

# Effect of Equity Incentive on Inefficient Investment in Chinese State-owned Enterprises

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Received: April 28, 2016

Accepted: May 24, 2016

Online Published: July 25, 2016

doi:10.5539/ijef.v8n8p222

URL: <http://dx.doi.org/10.5539/ijef.v8n8p222>

## Abstract

This study examines the impact of equity incentive on inefficient investment based on the sample of Chinese listed companies of Shanghai stock market. I show that: both of over-investment and under-investment are existed among state-owned enterprises, the level of under-investment is worse than the level of over-investment, equity incentive is not that popular among state-owned enterprises; equity incentive can limit over-investment as well as under-investment significantly, so universality of equity incentive among state-owned enterprises needs to be improved.

**Keywords:** under-investment, over-investment, equity incentive, state-owned enterprises

## 1. Introduction

Investment is an essential step for creating value for every company and it is also an intermediate variable for corporate performance. However, a higher investment rate in China comes with a lower investment efficiency rate. With regards to data of National Bureau of Statistics (NBS) of China, investment in fixed assets grows dramatically between year 2005 and 2015. As a result, over three fourths of GDP are invested by fixed assets. By contrast, only 2% of GDP are invested into high-tech industry (NBS 2015). It can be seen that investment performance is unbalanced and a large amount of investment is inefficiency in China.

Agency problem results from modern enterprise management system which is separation of ownership and management. The owner of the company delegates management power to chief executive manager. However, the interests of owner conflicts with the interests of CEO so that CEO may exercise power only for them instead of exercising power for owner. On the other hand, one of results of agency problem is inefficient investment. Manager may select the investment opportunity which is benefit for them instead of the owner. Stock-based incentive compensation is an effective solution to agency problem. This compensation gives manager another identity as a shareholder in daily operation. Therefore, manager can take the interests of shareholder into consideration.

## 2. Theoretical Analysis

### 2.1 Current Situation of Inefficient Investment in Chinese State-Owned Enterprises

In China, state-owned enterprises account for a large amount proportion with a fast growth rate in terms of fixed asset investment. It is reported that the proportion of state-owned enterprises investment in fixed asset investment is 50.1%, 47.3%, 43.4%, 39%, 35.5%, 45.1% and 41.1% in year 2009-2014 respectively. It can be seen that state-owned enterprises investment occupy a large share every year so that state-owned enterprises investment leads investments in fixed asset field.

Although state-owned enterprises investment is large, its investment efficiency is questioned. After expansionary monetary and fiscal policy has published, the amount of investment grows remarkably. However, a large amount investment is accompanied with low investment efficiency. 30% of state-owned capital occupies 70% of national credit during the past ten years. It is reported that, capital input in state-owned industrial enterprises is 22346.4 billion yuan between 2000 and 2014. However, the net asset of state-owned industrial enterprises is only 3574.12 billion yuan in the same period. Investing in state-owned enterprises even generate a lower profit than investing in the bank. What's worse, most profit of state-owned enterprises generated from monopolized industry. It can be concluded that state-owned enterprises with low investment efficiency wastes a large amount of social resources.

There are three major reasons that can explain inefficient investment of state-owned enterprises. Firstly, state-owned enterprises have wrong and unstable investment goals and it does not have a strict supervision system for investment process. It is common sense that the final goal of company is to maximize the wealth of shareholder. However, because of influenced by various elements, the goal of state-owned enterprises is diversity and unstable. In addition, no strict supervision system can lead to three phenomena. First is large scale of investment results from grand financial plan. Second is a rigid structure. Most of investment deal with long-run partners and even not change for several tens of years. Finally, most of investors in government are eager for quick success and instant benefits. Therefore, they prefer to pursue short-run benefit at cost of long-run benefit.

Secondly, abnormality ownership structure in which state-owned shares are in dominated proportion leads to over-investment. State-owned controls a big proportion of shares with no other shareholders counterbalance results in inefficient investment. Moreover, the agents for state-owned enterprises are treasuries and all districts and departments. They are not encouraged for efficient investment because they only have right to control decision-making but not rights to share retained earnings from a better decision. In addition, state-owned enterprises are living in a comfort environment. They are not threatened by breaking up and they are backed up with state funding so that they are not encouraged for a more efficient investment.

Thirdly, creditors do not work as a good supervisor for investment process. This is because most of state-owned enterprises' loan comes from state-owned bank and they have the same owner, they all belong to the government. Therefore, state-owned enterprises are not true debtors and state-owned bank are not true investors and decisions for lending money is made by the government. In other words, money lending is some kind the shares dominated by governments in state-owned enterprises.

## *2.2 Equity Incentive in State-Owned Enterprises*

According to listed rules, equity incentive provides a long-term incentive for chief executive officer or senior manager by giving companies' shares or share options or other stock rights. To be specific in the companies, equity incentive describes that shareholders of companies give managers some economic rights (usually shares option rights). Therefore, managers can be involved in decision-making process, sharing profits of companies and taking risks as shareholders. In order to earn more benefit as a shareholder, managers are encouraged to carry out due diligence to work for companies. As a result, equity incentive can help in improving ownership structure of companies, reducing agency cost and improving efficiency of management (Weijie, 2009).

There are three main types of equity incentive which are share options, employee stock owner plans (ESOP) and management buyout. Firstly, Share options originate from America in 1970s. It means that shareholders will give managers economic benefit (share options) if they achieve goals. This economic benefit gives managers a right to buy companies' shares at specified price in a specified period of time.

Secondly, employee stock owner plans is a special compensation plan. In order to encourage, retain and attract employees, ESOP advocates granting residual claim rights and decision-making rights to employees by giving them shares.

Finally, management buyout states managers buy companies' shares financed by lending in order to earn dividends, change ownership structure and even restructure the company. Generally speaking, management buyout is a kind of ESOP. ESOP focuses on all the staff in company whereas management buyout focuses on senior managers or key technical staff (Weijie, 2009).

Equity incentive approach is gradually used among state-owned enterprises in recent years. From year 2010 to 2013, state-owned enterprises has announced 117 stock incentive plans which are related to 80 state-owned listed companies. 82% of stock incentive plans has carried out, whereas 18% of plans are terminated for different reasons. Especially, stock incentive approach is popular between 2011 and 2012. This phenomenon may result from a depressed stock market so that more and more state-owned companies choose equity incentive to motivate managers (Ziwei, 2013). However, compared with other listed companies, equity incentive does not popular in state-owned companies. The reasons for low level development of equity incentive in state-owned enterprises are various including manipulation of national assets and lack of incentive mechanism.

Although equity incentive is not that popular in state-owned enterprises, it is inevitable to apply this approach for following reasons. Firstly, serious contradiction between principals and agents leads to internal control. Secondly, traditional incentive mechanism has many problems resulting in over-motivation and under-motivation. Thirdly, lack of talents is a big problem for Chinese companies, especially state-owned companies. Equity incentive can help companies to retain talents. Therefore, equity incentive method is necessary for state-owned enterprises to solve these problems above. Equity method can solve agency problems, convert single compensation system to

diversified compensation system.

In terms of implementation, it is feasible for state-owned enterprises to implement equity incentive method. Firstly, stockholding system has changed the ideology and behavioral mode of people. Employee shareholding system has been carried out for a long time and it adds share options and warranties into employees' salaries. Secondly, Employee Stock Ownership Plan (ESOP) Association has established which lays foundation for equity incentive in state-owned enterprises. ESOP originates from process of state-owned enterprises reform. It is an association which manages employee shareholdings and gives favor to them to exercise the power and bears duty (Weijie, 2009). Thirdly, laws and regulations support execution of employees' stockholding. Finally, fiscal policy support execution of employees' stockholding.

### 2.3 Effect of Incentive on Inefficient Investment

The research of relationship between management incentive system and inefficient investment begins in year 1976. Jensen and Meckling defined inefficient investment as the project which net present value is less than 0. They also pointed out equity incentive is a good way to manage inefficient investment (Jensen & Meckling, 1976). Smith and Watts has concluded that management incentive system can improve self-interest behavior of managers (1992). There are many professors overseas has researched relationship between equity incentive and inefficient investment.

In China, plenty of professors have gradually realized the importance of equity incentive on inefficient investment. Changjiang (2011) has investigated the data of listed companies from year 2006 to year 2009, he concluded that equity incentive has inhibitory effect on inefficient investment based on Richardson investment model. However, because of special Chinese conditions, state-owned enterprises have been ignored in identifying current situation of inefficient investment and relationship between equity incentive and inefficient investment. Therefore, following assumptions are proposed.

H1: Equity incentive can limit over-investment.

H2: Equity incentive can limit under-investment.

## 3. Model Design and Variable Measurement

### 3.1 Measuring Overinvestment and Underinvestment

Accounting to Richardson (2006), he puts forward a model to measure investment efficiency, I use the model to measure underinvestment. First, I regress the formula (1) which is used for investment scale, then use the company-level residual of the model to measure investment efficiency, where the positive residual indicates overinvestment, negative residual indicates underinvestment.

$$\begin{aligned} Inv_{i,t} = & a_0 + a_1Q_{i,t-1} + a_2Lev_{i,t-1} + a_3Cash_{i,t-1} + a_4StockR_{i,t-1} + a_5Age_{i,t-1} \\ & + a_6Size_{i,t-1} + a_7Inv_{i,t-1} + \sum Year + \sum Industry + \varepsilon_{i,t} \end{aligned} \quad (1)$$

Where:

$Inv_{i,t}$  = change in investment during period t,

$Q_{i,t-1}$  = Tobin'Q at the end of year t-1,

$Lev_{i,t-1}$  = total liabilities divided by total assets at the end of year t-1,

$Cash_{i,t-1}$  = cash and cash equivalents divided by total assets at the end of year t-1,

$StockR_{i,t-1}$  = stock returns from year t-1 to year t,

$Age_{i,t-1}$  = years from listing to investment spending,

$Size_{i,t-1}$  = natural log of total assets at the end of year t-1,

Year and industry are dummy variables, residuals of model (1),  $\varepsilon_{i,t}$  equals actual investment amount minus expected investment amount, when less than 0 means underinvestment, use absolute value  $Underinv_{i,t}$  to represent, when more than 0 means overinvestment, use  $Overinv_{i,t}$  to represent.

### 3.2 Model for Testing the Hypothesis

In order to identify the effect on equity incentive on inefficient investment, another model is needed. In this model, inefficient investment (residual error in model 1) is the explained variables and equity incentive is explaining variables. Moreover, some control variables that may affect inefficient investment are also selected including management fees, asset-liabilities ratio, and other account receivables, government intervention, free cash flow and government granting. The ideal result is to get a significant coefficient of equity incentive.

Meanwhile, it also identifies the effect of other elements on inefficient investment. The model is shown as follows.

$$\begin{aligned} \text{Overinv}_{i,t} = & a_0 + a_1 \text{Incent}_{i,t} + a_2 \text{Lev}_{i,t} + a_3 \text{OCC}_{i,t} + a_4 \text{ADM}_{i,t} + a_5 \text{Size}_{i,t} \\ & + a_6 \text{FCF}_{i,t} + a_7 \text{Subsidy}_{i,t} + a_8 \text{Gov}_{i,t} + \sum \text{Year} + \sum \text{Industry} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

$$\begin{aligned} \text{Underinv}_{i,t} = & a_0 + a_1 \text{Incent}_{i,t} + a_2 \text{Lev}_{i,t} + a_3 \text{OCC}_{i,t} + a_4 \text{ADM}_{i,t} + a_5 \text{Size}_{i,t} \\ & + a_6 \text{FCF}_{i,t} + a_7 \text{Subsidy}_{i,t} + a_8 \text{Gov}_{i,t} + \sum \text{Year} + \sum \text{Industry} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

Where:

Overinv<sub>i,t</sub> = positive  $\varepsilon_{i,t}$  of model (1),

Underinv<sub>i,t</sub> = absolute value of negative  $\varepsilon_{i,t}$  of model (1),

Incent<sub>i,t</sub> = 1 whereas companies do executes equity incentive, otherwise 0. In this article, equity incentive is regarded as executed when boards propose pre-arranged planning or actually executed,

Lev<sub>i,t</sub> = asset-liability ratio of year t,

OCC<sub>i,t</sub> = Other account receivables/Assets of year t,

ADM<sub>i,t</sub> = Administrative expense /operating revenue of year t,

Size<sub>i,t</sub> = natural log of total assets at the end of year t,

FCF<sub>i,t</sub> = (Net Operating Profits Less Adjusted Taxes + depreciation and amortization – increase in working capital – capital expenditure)/Assets of year t,

Subsidy<sub>i,t</sub> = 1 where government is granting is 1, otherwise 0,

Gov<sub>i,t</sub> = (-1)\*less government intervention from Chinese market index.

#### 4. Data and Descriptive Statistics

I select 2012-2014 Chinese listed companies in Shanghai Stock Exchange, and screen the data in accordance with following procedure: (1) Companies which are abnormal listed on stock exchange with ST or \*ST label are deleted; (2) Companies in financial industry are deleted; (3) Companies of which equity incentive does not actually executed are deleted; (4) Companies which are shortage of financial data or its financial data are abnormal are deleted. After screening the data, 267 companies are selected. All the data are from CSMAR database.

Based on the data above, the result of inefficient investment is shown in the following table I. It can be seen that both of over-investment and under-investment are existed among state-owned enterprises. 108 of total 267 companies are over-investment whereas 159 of total 267 companies are under-investment. From the figure below, it can be seen that under-investment is worse than over-investment which occupies 60%. By contrast, over-investment accounts for 40%.

Table 1. Degree of inefficient investment

	N	Maximum	Minimum	Median	Average	Standard deviation
Over-investment	108	0.322	0.001	0.0219	0.034	0.041
Under-investment	159	-0.000	-0.151	-0.019	-0.023	0.019

The descriptive statistics of over-investment group and under-investment group are shown in Table 2 and Table 3. It can be seen that the average of equity incentive is about 1%-2% which means only 2% of state-owned enterprises execute equity incentive. It can be concluded that equity incentive is not that popular among state-owned enterprises. The average of leverage maintains at 50% level which is a high ratio. From a higher leverage ratio, it can be seen that most of state-owned enterprises are confident about future development of companies. On the other hand, companies should also be careful about financial troubles. In terms of other receivables amount, the maximum amount of it is 18% which is too large and it can hinder the investment decisions of companies. In terms of management fees, it has a high standard deviation indicating a higher volatility. The minimum of free cash flow is -0.971 which may lead to under-investment whereas the maximum of free cash flow is 0.175 which may lead to over-investment. In terms of subsidy of companies, approximately 93% of state-owned enterprises have subsidies whereas only 7% of companies do not have subsidies. In terms of government intervention, it has a smaller standard deviation which indicates a stable data level.

Table 2. Descriptive statistics for over-investment group

	N	Minimum	Maximum	Average	Standard deviation
Overinv	108	0.001	0.094	0.029	0.019
Incent	108	0.000	1.000	0.011	0.107
Lev	108	0.194	0.863	0.541	0.175
OCC	108	0.000	0.111	0.013	0.016
Size	108	19.940	27.955	22.835	1.513
ADM	108	0.008	0.449	0.0725	5.435
FCF	108	-0.633	0.150	-0.061	0.147
Subsidy	108	0.000	1.000	0.977	0.150
Gov	108	-3.730	-3.070	-3.492	0.140

Table 3. Descriptive statistics for under-investment group

	N	Minimum	Maximum	Average	Standard deviation
Underinv	159	-0.078	-0.000	-0.019	0.012
Incent	159	0.000	1.000	0.020	0.148
Lev	159	0.119	0.983	0.575	0.203
OCC	159	0.000	0.186	0.021	0.032
Size	159	19.545	25.830	22.659	1.259
ADM	159	0.002	0.376	0.071	5.506
FCF	159	-0.971	0.175	-0.054	0.164
Subsidy	159	0.000	1.000	0.911	0.286
Gov	159	-3.760	-3.070	-3.490	0.176

## 5. Empirical Results

The regression analysis of over-investment is shown in the Table 4. R squared is 0.157 so that fitting degree is not so good. The coefficient of equity incentive is negatively related with over-investment at 0.1 significant levels which means that it has limitation effect on over-investment. Therefore, H1 can be verified. Leverage is unrelated with over-investment. Free cash flow is positively related with over-investment which verifies theory proposed by Jensen. However, it is not at a significant level. Management fees are negatively related with inefficient investment which means more money companies spend on managers will reduce degree of inefficient investment. In terms of size of company, it is negatively related with over-investment at 0.05 significant levels. It means that the larger the companies are, the less possibility of over-investment. With respect to government granting, it is not related with over-investment which may due to almost every state-owned enterprise has granting. Government intervention is negatively related with over-investment at 0.05 significant levels. It can be concluded that central government has ability to restrict over-investment.

Table 4. Regression results of model 2 (over-investment)

Model	coefficient	Standard error	t	P value (Sig.)
(Constant value)	-0.016	0.061	-0.255	0.080*
Incent	-0.035	0.019	-1.848	0.068*
Lev	0.000	0.012	0.024	0.981
OCC	0.140	0.134	1.048	0.298
Size	-0.056	0.041	-1.390	0.168
ADM	-0.003	0.001	-2.107	0.038**
FCF	0.011	0.015	0.704	0.483
Subsidy	0.003	0.014	0.215	0.830
Gov	-0.033	0.015	-2.166	0.033**
R squared			0.157	
F value			1.789	
P value (sig)			0.092*	

Note. Asterisks \*, \*\*, and \*\*\* denote two-tailed (one-tailed when there is a predicted sign) statistical significance at 10%, 5%, and 1% respectively.

The regression analysis of under-investment is shown in the Table 5. It can be seen that R squared is 0.244 which means fitting degree is at a good level. Regression equation passes F test which means explaining variables can explain explained variables. The coefficient of equity incentive is negatively related with under-investment at 0.05 significant levels which means that it has limitation effect on under-investment. Therefore, H2 can be verified. Leverage is negatively related with under-investment at 0.1 significant levels. Unlike over-investment, free cash flow is negatively related with under-investment which is not support Jensen theory. However, it is not significant. Management fees are negatively related with under-investment at 0.05 significant levels which means more money companies spend on managers will reduce degree of inefficient investment. In terms of size of company, it is positively related with under-investment at 0.001 significant levels. It means that the smaller the companies are, the less possibility of under-investment. With respect to government granting, it is not related with over-investment which may due to almost every state-owned enterprise has granting. Government intervention is negatively related with over-investment at 0.05 significant levels. It can be concluded that central government has ability to restrict under-investment.

Table 5. Regression results of model 3 (under-investment)

Model	coefficient	Standard error	t	P value (Sig.)
(Constant value)	-0.114	0.028	-4.029	0.000***
Incent	-0.013	0.007	-2.018	0.046**
Lev	-0.009	0.006	-1.678	0.096*
OCC	-0.068	0.032	-2.137	0.035**
ADM	-0.046	0.020	-2.272	0.025**
Size	0.003	0.001	2.854	0.005***
FCF	-0.004	0.006	-0.733	0.465
Subsidy	0.004	0.003	1.043	0.299
Gov	-0.011	0.006	-1.984	0.049**
R squared			0.244	
F value			5.086	
P value (sig)			0.000***	

Note. sterisks \*, \*\*, and \*\*\* denote two-tailed (one-tailed when there is a predicted sign) statistical significance at 10%, 5%, and 1% respectively.

## 6. Conclusion

Conclusions are shown as follows: (1) Based on results of model 1, all of 267 companies have inefficient investment problems at various levels, 159 of 267 companies are under-investment whereas 108 of 267 companies are over-investment. As a result, under-investment problem is worse than over-investment; (2) From the results of model 2 and 3, it can be concluded that equity incentive has effect on both over-investment and under-investment. Equity incentive can limit over-investment as well as under-investment significantly. Equity incentive among state-owned enterprises makes progress. Universality of equity incentive among state-owned enterprises needs to be improved.

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