, the correlation coefficient is 0.065 but not significant.

From the correlation analysis of over-investment and under-investment, it can be seen that there is no multi-collinearity problem, so regression result analysis and robustness analysis are meaningful.

Table 2. Correlation analysis of over-investment

	Overinvest	Intop3	Mhold
Overinvest	1.000		
Intop3	-0.098***	1.000	
Mhold	0.011	-0.115***	1.000

t statistics in parentheses $^{*}p<0.1$, $^{**}p<0.05$, $^{***}p<0.01$

Table 3. Correlation analysis of under-investment

Underinvest	Intop3	Mhold
1.000		
-0.139***	1.000	
0.065***	-0.115***	1.000

t statistics in parentheses $^{*}p<0.1$, $^{**}p<0.05$, $^{***}p<0.01$

4.2. Regression results

Regression was performed on models (1) and (2), and the results were shown in Table 4. For monetary compensation incentive, when the dependent variable is over-investment (Overinvest), the regression coefficient of monetary compensation incentive for senior executives is 0.0041, which is significant at 5% level and negatively correlated, indicating that monetary compensation incentive for senior

executives can significantly restrain over-investment and improve investment efficiency. This result verifies hypothesis 1a. When the dependent variable is under-investment (underinv), the regression coefficient of executives monetary compensation incentives is 0.0019 at the 1% level significantly negatively correlated, indicating that monetary compensation for executives can also ease investment opportunities, improve efficiency of investment. it is advantageous for executives to find some good investment opportunities and increas the enterprise value, so the regression results to verify the hypothesis 1b. As can be seen from the regression results of control variables, the higher the debt ratio, cash flow ratio and return of enterprises are, the over-investment will be aggravated, because it provides more opportunities for senior executives to be selfish. However, the faster the growth rate of an enterprise, the higher the proportion of independent directors in the board of directors, and the dual roles of corporate executives, the worse the under-investment will be. This may be because, for reasons of caution, executives of family firms avoid a decline in the value of the business and take a negative attitude towards some good investment opportunities.

For equity incentive, when the dependent variable is over-investment (Overinvest), the regression coefficient of the shareholding ratio of senior executives is 0.0158, which is significant above 1% and negatively correlated, indicating that the implementation of equity incentive for senior executives can significantly inhibit over-investment and alleviate inefficient investment. This regression result verifies hypothesis 2a. When the dependent variable is under-investment, the regression coefficient of the shareholding ratio of senior executives is 0.0029, which is significant and inversely proportional to 10%, indicating that the implementation of equity incentive plan for senior executives can alleviate under-investment to some extent. This result also proves hypothesis 2b.

Through the above regression analysis, it can be concluded that monetary compensation incentive and equity incentive can improve the investment efficiency of listed family firms. This paper provides reference for the development of family firms and fills the gap in the implementation of incentive mechanism. As most of the incentive mechanism in China is only monetary compensation and the situation is single, so through this paper, shareholders in family firms can consider combining monetary compensation incentive with equity incentive, combine short-term incentive with long-term incentive to restrict executive behavior and increase enterprise value.

Table 4. Regression analysis of monetary compensation and equity incentive

	Model(1)	Model(1)	Model(2)	Model(2)
	Overinvest	Underinvest	Overinvest	Underinvest
lntop3	-0.0041**	-0.0019***		
	(-2.3052)	(-5.4009)		
Mhold			-0.0158***	-0.0029*
			(-3.2265)	(-1.8934)
size	-0.0069***	-0.0011***	-0.0087***	-0.0017***
	(-4.5259)	(-2.9357)	(-6.4656)	(-4.9413)
growth	0.0040	0.0041***	0.0044	0.0040***
	(1.1891)	(5.1485)	(1.2975)	(5.1146)
lev	0.0530***	-0.0009	0.0534***	-0.0007
	(7.1219)	(-0.4880)	(7.1637)	(-0.3811)
age	-0.0004*	-0.0005***	-0.0006***	-0.0006***
	(-1.9345)	(-9.4976)	(-2.9116)	(-9.5355)
cash	0.0441***	-0.0040**	0.0435***	-0.0047***
	(5.3887)	(-2.2834)	(5.2928)	(-2.6450)
ret	0.0088***	-0.0029***	0.0085***	-0.0030***
	(3.2300)	(-4.2981)	(3.1237)	(-4.5753)
dual	0.0030	0.0010*	0.0028	0.0010
	(1.4350)	(1.7296)	(1.3609)	(1.5802)
inddir	0.0277	0.0056	0.0308*	0.0057
	(1.6142)	(1.0906)	(1.7948)	(1.1124)
_cons	0.2414***	0.0977***	0.2318***	0.0888***
	(7.7451)	(11.9366)	(7.6425)	(11.1064)
time	Yes	Yes	Yes	Yes
industry	Yes	Yes	Yes	Yes
N	3602	6234	3602	6234
F	9.7185	27.4163	9.9387	25.7344
R^2	0.0858	0.1132	0.0868	0.1104

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

The robustness test in this paper refers to the practice of Wang (2019). The measurement of growth in the control variable is replaced by TobinQ value, and the dependent variable is divided into over-investment and under-investment for regression. The regression results are basically consistent with the above. Therefore, we believe the research results of this paper are robust.

5. CONCLUSION

In this paper, the listed family companies of China's A-shares from 2013 to 2018 are selected and the residuals of OLS regression are used to calculate the investment efficiency. Through regression, it can be concluded that monetary compensation incentives for senior executives can effectively reduce investment inefficiency and alleviate over-investment and under-investment. Similarly, the implementation of an equity incentive plan for senior executives can also improve the investment efficiency of listed family firms to restrain over-investment and alleviate under-investment, as well as increasing enterprise value and restraining self-serving behaviors of senior executives.

This study can be extended from the following aspects: In future studies, sample data of listed family firms in recent 10 years can be selected to enhance the reliability of research results; In the regression analysis, we can consider the impact of the interaction terms of monetary compensation incentive and equity incentive on investment efficiency. Therefore, for future studies, it may consider further examining the impact of the combination of short-term and long-term incentives on investment efficiency.

ACKNOWLEDGMENT

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