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Executive's compensation and firm's risk-taking in China

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Abstract

This thesis empirically examines the impact of executives' payment on firm's risk-taking and the difference between state-owned companies and non-state-owned companies on risk-taking in China, using 9061 firm-year observations of Shanghai and Shenzhen Stock Exchange listed companies from 2006-2016. All the data are collected from China Stock Market & Accounting Research (CSMAR) Database. The results indicate that there is a positive relationship between executives' compensation and firm's leverage ratio but a negative relationship between executives' compensation and firm's R&D expense. In addition, there are significant difference between state-owned companies and non-state-owned companies on risk-taking; state-owned companies have higher leverage and invest more in R&D.

1. Introduction

In this thesis, I empirically examine the impact of executive's payment on firm's risk-taking. It uses Chinese companies as the sample and provides evidence to answer the following questions: Whether there is an impact of executive's payment on company's risk-taking? And whether state-controlled companies and non-state-controlled companies are different on firm's risk-taking?

Reasons for me to invest executives as one variable is because executives are a group of people, who have significant importance in a firm, because almost all of the important decisions are made by them. Thus, more and more researches try to link executives' certain characteristics and behaviors with firm's performance and future development. Recently, compensation is one of the most popular topics, which researchers are very interested in, because executives' compensation has been considered as an important factor, which moderates the contradiction between managers and shareholders. It is also called agency problem (Ozkan, 2011). An essential factor to ensure firms' success is how to apply appropriate impel that encourage managers to improve profits and increase the firm's value (Firth et al., 2006). For example, there is a great deal of papers examined the relationship between executives' payment and company's performance (Brick, 2006; Mehran, 1995; Xin and Tan, 2009; Kato and Kubo, 2006; Carpenter and Sanders, 2002). Their research results suggest that executives' payment has effects on company's performance.

Also, prior literatures examined the relationship of executives' compensation regulations and executives' risk-taking impel (Cheng, 2008; Huang et al., 2013; Devers et. Al., 2008). Their results point out that executives risk-taking incentives will increase,

when executives' compensation is high because executives take excessive risks. It has been widely recognized that one of the important roles of compensation is that it can motivate top managers to take higher risks (Ozkan, 2011). In finance, the concept that higher risks usually bring higher returns is used widely. The ultimate goal of all companies, except those has special aims, is to increase the overall value of the company. Therefore, some companies will use compensation policy to encourage executives to take excessive risks. It is widely believed that in banking, the use of incentive compensation usually is to motivate banks to take excessive risks, which could be a contributory factor to financial crisis (Hagendorff and Vallascas, 2011).

World Population Review reported that China, with a rapid average economic growth rate of 9.52% between 1989 and 2019, is one of the biggest economic power in the world, which ranks as the second biggest economy using measuring with nominal GDP, and which ranks as the biggest economy when measured with PPP in the world[1]. Therefore, Chinese economy has won more and more attentions and attracts lots of researchers to do investigations on Chinese companies. Nevertheless, compared with other countries' economy history, such as American, there is limited papers using Chinese companies as the data source, because Chinese economy has relative short development history. Prior studies prefer to focused on developed countries. Therefore, lots of existing literatures use US companies as their data source and examined whether there is a relationship between executives' payment and firms'

[1] World Population Review: In 2019, data shows that based on UN and IMF tables, the US ranks the number one around the world, and it's GDP is $20,400,000,000 (IMF) or $18,600,000,000 (UN). China has second-biggest GDP and it's GDP is $14.100,000,000 (IMF) or $11,200,000,000 (UN). But Chinese population is definitely larger than the US's. China has the most population around the world, as it has 1.42 billion people; the US has a population of 327 million.

risk-taking; there is limited papers using Chinese companies as the data source to investigate such relationship. Therefore, it is worthwhile to do so research using Chinese data.

Moreover, Chinese firms have unique ownership structure and have some unique features. The most significant feature is state ownership has an essential effect on company's ownership form (Huang et al., 2013). But Firth et al. argue that since the reforms, managers now have more responsibility to make decision for the firm and that managers' decision-making have a deeper influence on the firm's strategy than State (Firth et al., 2006). Thus, more evidence is need to answer the question whether state ownership still has an essential effect in firm's decision-making in China.

Thus, this thesis wants to investigate whether executives' payment will affect companies' risk-taking in China. To be more specifically, this thesis will examine whether state-controlled companies and private-controlled companies are different on firms' risk-taking. In the other words, this thesis will provide more evidence to answer whether state ownership structure can cause essential effects on company's risk decisions.

This study differs from the work of Huang et al., who examine the impact of equity-based payment on manager's risk-taking behaviors. First, although both of works focus on payment and risk-taking in China, Huang et al. use equity-based compensation, whereas this thesis uses total compensation, which includes cash compensation and bonus. Second, Huang uses 503 individual top executives from 166 companies, which are listed companies in the Shanghai Stock Exchange and Shenzhen Stock Exchange between 2006 and 2011 as the sample. This thesis uses 9061 firm-year

observations about listed companies using Chinese data during 2006-2016 as the sample. So, the time period is updated to the resent year.

The rest of the paper is organized as follows. In section two, it shows a literature review and also establish the hypothesis. In section three, there is methodology and data. Section four discusses analysis and findings. Section five summarizes and concludes this thesis.

2. Literature Review

2.1 EXECUTIVEs compensation policy & EXECUTIVEs risk-taking incentives

A cumulated paper focus on executives' compensation and executives risk-taking incentives and different compensation strictures have different impact on executives' risk-taking incentives. For example, Cheng (2008) points out that executives impel to take additional risky investments will reduce if there is a reduce in option-based payment. Huang et al., (2013) suggests that equity-based payment have effects on executives' risk-taking incentives. Devers et. Al., (2008) indicates cash-based forms of payment will, to some degree, adjust the impel properties of equity-based payment, which means cash-based payment might influent executives perceive risks related equity payment.

Prior paper examined that since different compensation policies can exert different influence on executives' risk-taking incentives, companies will apply incentive payment policy to motivate executive to take excessive risks (Cheng and Farber, 2008). For instance, Adithipyangkul and Zhang (2011) mentions that perk can incent executives to take higher risk, like taking higher leverage, expanding firm size, taking

more growth opportunities. Hagendorff and Vallascas (2011) states that executives are likely to engage in risk-increasing deal because of higher payment policy, and that he interpreted this as the evidence that there is some relationship between executives' payment and executives' incentives for risk-taking. Grant et al., (2009) points out that executives' higher share ownership and lower compensations will promote executives to take less risky investments. In addition, Kempf et al., (2009) argues that the impact of executive's salary on executives risk-taking incentives may affect by outside factors; if the overall employment risk is too high and the employment risk is more important than compensation incentives for managers, they are likely to decrease risk to avoid potential job loss.

2.2 Firm's risk-taking

Companies' risk-taking is affected by lots of factors. For instance, Li and Tang (2010) argue that company's risk-taking is positively affected by executives' hubris. Rogers (2002) states that firm's risk-taking behaviors are determined by management team risk-taking incentives. Moreover, Wright et al., (2007) points out that administrative stock options can directly and uniformly affected by company's risk-taking strategies and that when executives hold shares of the company, there is a curvilinear relationship with company's risk-taking. In addition, Kish-Gephart and Campbell (2015) argues that executives' social class origins have an important impact on his or her risk-taking incentives, which could influence firm's risk-taking strategy. Plus, Wang (2012) mentions that company's risk-taking is associated with its size of board, and smaller board size are affected by future's higher risk; smaller boards are likely to force executives and give incentives to executives to let them take higher risks than large

boards.

2.3 EXECUTIVEs compensation & Firms' risk-taking

Prior paper also examined that there are some relationships between executives' compensation and firms' risk-taking. For instance, Cheng et al., (2010) states that there is a correlation of executives' payment and companies' risk-taking. In addition, Xin and Tang (2009) mentions that stock returns to executives play an important role when executives are making risk decisions. Moreover, Coles et al. (2006) argues that more susceptible of executives' treasure to stock changes will cause executives to choose risker strategies, including higher leverage ratio, more money in R&D and less in PPE. Bolton et al., (2015) provide evidence that firms' additional risk-taking can be promoted by basing payment on both stock price changes and the credit default swaps (CDS) for executives. Gormley and Matsa (2013) suggest that executives tend to reduce firm leverage and reduce investment on R&D, if they have less convex payoffs. Plus, Deutsch and Laamanen (2012) provide evidence that there is a positive correlation between stock option payment schemes and company's risk-taking. In addition, Devers et. Al., (2008) also states that executive's equity-based salary will remarkably influence company's risk strategies. Moreover, Raviv and Sisli-Ciamarra (2012) show that the correlation between executive's equity-based salary and risk-taking will affected by state economic condition; the positive correlation between equity-based payment and risk-taking may weaken and even vanish during economic recession. What's more? Belkhir and Chazi (2010) find that bank which has better investment opportunities and which operates in a deregulated environment will reward their executives with a compensation because they have a higher sensitivity

to risk. However, Houston and James (1995) find evidence which did not consistent with their hypothesis, in the other words, executives' compensation policy will not promote firms to take more risks in bank industry.

2.4 Risk & Performance

Generally speaking, higher risk usually accompanied with higher return. For example, banks are highly-leveraged organizations, and shareholders get profits from additional risky investments, because higher-risk investments have higher potential increase of the bank assets (Hagendorff and Vallascas, 2011). Prior paper already investigated the correlation between firm risk-taking and company's performance. For example, Singh (1986) uses a cross-sectional sample of firms to test this relationship. Moreover, Gilley et al., (2002) use perceptual (rather than archival) measures of risk-taking to investigate the correlation of company's risk-taking behavior and company's condition of business, and they point out that firm's risk-taking has a strong positive effect on company's performance. Bowman (1980) suggests that there is a negative influence of company's risk-taking on firm performance. Guo and Khaksari (2015) provide evidence that banks which undergo greater risk-taking (lower Z-score) tend to suffer from financial distress than banks which are less risk-taking.

2.5 Compensation & Performance

Brick (2006) states that excessive compensation has an influence on company's performance. Mehran (1995) finds that there is a impact of firm performance on executives' compensation: company's condition of business is positively affected by both the executives' total salary's percentage that is equity-based and the percentage of shares held by executives. Xin and Tan (2009) also mention that the susceptible of

executive payment to performance will be increased by market-oriented reform. Kato and Kubo (2006) suggest that Japanese executives' payment is susceptible to company's performance and bonus regulations makes executives salary more susceptible to firm performance. Carpenter and Sanders (2002) point out that compensation can predicate firms' future performance and the influence of executives' payment on company's future development is depend on top team payment. However, Firth (2006) argue that for state-owned companies, executives' compensation appears to be less affect by firm performance. Additionally, Kato and Long (2006) also indicate that state ownership of China's listed companies weakens the correlation between executives' salary and firms' performance and that state-owned companies are likely to make China's listed firms to solve the principal-agent problem between owners and management less effectively.

According to existing literature and above discussion, it looks that there is indeed some relationship of executives' salary and firms' risk-taking, and that some factors can moderate this relationship slightly and some factors are irrelevant. Therefore, this thesis comes up the following hypotheses:

Ho: there is no relationship between executives' payment and company's risk-taking in China.

H1: the state-ownership has no difference on firm's risk-taking in China.

3. METHODOLOGY & DATA

3.1 Data and sample selection

All the information used in this thesis, including companies' basic information,

executives' compensation information, and industry information, are received from The China Stock Market & Accounting Research (CSMAR) Database which contains information about the China stock markets and the financial statements of China's listed companies. I use the listed firms in Shanghai Stock Exchange and Shenzhen Stock Exchange from mainland China from 2006-2016 as sample. Using this time period is because many empirical research papers use 5-10 years historical data as their sample and usually more data is better; therefore, I choose to use 10 years data period. Because when calculate the sales growth, I use current sales divide previous sales. Thus, I collect 11 years data. The latest data from the database CSMAR I can get is 2016; thus, the sample period of this thesis is from 2006 to 2016 and I think use this time period is proper. Financial industry firms are excluded from this thesis, because financial industry firms have specific characteristics, whose data analysis is totally different from data analysis of other industries' firm. And some missing data are excluded from data analysis. Finally, this thesis contains 9061 firm-year observations between 2006-2016.

3.2 Methodology and Research Models

This thesis investigates the impact of executives' compensation and company's risk-taking. It uses Financing policy model and Investment policy model to examine this relationship. Using regression can investigate the relationship between different variables. And to test whether State-owned companies and Non-state-owned companies are different on the relationship between executives' payment and company's risk-taking, mean difference is used. From analyzing the t-test results, this thesis can provide evidence to investigate whether state-ownership have difference

on company's risk-taking in China. For measuring a company's risk-taking, this thesis uses Book Leverage ratio, which represents the financing policy, and R&D, which represents the investment policy, because Huang et al. (2014) use these two data when he examines the correlation between equity-based salary and administrative risk-taking and his paper provide empirical results on this research question. Therefore, I think using these two models is suitable for my thesis.

Financing policy model:

Book financial leverage ratio is determined by the rate of debt to total assets. This ratio can be very important to evaluate risks. A proper leverage ratio can create benefits for firms, since firms can borrow money from investors both from loans and from stocks, which provide funds for firms to operate and invest their business. However, a high leverage ratio usually indicates a high-risk level. Because debt represents the obligation of a firm to pay back the loan and interests, but firm can also raise money by issuing stocks, which firm can decide not to pay the dividends. When a company cannot pay back its debt obligations, it is likely that this firm will go bankrupt. Therefore, a high leverage ratio means a high risk the firm takes. I use Book leverage as dependent variable and the financing policy is:

$$\textit{Book Leverage Ratio}_{it} = \alpha 0 + \alpha 1\ \textit{AveComp}_{it} + \alpha 2\ \textit{EXECUTIVEAge}_{it} + \alpha 3\ \textit{Size}_{it} + \alpha 4\ \textit{MTB}_{it} + \alpha 5\ \textit{ROA}_{it} + \alpha 6\ \textit{Net PPE}_{it} + \alpha 7\ \textit{R\&D}_{it} + \alpha 8\ \textit{Z-score}_{it} + \alpha 9\ \textit{Topten}_{it} + \varepsilon_{it}$$

Investment policy model:

Using R&D as an index to represent a firm's risk is because it usually takes a long period of time to get return from the investment of R&D. In addition, lots of money spend on

R&D do not bring any return, since the success rate of an improvement and innovation is very low compared with the failure rate. Therefore, R&D is be regarded as a highly risky investment. R&D is the dependent variable and the investment policy is:

$$R\&D_{it} = \alpha 0 + \alpha 1\ AveComp_{it} + \alpha 2\ EXECUTIVEAge_{it} + \alpha 3\ Size_{it} + \alpha 4\ MTB_{it} + \alpha 5\ SurplusCash_{it} + \alpha 6\ SalesGrowth_{it} + \alpha 7\ StockReturn_{it} + \alpha 8\ Book\ Leverage\ Ratio_{it} + \alpha 9\ Topten_{it} + \varepsilon_{it}$$

Where *i* and *t* are the firm and year, and ε represents the error.

Control Variables

AveComp means average compensation. I use the average compensation received by executives as my dependent variable, because I want to test the impact of executives' compensation and company's risk-taking in China. The average compensation received by a firm's executives in one year is proper to represent the executives' compensation.

EXECUTIVEAge is the age of the executive. Since executive's age is one of the elements which could affect executive's payment and executive's age also have impacts on executive's risk preference (Serfling,2014), I put executive's age as one variable in the model. And I use average executives' age to represent *EXECUTIVEAge.*

I also include firm size, market-to book ratio, return on asset, net PPE, R&D, surplus cash, sales growth, and stock return, which describe company's characteristics, as control variables in the thesis. Because prior papers indicate that certain firm's characteristics have huge influence on firm's strategic taking, including investment strategies, leverage strategies, and firm's performance (Crutchley and Hansen (1989).

Size is calculated by the logarithm of sales. *MTB* represents market-to-book ratio. *ROA* means return on assets and is the ratio of net income to total asset. *Net PPE* represents the sum of net property, plant, and equipment to total assets. *R&D* represents the spends on research and development. *SurplusCash* is calculated by (Net cash flow - depreciation and amortization + R&D expense)/Total assets. *SalesGrowth* is a ratio calculated by using the logarithm of current sales to previous sales. *StockReturn* is the return over the fiscal year on stock. *BookLeverage* is calculated by the ratio of total debt divided by total assets.

This thesis adds Altman's Z-score in the thesis, because it is an important and good method to measure a firm's bankruptcy risk. Since leverage is highly linked with risks, it is useful to use Z-score to indicate the risk of bankrupt. Z-score is used to measure firm's bankruptcy risk from Altman (1968) and it is calculated by the following equation:

$$\text{Z-score} = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.999X_5$$

In the above equation, X_1=working capital divided by total assets; X_2=retained earnings divided by total assets; X_3=income before interest and taxes divided by total assets; X_4=market value of equity divided by total liabilities; X_5=total sales divided by total assets.

Big shareholders usually have huge influence on firm's decisions, because they have more rights to vote. Therefore, I add top ten shareholders as the control variable. *Topten* represent the shares owned by top ten shareholders.

Table 1 Variable Definitions

Variable	Definition

Dependent Variables	
Book Leverage Ratio	= Debt divided by total assets
R&D	= Expense of research and development
Variable of Interest	
AveComp	= Average compensation received by a firm's executives
Control Variables	
ExecutiveAGE	=Average age of executives measured by year
MTB	= Market value of equity divided by book value of equity
ROA	= Net income divided by total asset
Net PPE	= Net property, plant, and equipment divide by total assets
SIZE	= Logarithm of the company's sales
SalesGrowth	= Logarithm of current sales to previous sales
SurplusCash	= Net cash flow - depreciation and amortization + R&D expense)/Total assets
StockReturn	= Return over the fiscal year on stock
Z-score	=1.2 working capital/ total assets + 1.4 retained earnings/ total assets +3.3 income before interest and taxes/total assets + 0.6 market value of equity/ total liabilities + 0.999 total sales/ total assets.
Topten	= The shares owned by top ten shareholders

4. ANALYSIS & FINDINGS

4.1 Descriptive statistics and univariate analysis

Appendix A presents descriptive statistics for used variables. This thesis has 9061 observations. The mean value of *Leverage* is 0.403. Usually when we talk about the leverage risk, we consider the leverage ratio, which is below 0.4, low leverage ratio and represents a lower risk. For leverage ratio above 0.6, we consider it high risk[2].

Therefore, firms used in this thesis do not face higher risks when only take leverage ratio into consideration. The mean value for *R&D* is 1.520e+08. For control variables,

[2] According to Investopedia, from a pure risk perspective, 0.4 leverage ratio is usually considered better leverage ratio. Because debt represents obligations to pay back the loans, and if the debt is too high, the company may not have the ability to pay back. And this leads to bankruptcy risks.

the mean value of *AveComp* is 251220.99 in RMB for executives yearly. And the *AveAge* for executives is 48.5. The mean values of *Size*, *MTB*, *ROA*, and *NetPPE* are 21.208, 2.269, 0.055, and 0.225, respectively. I also find that the mean value of *Z-Score* is 7.319. In Altman (1968) bankruptcy model, if the Z-Score is less than 1.81, it indicates the firm has a higher possibility to go bankrupt; if the Z-Score is more than 3.0, it predicts a low propensity of bankruptcy (Robinson et al. 2015). Thus, the sample firms in this thesis have high Z-Score value, which represents a low possibility to go bankrupt. This result is no surprising, because our sample firms are from listed firms in Shanghai and Shenzhen Stock Exchange in China. The mean value of *SurplusCash*, *SalesGrowth*, and *Stockreturn* are -0.003, 0.121, and 0.334, respectively. *Statepercentage* is 4.3 and *toptenshares* is 58.618.

4.2 Pearson Correlation

Appendix B and Appendix C present Pearson correlation coefficients among the data used in the data analysis. I check the problem of multicollinearity, and no coefficients of these correlations are large enough to indicate collinearity problems. All the coefficients among independent variables are between -0.5 and 0.5, except the correlation between size variable (*Size*) and leverage (*Leverage*), which has a slightly higher value (0.529).

4.3 Multivariate Regression

Appendix D shows the results of multivariate regression analysis about Leverage. There is a significant and negative effect of *AveComp* on *Leverage* (-0.0000001, p-value<0.01). This result indicates that executives, who get higher compensation, tend to use small leverage ratio. In other words, executives will take less risks when they

received high compensation. Therefore, hypothesis 1 which estimates that there is no impact of executives' compensation and company's risk-taking in China is rejected. The result is same as the results of Huang et al. (2013), whose results suggest that higher compensation tends to make executives be more risk-adverse and therefore, they are likely to reduce firms' risks. And the simple way for firms to reduce their risks is to decrease firms' leverage ratio.

For the control variables, *Aveage* is negatively related with *Leverage* (-0.0021, p-value<0.01). This result is the same as Dechow and Sloan's (1991) result, which argues that when executives are close to retirement age, they are more conservative and are more likely to use small leverage ratio. *Z-Score* has a negatively significant relationship with *Leverage* (-0.00544, p-value<0.01). This result is reasonable, because higher leverage ratio indicates higher risks and higher risks will get lower Z-Score value. Thus, Z-Score should be negatively related with leverage.

The regression models are controlled for industry and year fixed effects. Therefore, there is no reason to doubt whether different industries will have different results and whether different time periods will have impacts on the results. Moreover, the adjusted R^2 is great than 55%. Therefore, the regression model is quite reasonable in this thesis.

Appendix E shows the results of multivariate regression analysis about R&D. There is a significant and positive impact of *AveComp* on *R&D* (378.5, p-value<0.01). This result indicates that higher executives' compensation encourages administrators to provide more money in research and development, although R&D is usually considered as highly risky investment. The results are consistent with prior researches. Hagendorff

and Vallascas (2011) states that it is likely for executives to take risky strategies due to higher payment policy. And Grant et al., (2009) also point out that lower compensation will encourage executives to take less risky plans.

For the control variables, *MTB* positively related with *R&D* (10523896.67, p-value<0.01). This indicates that firms that have higher growth opportunities invest more money in R&D. *Size* and *SurplusCash* have positive relationships with *R&D* (1.895e+08, p-value<0.01; 6.334e+08, p-value<0.01). The results are reasonable, because firms' sales and surplus cash increase will provide more money for firms to support R&D.

To summarize, there is a significantly negative effect of executives' compensation and company's financial leverage ratio, and a significantly positive effect of executives' payment on company's R&D investment. This evidence suggests that higher compensation make executive become risk-adverse but higher compensation can serve as an incentive for executives to invest more in R&D.

4.4 Mean Difference of State-owned companies and Non-state-owned companies

Appendix F presents the mean difference about state-controlled companies and non-state-controlled companies. Because this thesis wants to examine whether state-ownership have difference on firm's risk-taking, I divide all the sample into two groups by the ownership nature of firms to measure. Group 1 contains firms that are state-controlled companies, and Group 2 contains firms that are non-state-controlled companies. In Appendix F, I compare descriptive statistics of variables about state-controlled companies and non-state-controlled companies. There are 3118 state-owned companies and 5943 non-state-owned companies in this thesis. The mean

value of company's leverage of state-controlled companies is 0.509 and the mean value of company's leverage for non- state-controlled companies is 0.347. This result indicates state-owned companies and non-state-owned companies are significant different on firms risk-taking, and the state-owned companies own higher leverage ratios, when compared non-state-controlled companies with state-controlled companies (t-test: p-value<0.001). The mean value of R&D for state-owned companies is 2.5e+08 and for non-state-owned companies is 1.0e+08. This result also indicates that state-controlled companies and non-state-controlled companies are significant different on firms risk-taking, and the state-owned companies invest more in R&D than non-state-owned companies' (t-test: p-value<0.001). In Appendix F, except *Avecomp* (t-test: p-value>0.1) and *SurplusCash* (t-test: p-value>0.1), all other variables (t-test: p-value<0.001) are significant different between state-controlled companies and non-state-controlled companies. Therefore, hypothesis 2 which assume that the state-ownership has no difference on firm's risk-taking in China is rejected.

The results of this thesis about whether state-ownership have difference on company's risk-taking are different with the results of Huang et al. (2013), whose results argue that for state-controlled companies, they invest less in research and development, which means state-controlled companies are less encouraged to innovate. However, in this thesis, the results show that compared with non-state-controlled companies, state-controlled companies are more willing to provide money on research and development to support creativity. The result is a little bit surprise because it is on the opposite side of traditional concepts that state-controlled companies are more conservative than non-state-controlled companies. However, this result is quite reasonable, because usually state-controlled companies and non-

state- owned companies are different when considered their functions in the society and different firms' purposes have significant impacts on firms' strategies and investment projects.

The first difference between state-controlled companies and non-state- controlled firms is that state-controlled companies are more likely to get resources, including funds, technology supports, tax reductions, employees, and etc. Therefore, state-owned companies can easily get money support from government and also, they are likely to get debt from banks, even if their financial statement and firm performance are not as good as non-state-owned companies. The reasons behind why state-controlled companies are likely to get resource from the society is because, state-controlled companies regulated important industries, such as military, petroleum, gas, telecommunication, civil aviation etc. And those industries are very important for a country. Thus, the purpose for those industries is not always focus on generating profits, but focus on maintaining regular operation and providing service and supports to citizens. Therefore, when compared non-state-controlled companies with state-controlled companies, state-controlled companies are easier at financing. So, it is reasonable why state-controlled companies get higher company's leverage than non-state-controlled companies.

Secondly, state-owned companies created lots of opportunities for citizens; thus, it is not likely for state-controlled companies to announce bankrupt, even if they face operation problems. One important role of state-controlled companies is that they can reduce unemployment rate. According to Economic Daily, although the percentage of state-owned employees has continued to decrease from 78.3% in 1973

to 14.9% in 2016, state-owned companies still have a significant role in solving the employment problems in China[3]. Therefore, even state-controlled companies faced financial problems, they will keep operation by borrowing money from banks, which will increase their leverage ratio.

Prior research suggests that firms' performance is negatively influenced by the state ownership (Gunasekarage et al.,2007). And (Zhou et al.,2016) also point out that state-controlled companies in an emerging economy enable them to get R&D resources easily, which will make state-owned companies less efficient when using those resources to create innovation. This discussion is consistent with my thesis results, because my results show state-owned companies have higher leverage and invest more in R&D, but have lower *SalesGrowth* and *Stockreturn* (-0.075, p-value<0.001; -0.075, p-value<0.001, respectively).

5. Conclusion

In this thesis, it examines the effects of executives' compensation on company's risk-taking using Chinese listed companies from 2006 to 2016. The evidence supports the hypothesis that executives with higher compensation tend to decrease company's risk-taking by reducing financial leverage ratio, but payment policy can also encourage executives to provide more funds to support R&D. In addition, this thesis also investigates whether state-controlled companies and non-state-controlled companies are different in firm's risk-taking. The results present that state-controlled companies

[3] On the one hand, in cities with resources and heavy chemical industry as the leading industries, state-owned enterprises are the main force to absorb employment. On the other hand, in the period of economic downturn, private enterprises may lay off workers under market pressure, while state-owned enterprises bear the responsibility of stable employment.

are not more risk-averse because they have higher leverage ratio and invest more in R&D but state-controlled companies are less efficient in transforming input resources into output values.

This thesis has some contributions. First, it uses updated data to test the impact of executives' payment and company's risk-taking using Chinese listed firms. And it provides more evidence on this specific and interesting research topic, which can serve as reference for future research. Second, this thesis provides evidence to show that there are some significant differences between state-controlled companies and non-state-controlled companies in firm's leverage and investment in R&D. Moreover, it also provides reasonable explanations to those differences.

This thesis also contains some limitations. First, it may use more measurements to represent firm's risk-taking. Because there is no agreement on what is the best represent for risk-taking and different measurements, for example firm stock return volatility, may lead to different results as well as provide more useful information to this research topic. Secondly, more investigation on the discrepancy between state-controlled companies and non-state-controlled companies need be done, because prior research has come up with different results. This thesis only focuses on firm's leverage and firm's investment on R&D. Therefore, future research can widen the research topic on this area to provide more useful information to help firms adjust the state-ownership structure.

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Appendix

Appendix A Descriptive Statistics of Selected Variables

	N	Mean	Median	Std. Dev.	p25	p75
Leverage	9061	.403	.388	.213	.233	.56
R&D	9061	1.520e+08	38734200	9.499e+08	16409305	91412600
AveComp	9061	251220.99	201582.36	198162.87	137461.53	299166.66
AveAge	9061	48.505	48.571	3.208	46.353	50.625
Size	9061	21.208	21.027	1.437	20.19	22.003
MTB	9061	2.269	1.771	1.692	1.335	2.597
ROA	9061	.055	.052	.083	.029	.082
NetPPE	9061	.225	.197	.148	.113	.312
Z-Score	9061	7.319	4.577	11.507	2.852	7.892
SurplusCash	9061	-.003	-.008	.106	-.052	.038
SalesGrowth	9061	.121	.097	.359	-.037	.247
Stockreturn	9061	.334	.172	.715	-.109	.596
Toptenshares	9061	58.618	59.76	15.024	48.36	70.1

Appendix B Correlation among Leverage, Executives' compensation, and other selected variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) leverage	1.000									
(2) avecomp	0.072***	1.000								
(3) aveage	0.202***	0.128***	1.000							
(4) size	0.529***	0.399***	0.380***	1.000						
(5) MTB	-0.192***	-0.020*	-0.062***	-0.277***	1.000					
(6) roa	-0.287***	0.156***	-0.027***	0.067***	-0.076***	1.000				
(7) netPPE	0.218***	-0.115***	0.142***	0.134***	-0.125***	-0.097***	1.000			
(8) rd	0.121***	0.194***	0.121***	0.282***	-0.056***	0.001	-0.035***	1.000		
(9) zscore	-0.461***	-0.016	-0.071***	-0.271***	0.506***	0.153***	-0.154***	-0.042***	1.000	
(10) toptenshares	-0.167***	0.043***	-0.064***	0.069***	-0.121***	0.150***	-0.043***	0.053***	0.032**	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Appendix C Correlation among R&D, Executives' compensation, and other selected variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) rd	1.000									
(2) avecomp	0.194***	1.000								
(3) aveage	0.121***	0.128***	1.000							
(4) size	0.282***	0.399***	0.380***	1.000						
(5) MTB	-0.056***	-0.020*	-0.062***	-0.277***	1.000					
(6) SurplusCash	0.095***	0.085***	-0.014	0.054***	0.076***	1.000				
(7) SalesGrowth	-0.001	0.045***	-0.122***	0.063***	-0.002	0.136***	1.000			
(8) stockreturn	-0.010	-0.027***	-0.041***	-0.060***	0.368***	0.101***	0.091***	1.000		
(9) leverage	0.121***	0.072***	0.202***	0.529***	-0.192***	0.004	-0.030***	0.010	1.000	
(10) toptenshares	0.053***	0.043***	-0.064***	0.069***	-0.121***	-0.013	0.115***	-0.009	-0.167***	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Appendix D Multiple Regression of Executives' compensation and Leverage

VARIABLES	*Leverage*
AveComp	-0.0000001***
	(-8.814)
AveAge	-0.0021197***
	(-3.917)
Size	0.0757272***
	(50.209)
MTB	0.0134561***
	(11.490)
ROA	-0.5597539***
	(-28.581)
NetPPE	0.1382766***
	(10.723)
R&D	-0.0000000
	(-1.441)
Z-Score	-0.0054385***
	(-33.539)
Toptenshares	-0.0021122***
	(-19.776)
Constant	-0.8858500***
	(-22.348)
Observations	9,061
R-squared	0.554
Fyear FE	YES
industry FE	YES
Adj.R-sq	0.550

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix E Multiple Regression of Executives' compensation and R&D

VARIABLES	*R&D*
AveComp	378.485***
	(6.831)
AveAge	7523586.949**
	(2.215)
Size	1.895e+08***
	(18.265)
MTB	10523896.666
	(1.539)
SurplusCash	6.334e+08***
	(6.811)
SalesGrowth	-1.119e+08***
	(-4.019)
Stockreturn	16340675.594
	(0.900)
Leverage	-9.063e+07
	(-1.567)
Toptenshares	2615873.015***
	(3.822)
Constant	-4.482e+09***
	(-18.012)
Observations	9,061
R-squared	0.125
Fyear FE	YES
industry FE	YES
Adj.R-sq	0.116

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

Appendix F Mean Difference of State-owned companies and Non-state-owned companies

Variables	G1(1)	Mean1	G2(2)	Mean2	MeanDiff
Leverage	3118	0.509	5943	0.347	0.162***
R&D	3118	2.5e+08	5943	1.0e+08	1.5e+08***
AveComp	3118	2.5e+05	5943	2.5e+05	-5.2e+03
AveAge	3118	50.243	5943	47.593	2.650***
Size	3118	21.986	5943	20.800	1.186***
MTB	3118	2.012	5943	2.404	-0.392***
SurplusC~h	3118	-0.001	5943	-0.003	0.002
SalesGro~h	3118	0.072	5943	0.147	-0.075***
Stockret~n	3118	0.285	5943	0.360	-0.075***
Toptensh~s	3118	56.845	5943	59.547	-2.702***

**** p<0.01, ** p<0.05, * p<0.1*

Appendix G Dataset

AVE of Comp	AVE of age	Size	MTB	Surplus Cash	Sales Growth	Stock Return1	Leverage	State per	TopTenHoldersRate
703333.333300	45.047619	10.279472	1.900205	0.153439		2.671332	0.649418	0.037834	27.090000
2287619.048000	46.047619	10.650432	2.520218	-0.001082	0.370960	1.832039	0.661125	0.024010	22.710000
931047.619000	46.476190	10.631274	1.249144	-0.000791	-0.019158	-0.640054	0.674441	0.024010	22.010000
2114500.000000	47.000000	10.760387	1.511156	0.013909	0.129113	0.683490	0.670017	0.000000	22.910000
2449090.909000	47.909091	10.945073	1.165388	0.060177	0.184686	-0.232341	0.746861	0.000000	22.770000
2850869.565000	49.478261	11.017033	1.042680	-0.005393	0.071960	-0.079738	0.770997	0.000000	23.150000
4457916.667000	51.125000	11.064458	1.076892	0.045708	0.047425	0.373709	0.783163	0.000000	23.440000
2798750.000000	51.458333	11.184691	0.968694	-0.017318	0.120233	-0.194315	0.779970	0.000000	22.300000
3347500.000000	53.192308	11.225309	1.064914	0.035630	0.040618	0.827567	0.772046	0.000000	37.880000
3167823.529000	55.647059	11.283301	1.192347	-0.017384	0.057992	0.818117	0.777015	0.000000	55.360000
3343894.737000	54.947368	11.457882	1.069010	0.032002	0.174581	-0.123486	0.805367	0.000000	57.400000
78076.923080	45.846154	7.864327	1.703456	-0.086483		0.237922	0.450415	0.348248	40.390000
52158.823530	48.588235	7.721380	4.383735	0.009239	-0.142947	1.526439	0.424184	0.215476	32.630000
84625.000000	48.625000	7.803618	2.066047	-0.202103	0.082237	-0.642570	0.491793	0.160756	39.360000
56476.000000	47.400000	8.039844		0.182516	0.236226	1.808989	0.610368	0.160961	45.550000
59831.034480	46.655172	8.042474	5.781349	-0.213552	0.002630	0.204000	0.298574	0.000000	43.350000
106847.368400	45.052632	7.882831	3.752373	0.032771	-0.159643	-0.328073	0.294935	0.000000	42.810000
107111.764700	46.529412	8.005982	3.789975	-0.032395	0.123151	0.011125	0.232528	0.000000	38.360000
75858.333330	46.041667	7.981252	4.439236	-0.021606	-0.024730	0.424205	0.403239	0.000000	40.630000
119185.714300	43.928571	8.057892	4.395817	-0.063304	0.076641	0.336481	0.534754	0.000000	35.760000
98106.250000	44.437500	8.158362	10.146928	0.016075	0.100470	1.947977	0.590402	0.000000	51.780000
85162.500000	46.875000	8.488377	16.863975	0.219437	0.330014	-0.021786	0.203456	0.000000	53.900000
79157.894740	43.842105	7.999360	1.695384	-0.012299		1.505181	0.540864	0.042999	32.210000
97819.047620	44.285714	8.412230	4.145112	-0.006726	0.412871	1.855422	0.485005	0.000000	29.300000
163571.428600	45.285714	8.030527	1.870547	0.002346	-0.381703	-0.651195	0.458645	0.000000	26.670000
165190.476200	46.285714	7.618827	4.637660	-0.002268	-0.411701	1.427419	0.467575	0.000000	26.510000
164333.333300	47.047619	8.144833	3.070612	-0.018914	0.526006	-0.390365	0.477960	0.000000	28.220000
181333.333300	48.095238	7.894815		-0.008562	-0.250018	0.051771	0.476484	0.000000	29.590000
171190.476200	49.190476	7.945525	2.539863	-0.001267	0.050710	-0.230570	0.483142	0.000000	30.170000
142280.000000	50.760000	7.822111	2.396972	-0.004799	-0.123414	-0.158249	0.474831	0.000000	29.860000
157550.000000	51.850000	7.728344	3.251514	0.000911	-0.093767	0.640000	0.509964	0.000000	26.860000
156571.428600	52.380952	7.936558	4.704045	0.049011	0.208214	1.448781	0.447040	0.000000	30.360000
172724.000000	51.600000	8.594224	2.981204	-0.033006	0.657666	-0.326693	0.463708	0.000000	32.040000
259970.588200	47.588235	9.069175	1.530590	-0.053938		2.864295	0.545582	0.163898	38.160000
196305.882400	48.588235	9.228575	1.748512	0.044614	0.159400	0.974543	0.677418	0.113898	34.780000
280837.500000	49.250000	8.583920	1.126540	-0.078180	-0.644655	-0.621427	0.716675	0.046119	28.800000
299031.250000	47.250000	9.323787	1.475422	0.079700	0.739867	1.312869	0.698577	0.000000	34.320000
426438.888900	47.888889	9.452393	1.311918	0.102967	0.128606	-0.064413	0.701421	0.000000	45.940000
413175.000000	48.687500	9.494677	1.137113	-0.121172	0.042285	-0.228947	0.652855	0.000000	48.170000
328749.500000	48.083333	9.611783	1.296548	0.121861	0.117105	0.580172	0.620165	0.000000	53.090000
498956.222100	47.526316	9.453749	1.245490	0.014484	-0.158033	0.069082	0.579972	0.000000	54.830000
519177.954100	48.647059	9.496813	1.447486	-0.066635	0.043064	0.477997	0.641420	0.000000	41.870000
445900.000000	49.647059	9.483839	1.863047	0.034897	-0.012974	0.645012	0.646151	0.000000	41.600000
348572.727300	51.000000	9.628134	1.576954	0.070752	0.144295	-0.165348	0.610499	0.000000	40.860000
76250.000000	49.437500	8.197445	1.349256	-0.025841		0.142360	0.978745	0.038558	35.316000
74312.500000	50.437500	8.297961	2.485559	0.195489	0.100516	2.107438	1.011334	0.000000	33.930000
154357.142900	46.071429	8.192061	1.864027	0.008273	-0.105899	-0.569149	1.122615	0.000000	33.820000
159428.571400	46.357143	8.116837	4.729340	-0.475997	-0.075224	1.169753	1.149899	0.000000	30.780000
179466.666700	47.333333	8.157784	5.855898	-0.088938	0.040947	0.216216	1.098531	0.000000	30.980000
182480.000000	46.000000	8.253891	3.712283	0.256494	0.096107	-0.230409	0.193420	0.000000	43.630000
186133.333300	47.333333	8.469238	4.086069	0.005071	0.215347	1.199088	0.624158	0.000000	43.020000
115291.666700	48.791667	8.179807	4.471492	0.010213	-0.289431	-0.040774	0.462754	0.000000	48.160000
141434.782600	49.913043	8.230962	4.945892	-0.085282	0.051155	0.051873	0.474294	0.000000	47.820000
140450.000000	46.916667	7.991626	10.500341	0.290828	-0.239335	0.629452	0.223847	0.000000	39.340000
183052.631600	44.736842	7.638870	10.504864	-0.307798	-0.352756	0.077343	0.149962	0.000000	45.500000
196470.588200	49.176471	9.439119	1.231184	0.021794		0.831169	0.646419	0.227963	30.680000
220000.000000	49.375000	9.349250	2.331432	-0.011564	-0.089870	2.758865	0.591281	0.111545	33.540000
283858.823500	50.117647	9.471251	1.193601	-0.034012	0.122002	-0.677886	0.589999	0.070383	21.730000
340094.117600	51.117647	9.530521	2.085754	0.116113	0.059270	1.903240	0.602092	0.020148	26.980000
825781.250000	50.312500	9.451521	2.430216	-0.002679	-0.079001	0.532361	0.629530	0.003139	30.600000
878562.500000	51.312500	9.544651	1.652352	-0.045956	0.093130	-0.349385	0.650402	0.000000	32.180000
621987.500000	52.062500	9.616768	1.368568	0.047536	0.072118	-0.192661	0.643669	0.000000	29.120000
541345.000000	50.900000	9.645930	1.494473	-0.031568	0.029161	0.238129	0.628798	0.000000	27.640000
1072600.000000	51.294118	9.639342	1.942827	0.027668	-0.006587	0.648850	0.628934	0.000000	24.150000
899618.750000	52.625000	9.710607	2.138489	0.094296	0.071265	0.389233	0.638202	0.000000	23.360000
1263831.818000	52.590909	9.823138	1.644685	-0.083875	0.112531	-0.217461	0.623791	0.000000	21.410000
11111.111110	41.944444	8.034551	2.328549	-0.098609		0.904255	0.645749	0.000000	53.250000
53111.111110	42.944444	8.030371		-0.001941	-0.004180	1.893855	0.532469	0.000000	54.470000
33611.111110	43.944444	8.180765	2.567757	-0.044735	0.150394	-0.667954	0.646314	0.000000	57.670000
69200.000000	46.400000	8.255166	4.301205	0.062984	0.074401	1.298450	0.638654	0.000000	54.080000
80168.421050	45.315789	8.200246		-0.049471	-0.054920	0.233558	0.597420	0.000000	54.220000
100228.571400	50.071429	8.263917		-0.052697	0.063671		0.606440	0.000000	54.220000
83081.500000	49.900000	8.306881	6.103702	0.015445	0.042964	0.278196	0.602239	0.000000	53.580000
108400.000000	48.760000	8.592074	2.727702	0.420834	0.285192	0.640641	0.358152	0.093243	53.930000
219711.111100	49.222222	8.316095	3.877863	-0.091618	-0.275978	-0.035202	0.314128	0.034637	49.240000
256647.058800	49.470588	8.281537	1.586325	0.137667	-0.034558	0.364865	0.578180	0.018431	46.810000
239520.000000	49.200000	8.836027	1.417481	-0.199490	0.554490	-0.238614	0.543325	0.018431	44.330000
83568.421050	48.736842	8.487314	1.328224	-0.104370		0.091954	0.644801	0.597542	72.150000
98880.000000	45.500000	8.673953	1.694057	0.062412	0.186639	1.221053	0.699376	0.597542	73.403600
143283.333300	45.722222	8.767042	1.133383	-0.002910	0.093089	-0.692733	0.729266	0.597542	73.299000
334050.000000	46.722222	9.185185	1.559554	0.184707	0.418143	3.205330	0.766335	0.641817	66.880000
298126.315800	47.578947	9.053642	1.312953	-0.113366	-0.131544	-0.361085	0.699635	0.641817	65.850000
316636.842100	47.684211	8.865561	1.195346	-0.030195	-0.188080	-0.096632	0.676791	0.638089	66.460000