ISCTE IUL

Instituto Universitário de Lisboa

The impact of executive incentives on detection of investment opportunities and performance: the case of Chinese listed companies

Chen Deqi

Thesis submitted as partial requirement for the conferral of the degree of

Doctor of Management

Supervisor:

Professor José Paulo Esperança, ISCTE Instituto Universitário de Lisboa

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Full name Deqi Chen

Course Doctor of Management

Student number 201303

Email address cdeqi@163.com

Personal email address 825904792@qq.com

Telephone number 13887697706

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Abstract

Since the reform and opening up in 1978, China has realized a significant transition from a centrally planned to a market economy. The reform of the income distribution system is of great significance for promoting this transformation. For private enterprises as its mainstay, the market valuation and the stock performance depend largely on the future investment opportunities of the enterprises, and whether they can grasp investment opportunities and create new growth opportunities in the future is highly dependent on the decision-making ability of their executives. The existing research on the incentive effect of corporate executives mainly focuses on the evaluation of business performance based on financial indicators and there still is a lack of more in-depth examination of the effect of executives grasping and creating investment opportunities, which is key to the incentive for corporate executives.

Based on the definition of related concepts and literature review, this thesis analyzes 2,533 non-financial A-share listed companies in Shanghai and Shenzhen stock markets from 2004 to 2013. Through descriptive statistics and Fama-Macbeth cross-sectional two-step regression method it first tests the regulating effect of investment opportunities on the return-volatility relationship, and then two types of executive incentives, i.e. equity-based incentive and cash-based incentive, by comparing the regulating effect of investment opportunities with or without incentives, and under different incentive strengths.

The results show that, consistent with the existing empirical results, the change of individual stock volatility has a significant positive relationship with the stock return, and this positive relationship is more obvious in enterprises with more future investment opportunities. Further, the results obtained by grouping the method of executive incentives and the incentive strength show that the higher the strength of executive incentives (especially equity-based incentives) is, the more obvious the role of investment opportunities is in strengthening the positive relationship between volatility of individual stocks and stock returns. It is showed that executive incentives can help companies grasp or create more investment opportunities, and thus allow capital market valuation of investment opportunities to be reflected by the relationship between the changes in individual stock volatility and stock returns. The research results not only provide a new test for the impact of executive incentives on capital market valuation, however also point out that the grasp and creation of investment opportunities is

the key to implementing equity-based incentives among executives.

Key words: Executive Incentives, Investment Opportunities, Stock Returns, Individual Stock Volatility

JEL: G30 ; M52

Resumo

Desde a reforma e abertura de 1978, a China fez uma significativa transformação de uma economia planificada para uma economia de mercado. A reforma do sistema de distribuição de rendimento tem um grande significado na promoção desta transformação. Sendo as empresas privadas o principal esteio da economia de mercado, a valorização e o desempenho das ações dependem essencialmente das oportunidades de investimento futuras e da capacidade de explorar e criar novas oportunidades no futuro, o que é altamente dependente da capacidade de decisão dos seus gestores. A investigação atual sobre o efeito dos incentivos dos gestores foca-se essencialmente na avaliação do desempenho financeiro baseado em indicadores financeiros. Existe uma lacuna na investigação do efeito da capacidade dos gestores em compreender e criar oportunidades de investimento, o que deve ser um elemento chave para os incentivos dos gestores.

Com base na definição dos conceitos relacionados e na revisão da literatura, este estudo analisa 2.533 empresas cotadas tipo A, não financeiras, registadas nas bolsas de Shanghai e Shenzhen, entre 2004 e 2013, através de estatística descritiva e do método de regressão em duas etapas de Fama-Macbeth. Começa por testar o efeito regulador das oportunidades de investimento na relação entre rendibilidade e volatilidade e, a seguir, analisa os incentivos baseados na posse de ações e na remuneração em dinheiro, comparando o efeito regulador das oportunidades de investimento com e sem incentivos e sob diferentes níveis dos incentivos.

Os resultados mostram que, à semelhança de anteriores estudos empíricos, a mudança de volatilidade de ações individuais tem uma relação positiva e significativa com a rendibilidade e esta relação é mais intensa para empresas com maiores oportunidades de investimento futuras. Para além disso, os resultados obtidos agrupando o método de incentivos e a sua intensidade, mostram que, quanto maior o peso dos incentivos (especialmente os baseados na posse de ações) maior o impacto das oportunidades de investimento no reforço da relação positiva entre volatilidade e rendibilidade. Verifica-se que os incentivos dos gestores ajudam as empresas a identificar e criar maiores oportunidades de investimento, permitindo assim que as avaliações pelo mercado das oportunidades de investimento se reflitam na relação entre volatilidade e rendibilidade das ações. Os resultados desta investigação fornecem um novo teste do impacto dos incentivos dos gestores na valorização do mercado de capitais,

confirmando também que a identificação e criação de oportunidades de investimento são essenciais para a implementação de incentivos baseados na posse de ações pelos gestores.

Palavras chave: Incentivos aos gestores, Oportunidades de investimento, Remuneração das ações, Volatilidade das ações

JEL: G30; M52

摘 要

自 1978 年改革开放至今，中国实现了从计划经济向市场经济的转型，并取得了举世瞩目的成就，其中收入分配制度改革对于促进市场经济转型意义重大。对于作为市场经济主体的微观企业而言，无论市场估值还是股票表现，都很大程度上取决于企业未来的投资机会，而未来能否把握投资机会和创造新的增长机会，又高度取决于企业管理者的决策能力。现有关于企业高管激励效果检验的相关研究主要集中于以财务指标为主的经营绩效的考察，尚缺乏对于管理者把握和创造投资机会效果的深入考察，而这正是企业激励高管的重点所在。

本文在界定相关概念和文献综述的基础上，以沪深两市 2004-2013 年间 2533 家非金融 A 股上市公司为样本，运用描述性统计和 Fama-Macbeth 截面两步回归方法，首先检验投资机会对股票收益-波动关系的调节作用；其次，分别针对股权和薪酬两种高管激励方式，通过比较有无和不同激励强度下投资机会的调节作用大小，从投资机会的视角检验高管激励的效果。

研究结果表明：与已有实证结果一致，个股波动率的变化与股票收益率具有显著的正向关系，且这一正向关系在未来投资机会多的企业中表现得更为明显。进一步，高管激励方式和激励强度分组下的结果显示：高管激励尤其是股权激励的强度越大，投资机会对个股波动率变化和股票收益间正向关系的加强作用越为明显。该结果表明：高管激励有助于企业把握或创造多的投资机会，并因此使得资本市场对投资机会的估值可以通过个股波动率变化和股票收益关系得以反应。研究结果不仅从资本市场估值的角度为高管激励效果提供了新的检验视角，而且指出了投资机会把握与创造才是实施高管股权激励的关键所在。

关键词：高管激励；投资机会；股票收益率；个股波动率

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My learning career as a doctoral student is about to end. Now, I feel extremely grateful when my dissertation has been finalized!

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Chapter 1: Introduction

1.1 Research Background

After nearly 40 years of reform and opening up, the development of China's market economy has made great achievements as China has become the most dynamic economy in the world. Under the principle of "opening up both externally and internally", there has been a great breakthrough in economic theory. It has exited the circle of the former Soviet planned economic system and experienced the transformation of economic system models from planned economy to planned commercial economy, commercial economy and finally to market economy. Through the economic system reform, the state-owned enterprises have become market-oriented, and been engaging in autonomous operations, assuming profits and losses independently, and pursuing self-development under macro-indirect management of the government. The shareholding system has been implemented in the capital market, with clear ownership of interests, in favor of the investors, and a modern enterprise system has been established. The development of the private economy is encouraged by regulations, systems and policies, thus creating an unprecedented era of mixed economy. In terms of the rational allocation and optimal allocation of resources, the resource-based industries are appropriately liberalized to private enterprises, which has prompted the trend of China's private economy surpassing the state-owned economy, creating value for the country's economic and social development.

In recent years, the reform of China's market economy has set foot in the "deep water zone", and the reform of the distribution system has increasingly attracted the attention of the Party and the government. When it comes to the salary distribution of listed companies, the phenomenon that the “sky-high compensation” of corporate executives seriously un-matches the wealth created by them, has aroused widespread concerns. The recent battle over the control of Vanke has set off a wide-ranging discussion. The newspaper named as Securities Daily on June 28, 2016, it was reported, Baoneng party of main shareholder from Vanke challenged, that Wang Shi acting in Board-Chairman of Vanke, but had been out of work for a long time, still got huge cash rewards of RMB 50 million . In 2015, of the executives of

listed companies in China, just those of financial listed companies, were paid a total of RMB 1,358 billion from financial listed companies, of whom 7 middle and senior management personnel were paid more than RMB 8 million, respectively. Chen, chief investment officer of Ping An Insurance (Group) Company of China, Ltd., received a remuneration of RMB 12.86 million last year, equivalent to 23.5 times the salary of Jiang, board chairman of the Industrial and Commercial Bank of China who was about to retire. Yi, a hi-tech listed agricultural company in China, suffered a serious loss in 2007. The analysis results showed that its equity-based incentive expenses for the year amounted to RMB 460 million, and the net profit amounted to only RMB 439 million, indicating that the extremely high proportion of executive compensation in the cost was the main reason for the company's losses . Similarly, the compensation of executives in foreign investment banks is even more alarming. Stan O'Neal, the former CEO of Merrill Lynch, received a bonus of USD 36 million and USD 47 million in 2005 and 2006 respectively. In October 2007 when he left the company, the value of stock options he got reached USD 161.5 million. After the 2008 financial crisis, American International Group (AIG) received the relief of more than USD 17 billion 4 times from the US government but used most of the money (totaling USD 165 million) to pay the middle and top executives, causing widespread dissatisfaction. US President Barack Obama vehemently condemned this act. In fact, the US "Occupy Wall Street" movement in 2011 was also caused by the high salary of Wall Street financial executives, which resulted in strong public dissatisfaction.

The reason why there are many controversies about the sky-high compensation of executives centrally lies in how to understand the key points of executive incentives, and how to quantify and measure their effects accordingly. In fact, unlike the incentives of ordinary personnel, the executive incentives emphasize whether they help companies grasp investment opportunities in a timely manner, and whether they help create new growth opportunities for enterprises. However, it is difficult to directly observe or even measure the investment opportunities in the real world, and it is also difficult to explain the extent to which the corporate value growth is brought about by the executives who succeed in grasping and creating investment opportunities, thus resulting in the dispute of “sky-high annual compensation”. On this basis, this research chooses the investment opportunity perspective to test the effect of executive incentives, which can make up for the insufficiency of existing research on incentive effects through financial performance and other business performance.

As for the asset composition of the company, Myers (1977) took the lead in decomposing the total asset value into Asset-in-Places and Growth Options, while with the executive incentives, the company grasps and creates the investment opportunities to enhance the corporate value through growth options, which is reflected in an effective capital market. Grullon, Zhdanov, and Lyandres (2012) pointed out from the basic theory of option pricing that the growth option value and the underlying asset value volatility have a positive relationship, so that there is a positive relationship between the volatility change of the underlying asset and the growth option yield. Further, the higher the proportion of growth options in the composition of an enterprise's assets is, the stronger the positive relationship between the return on assets and the change in volatility is, that is, the growth option has a positive regulating effect on the relationship between the return and the change in volatility. On this basis, if the implementation of executive incentives, especially long-term equity incentives, can bring new investment opportunities to enterprises, or increase the valuation of existing investment opportunities, then the corporate assets and their value will contain more growth options. As a result, growth options will have a stronger sinusoidal regulation on the relationship between stock volatility changes and stock returns. Therefore, based on the positive relationship between stock returns and volatility changes, and the further positive regulating effect of growth options on this relationship, we can compare the strength of regulation with and without executive incentives, and under different modes and intensity of incentives, and investigate the effect of executive equity incentives from the perspective of grasping and creating investment opportunities.

The incentives for executives include cash compensation incentives and equity incentives. Of them, equity incentives, including equity and stock options, can better reflect the effects of executives' grasping and creating investment opportunities. In the past, most of the research on focused on the cash compensation incentives, however few on equity incentives. Stock options were uncertain to a large extent and it was difficult to estimate their value. Therefore, even if executives occupied a large proportion of long-term incentives, the research in most of the previous literature was mainly limited to cash compensation. Long-term incentives usually include stocks or stock options, which are usually redeemed in a few years, and then the value of executive compensation can be realized. Considering the availability of data collection and the feasibility of research, in the past, most domestic scholars used the cash compensation of executives as a compensation variable (Du & Wang,

2007; Li, Bao, Gao, and Kong, 2007; Shen & Li, 2010). Some researchers selected cash compensation and equity-based compensation as the compensation variable factors for simple research (Xu, Wang, & Gong, 2007). The practice of equity incentives in China is very short and there is a possibility of abuse. Some people believe that equity incentives have become an effective means for executives to seek personal gain (Wu & Wu, 2010). In fact, of the executive incentives, equity or stock options are more able to motivate executives to grasp and create investment opportunities, however this incentive effect is difficult to be reflected through financial index-based business performance, however more needs to be combined with the reasonable pricing of stock market. Grullon et al. (2012) found that equity incentives are effective in improving management efficiency, reducing agency costs and improving the company's cohesiveness and competitiveness. With the implementation of the national normative documents for equity incentives and the increased availability of data collection, the focus of this research is to test the long-term effects of executives' grasping and creating investment opportunities, that is, on the basis of previous studies on cash compensation, this research tries to use descriptive statistics and Fama-Macbeth two-step regression method to further compare cash compensation and equity compensation in terms of selecting and expanding investment opportunities so as to determine their impact on stock returns. First, this research examines the impact of investment opportunities on stock return-volatility, that is, tests the impact of investment opportunities on stock returns, and determines the investment opportunity pricing. Second, this research conducts a comparative analysis on the impact of investment opportunities when the executive incentives of different modes or intensities are adopted, and empirically tests the effects of executive incentives from the perspective of investment opportunities.

1.2 Definition and Discrimination of Related Concepts

1.2.1 Definition of executives

Regarding the compensation incentive study of executives, domestic and foreign researchers hold different scopes of analysis. Some scholars focus mainly on CEOs. For example, McGuire, Chiu, and Elbing (1962) studies only CEOs. More recently, Xu et al. (2007) included the board chairman and the general manager. Some scholars broadened the object of their study from CEOs to the entire management team. For instance, Murphy (1985)

took the compensation of managers who have signed the power of attorney in the capacity of shareholders at least for successive 5 years as the variables. In the study of Wei (2000), an executive was defined as a member of the company's board of directors, the company's board of directors, general manager, deputy general manager, president, vice president, chief financial officer, chief engineer, chief economist, chief agronomist, secretary of the board of directors and a member of the board of supervisors.

According to the previous research, with reference to Special Regulations of the State Council Concerning Issuing and Listing of Shares Overseas by Company Limited By Shares, an executive of the company is defined as member of the management personnel under the supervision of the board of directors, including the board of directors, senior managers, officers responsible for the company's business and all senior management personnel disclosed in the annual report. For listed companies, this scope covers the chairman, president, chief financial officer and vice chairman, deputy general manager and other senior management (directors, supervisors, board secretary and other senior management personnel). The reasons why the definition is broad mainly include: First, after the enacting of the Company Law, the scope of executives is extended to the company's senior management, board secretary and chief financial officer. Second, the corporate governance structure and development nature are decided by the company's board chairman or general manager, however the personal influence of other senior executives also cannot be neglected. The company's business performance is the result of joint efforts. Third, many of the executive compensation incentive metrics in the study can be extracted directly from the listed companies' annual report to avoid data distortion during the data collection process, to improve the accuracy and reliability of the data, and to ensure the correctness of the research results.

1.2.2 Definition and type of incentives

Incentives mean to show concern for and exercise a binding influence on people. By pre-setting a goal and requirements, managers motivate people to work in a stimulating way to achieve desired goals.

There are two types of incentives, explicit and implicit. Explicit incentives are usually in the form of material returns and money, such as wages, bonuses, allowances and stocks. Implicit incentives are mostly non-material such as recognition, rights and consumption at

work. The rewards are classified as short-term and long-term in terms of the duration. Short-term incentives will work within one year, and long-term incentives will work after one year. This research examines two types of rewards that have dominant, short-term and long-term effects: compensation incentives and equity incentives.

1.2.2.1 Compensation incentives

Top management compensation is generally composed of base salary and performance-related pay. The base salary is usually determined by the professional quality and work attitude, work experience, and the scope of work of the executives, and is relatively stable which can meet the basic living requirements of middle and senior managers. Performance-related pay is part of executive compensation and fluctuates greatly with the company's performance. It aligns the personal goals of senior management with the corporate goals, thereby easing agency costs, urging the executives to work hard, and creating more value for the company. Previous research has shown that rewards have a positive impact only if managers receive monetary compensation above their intended goals. According to the optimal contract theory (Bebchuk & Fried, 2003), shareholders can design a compensation contract that maximizes the executive's ability to embody the compensation value of senior management and meet the interests of senior management, thus achieving the win-win situation of shareholders and senior management. The definition of executive compensation in this research is their annual total salary (that is, the “compensation” in this research mainly refers to short-term, performance-based annual salary and rewards, which is different from long-term incentives such as equity and stock options).

1.2.2.2 Equity incentives

Equity incentives mean that shareholders give the company's shares to senior management, that is, the interests of the company's shareholders and senior management are harmonized through joint stock ownership. Senior managers must work hard to maximize their own interests, so as to improve the company's performance and create more value, which tends to make the interests of both parties consistent, thus alleviating agency conflicts and reducing costs. As a scientific and effective long-term incentive method, equity incentives can make up for the limitation and deficiency of short-term incentive mechanism to a certain extent, and serve as an important part of modern corporate governance structure. The experience of Western countries also shows that the use of short-term and long-term

incentives is more conducive to the company's long-term development in the future.

The goal of equity incentives is to solve the problem of agency conflicts, and tie the interests of managers themselves with the interests of the company, thus achieving the "incentive compatibility". However what are equity incentives? On this issue, there is no unified answer in the theory and practice of China and foreign countries.

From the perspective of legal system, the securities and exchange commission (SEC) holds that equity compensation refers to a plan or arrangement for a listed company to grant a certain amount of securities based on its own stock to directors, employees or other service providers as compensation for their services to the company. Under this definition, the securities should be considered equity compensation as long as they are part of compensation, even though they may not be granted with a specific arrangement or plan. However, if the plan is for all shareholders or only allows directors, employees and their service providers to buy shares from the securities market or the company at market prices, neither spot nor option transactions can be classified as equity compensation plans. According to this definition, various forms of equity incentives, including stock options, restricted stock, performance stock, stock appreciation right, employee stock ownership plan. are regarded as equity incentives in the United States.

In China, equity incentives are an institutional arrangement. In 2006, the Measures for Implementation for Equity Incentives of Listed Companies (Tentative) issued by the relevant departments stipulated that equity incentives are long-term incentives for senior executives based on the stocks of the company. Therefore, it can be considered that equity incentives are an institutional arrangement under which the executives can achieve the status of the company's shareholders, participate in decision-making, share profits according to the proportion of equity, take risks, claim the company's remaining property rights, and are encouraged to serve the company for a long time.

It is worth mentioning that before the Measures for Implementation for Equity Incentives of Listed Companies, our country began to explore the equity incentive system of listed companies, stock appreciation rights, virtual stock shares, performance incentives, such as executives shareholding form appeared, but the incentive plan is limited by the legal policy strictly limited, poor maneuverability, incentive effect is not good, whether with the same period of the enterprise on the implementation of equity incentive, and introduced the measures for the management of Chinese enterprises after the implementation of equity

incentive, it have significant difference on the nature and function, do not belong to the equity incentive in the true sense. However, considering that in China's listed companies, management shareholding greatly exceeds the new equity incentive system in terms of application universality and intensity, so many domestic scholars still regard management shareholding as an equity incentive.

1.2.3 Definition of investment opportunities

The value of an enterprise's assets can be divided into an invested asset-in-place that can generate cash flow, and expected value of investment opportunities to be invested in the future. Investment opportunities are a combination of the company's internal resources and external factors that create a growing accumulation of technology, profitability, size, reputation, and market position, economic or non-economic factors. Investment opportunities are a relatively abstract concept and are difficult to observe directly without an exact definition. They can only be measured by some indirect variables. In general, investment opportunities determine the company's development potential, that is, the more investment opportunities are and the higher the growth potential is. Therefore, most people think that the company's growth search (growth opportunity search) is investment opportunity search. In the academic world, these two concepts are generally not distinguished. The investment opportunities mentioned in this research are growth opportunities.

Regarding the search of investment opportunities of enterprises, most scholars start from real options, i.e. the growth option research. In general, the company has a set of investment opportunities, that is, to obtain the opportunity for the future growth of the company through investment, and to hold the right to carry out certain economic activities at a certain time. When the interests of the company and the interests of the executives are consistent, the enforcement of such rights can bring some benefits to the executives. In other words, proper incentives lead executives to exercise the power to select the investment opportunities for project investment, thereby expanding the scale of the company and the product market to create conditions for the company's growth. Therefore, from the perspective of value, the value of investment opportunities is greater than that of invested assets-in-place.

Selecting investment opportunities and gaining long-term development capabilities for the company is the right granted by shareholders to the executives. Improper selection of investment opportunities or the wrong timing will affect the company's performance. Because

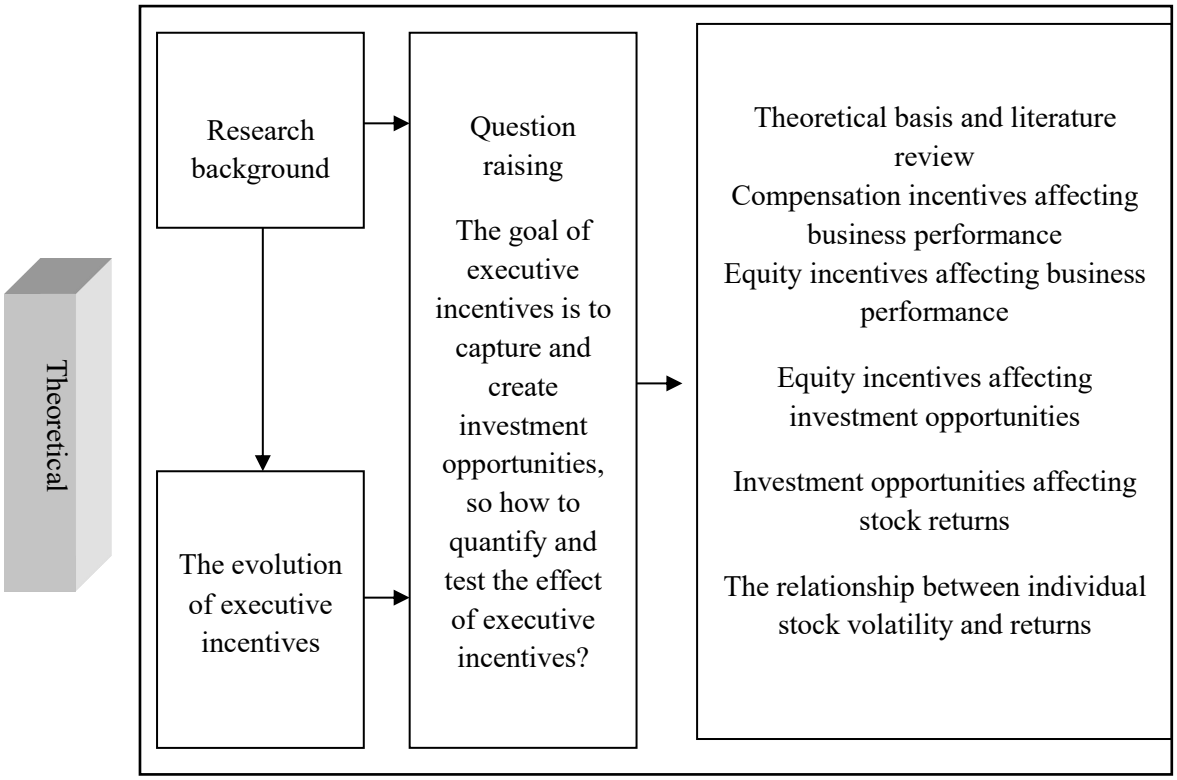
shareholders do not necessarily have management skills, there is information asymmetry in the selection of investment opportunities, and objectively, company executives are also required to select investment opportunities. Previous research has shown that corporate executives may pursue "self-interest", and even commit "moral corruption" behavior by using their powers to choose and decide on the investment opportunities that maximize their benefits, thereby damaging the company's value and bringing more serious principal-agent problems. However, with high investment opportunities, companies will have better operating performance and high yields. On the other hand, shareholders need to give executives enough incentives to ease agency problems, thereby reducing the self-interest behavior of executives. The analysis of these two aspects constitutes the two core topics of this study.

1.3 Ideas and Structure of the research

1.3.1 Research ideas

The research contents of this research involve two aspects of standardization research and empirical research. In terms of standardization research, in view of the fact that equity incentives were less considered in previous studies, this research specifically introduces the development process of equity incentives in the United States in Chapter II. By reviewing this process, it can be seen that companies adopt equity incentives to achieve the goal of “incentive compatibility”, i.e. making the interests of the company's shareholders and senior management consistent, which is conducive to the long-term development and growth of the company, and helps maximize its value. At the same time, this research also introduces the development of equity incentives. With the enacting of the Measures for the Administration of Equity Incentives of Listed Companies, there are three main ways of domestic equity incentives, including Stock Options, Restricted Stock and Stock Appreciation Rights. As to the empirical research, a step-by-step approach is adopted. First of all, this research presents empirical research showing that stock volatility has a significant positive correlation with stock returns. On this basis, the investment opportunity variable is added to test the impact of the interaction between investment opportunities and stock volatility on stock returns. Finally, this relationship is first grouped according to the level of cash compensation, and then grouped according to the level of equity compensation, to compare the difference between high-paying sample companies and low-paying sample companies in terms of the relationship

between the interaction and stock returns. Eventually, the relationship between executive compensation and stock returns is analyzed from the perspective of opportunity and stock volatility. The specific research ideas of this research are shown in Figure 1-1.



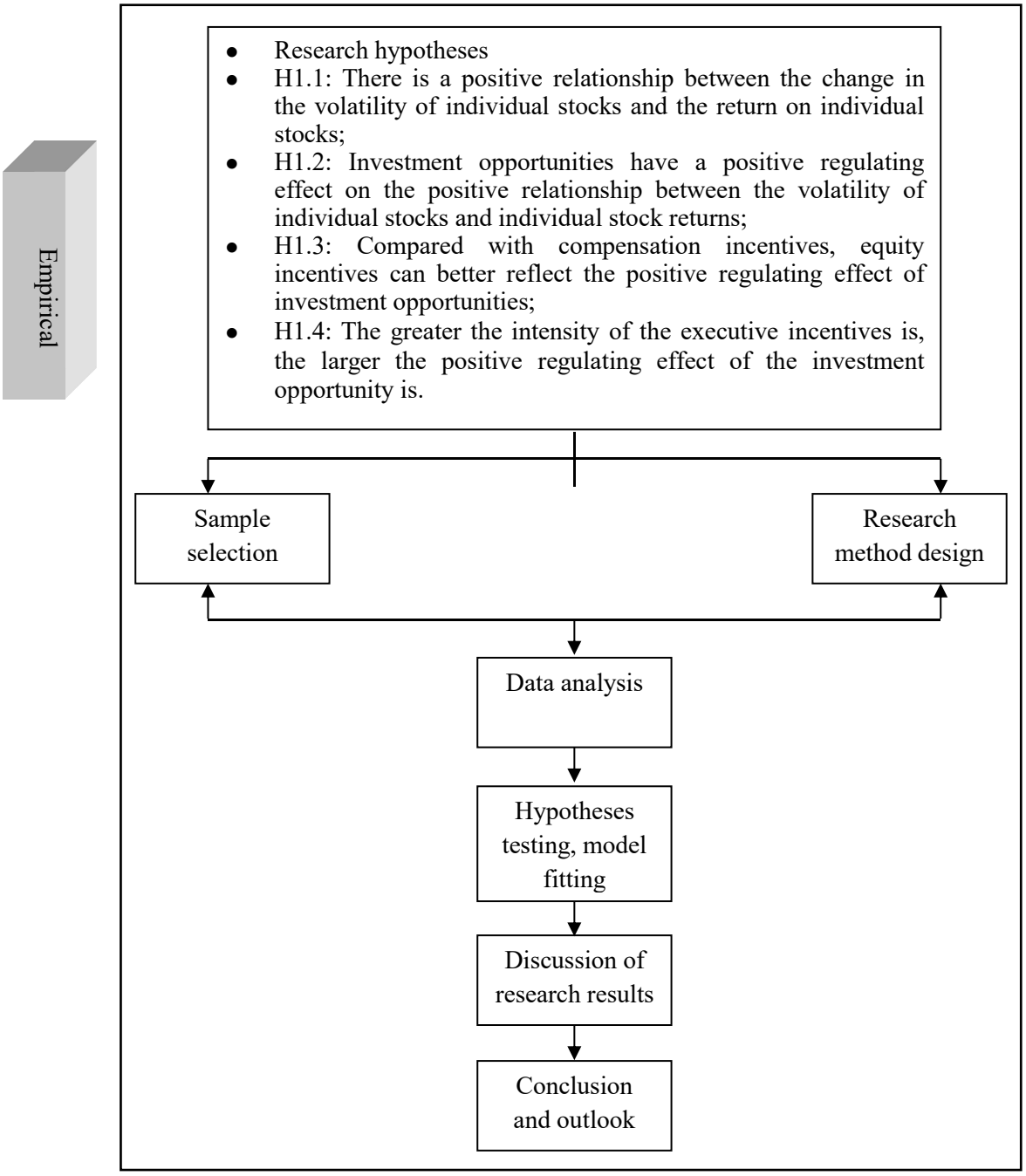


Figure 1-1 Research ideas

1.3.2 Research contents and arrangement of chapters

The study is organized as follows:

Chapter 1: Introduction. This chapter briefly reviews the development history of China's market economy, presenting the debate over “sky-high compensation” of listed companies’

executives, introduces the research theme of the effect of executive incentives in this research. Then it briefly introduces the research status of executive incentives, and elaborates the research focus of this research, i.e. to examine the long-term effects of executives' ability to grasp and create investment opportunities; introduces the definitions of executives, incentives and investment opportunities; proposes research ideas and the overall framework of this research, and points out the innovations of this research.

Chapter 2: Real Development of Executive Incentives. This chapter introduces equity incentives under different institutional contexts in the United States and China, compares the development and different characteristics of equity incentives in the United States and China, and points out the problems of Chinese executive incentives.

Chapter 3: Theoretical basis and literature review. This chapter first introduces five main theories related to executive incentives, namely principal-agent theory, optimal contract theory, incentive theory, information asymmetry theory and executive power theory, focuses on the theory of option pricing and Human capital theory. Secondly, the status quo of executive incentives is analyzed and summarized. It is pointed out that the most important essence of executive incentives is arranging the long-term and effective equity incentive mechanism, promoting the exercise of executive growth options, enabling enterprises to grow by leaps and bounds and realize corporate value to the maximum, and the win-win situation of shareholders and executives. Thirdly, the basic method of option pricing is introduced, which shows that investment opportunities can be characterized as growth options, and finally be priced by option pricing. Finally, it reviews the relevant theories and empirical evidence of executive incentives by sorting out the literature on the executive incentives affecting investment opportunities, and investment opportunities affecting stock returns.

Chapter 4: Research Hypotheses and Empirical Design. With the A-share listed companies as a sample, this chapter proposes the literature based research hypotheses on the relationship between the volatility and returns of individual stocks, the regulating effect of investment opportunities on the relationship between the volatility and returns of individual stocks, and the incentive effect of executives based on investment opportunities.

Chapter 5: Analysis of Empirical Results. This chapter analyzes the empirical results, which shows that investment opportunity research is of great significance to enterprises. Investment opportunities have a great impact on enterprise growth, which is ultimately reflected in stock returns. The grasp of investment opportunities is mainly decided by the

corporate executives, and therefore, incentives for executives should focus on motivating executives to grasp and create investment opportunities, or executive incentives should target their ability to capture, grasp and create investment opportunities. The intensity of incentives for executives determines the amount of investment opportunities for enterprises. The effect of executive incentives is ultimately reflected in the returns and volatility of stocks, especially their relationship.

Chapter 6: Conclusions and Recommendations. This chapter summarizes the full text and looks forward to the research results. Firstly, through reviewing and summarizing the full text, the main research conclusions of this research are obtained. Secondly, the research conclusions are summarized and on this basis the policy recommendations are put forward. Finally, the limitations of the research are elaborated, and the direction of further research is pointed out.

1.4 Major Contribution

The second and third chapters of this research adopt the normative research method to review and evaluate the literature related to executive incentives. It is concluded that the essence of executive incentives is to achieve executive growth options through incentive mechanism arrangements, so that the shareholders and executives can get benefit. On this basis, the fourth and fifth chapters adopt empirical methods to propose research hypotheses, then test the impact of individual stock volatility on stock returns, as well as the role of investment opportunities in regulating the volatility and returns. The executive pay is grouped into high and low one to examine whether the influence of individual stock volatility on stock returns was strengthened, and point out the relationship among executive incentives, investment opportunities and stock performance. Therefore, through the combination of normative research and empirical research, this research studies the effect of executive incentives of listed companies in China from the perspective of investment opportunities, and has certain guiding significance for improving the executive incentive system of listed companies. The major contributions of this research lie in:

(1) Based on the existing research on the relationship between individual stock volatility and returns, the executive incentives of listed companies in China and their effects are tested from the perspective of grasping and creating investment opportunities, and

investment opportunities are the core of enterprises (especially the sustainable growth of enterprises in China) and the key to executive incentives. The basic conclusions show that the change of individual stock volatility has a significant positive correlation with the stock return, and this positive relationship is more obvious in enterprises with more investment opportunities in the future. Through the further research, it is shown that the test results based on the intensity of sample companies' executive incentives indicate that the greater the intensity of executive incentives is, especially the equity incentives, the more obvious the role of investment opportunities play in strengthening the positive relationship between stock volatility and stock returns. The research results not only provide a new perspective of capital market pricing to test the effect of executive incentives, but also point out the key of equity incentives from the perspective of grasping and creating investment opportunities.

(2) This research reviews the development status and related literature on executive incentives in a more comprehensive manner. Most of the existing research evaluates the effect of executive incentives and its influencing factors through business performance, mainly the financial index, while this research emphasizes the rational pricing of capital market through the relationship between the change of volatility and return of individual stocks based on the option pricing theory, which largely compensates for the short duration and subjective limitation of financial performance indicators.

Chapter 2: Recent evolution of Executive Incentives

2.1 Development of Executive Incentives in the United States

Executive compensation usually includes three elements: (1) cash compensation such as wages and bonuses; (2) long-term incentives, including various forms of stock options and deferred compensation; and (3) other benefits other than wages and allowances, such as insurance premiums, club membership and non-cash compensation. For a long period of time, equity incentives, as an important part of executive compensation, have accelerated the development of the US economy and been considered a catalyst for US economic development. From a global perspective, equity incentives in the United States are diverse with the widest coverage, and are widely used in US companies, with the highest percentage of total compensation (Hall & Murphy, 2002).

2.1.1 Budding period

Equity incentives originated in the 1930s. The Employee Stock Option Plan was first proposed by Kelso, an economist. In the capitalist manifesto, Kelso and Adler (1958) proposed: mobilizing the establishment of loan mechanism, supporting employees to buy the assets of enterprises from the retiring employee's , and become the employees and shareholders of new enterprises, and promoting the combination of labor income and capital income of workers. The original intention of this plan in the United States was to alleviate the severe social inequality and sharp labor conflicts, and to promote the government's legislation on employee stock ownership plan in the United States. Since the mid-1950s, the plan has been gradually extended from the United States to the United Kingdom, Japan and the Netherlands and become an important system in enterprises.

In order to promote the recovery and development of the post-war economy, the United States regulated corporate behaviors. In 1950, the US Congress passed the 1950 Income Act (Section 218, Revenue Act of 1950), which amended the US tax law by officially regulating the restrictive stock options in a legal manner, granting the legal status of stock options, stipulating that any enterprise could issue stock options to employees, and would not be taxed

when the restricted stock is granted, but taxed at 25% of the spread when the stock is exercised. Compared with cash payments taxes of up to 92%, this policy was undoubtedly very attractive to corporate executives. In 1952, Pfizer, a US pharmaceutical company, launched the world's first equity incentive plan, which aimed to reduce the income of senior executives of the company to pay high income tax (the highest marginal tax rate was 92%). Pfizer was the first company to adopt stock options. Although its purpose was not to reduce agency fees through long-term incentives, it objectively combined the long-term interests of the company with the interests of corporate executives.

2.1.2 Period of slow development

There are two important reasons for the widespread use of equity incentives: one is tax preferences, and the other is the prosperity of the stock market. In 1964, the Kennedy Reform Act replaced conditional stock options with restricted stock options, and newly granted options were not exercised until the previous option had expired. In the 1970s, US companies' executives spurred the launch of various equity incentive plans, including stock appreciation rights and virtual stocks, and integrated these equity incentives together. Through these various equity incentive programs and combinations, on the one hand, the work initiative of executives is improved; on the other hand, executives will pay more attention to the long-term interests of the company, rather than the short-term benefits. In general, equity incentives have grown slowly as Congress has revised the tax law twice to lower the tax rate on cash compensation and the US economy has entered a "stagflation period".

2.1.3 Period of rapid development

The rapid development of hi-tech industries has accelerated the growth of equity incentives. In the 1980s, the proportion of US companies using equity incentives was generally small, but after the 1990s, this proportion gradually increased, and many small and medium-sized enterprises also adopted equity incentives, enabling equity incentives to become a normal mode of executive incentives widely used in the United States. By the end of 1999, more than 90% of NASDAQ-listed companies had adopted stock options. Around the year 2000, the median value of the stock and option value of the US S&P 500 management was USD 30 million. In all industries, financial companies had the highest pay, and the median compensation paid through equity was USD 55 million (Hall & Murphy,

2002). Hacker and Pierson (2010) found that, on average, during the ten years from 1990 to 2000, the proportion of stock options in total compensation rose from less than 25% to around 50%.

There are many reasons why stock options are becoming more and more popular among US companies, mainly changes in tax incentives, changes in accounting standards, prevention of brain drain, and the US bull market in the 1980s. Of them, the most important factor is the change in accounting standards and tax policies. The specific treatment of equity incentives in the US accounting practice is that the company only needs to disclose the matter in the notes to the financial statements of the year in which the shares are granted, and does not include the granted stock options in the current expenses, that is, the over-year stocks are not required to be expensed. This accounting treatment method continued until 2004. Prior to this, the 1972 APB 25: Accounting for Stock Issued to Employees and the Financial Accounting Standards Statement No. 123 - Share-based Payments issued by the Financial Accounting Standards Board (FASB) in 1995 were adopted. This standard may cause listed companies to inflate profits. Buffett once commented on equity incentives: "If an option is not a form of compensation, what is it? If compensation is not a fee, what is it? Also, if the cost is not included in the calculation of the income, how should it be treated?" In terms of tax incentives, the equity incentive income has a lower tax rate, and within a certain range, the option tariff can be deducted before tax. In addition, by linking the shareholding time and the tax rate, the tax is paid when the stock is sold, and the incentive object is given the substantial tax subsidy, which helps bring into play the role of equity incentives.

Kaplan (1994) made a comparative study on the dismissal and remuneration of senior managers with the relationship of corporate performance about Japanese and American. He found that the relationship between executive compensation and performance in Japanese and American companies was statistically similar. Mehran (1995) used data of 153 manufacturing companies randomly sampled from 1979 to 1980 and found that incentive compensation for CEO was the driving force to improve corporate performance. Dewatripont and Tirole (1999) discussed in detail the implicit motivation for managers -- the focus on reputation and career, believing that managers always want to establish a good reputation for themselves within the company and in the manager market. Reputation is an important means to motivate and restrain managers. If it wants to play the role of reputation incentive, there must be a perfect professional manager market. By the end of the 20th century, 90% of the companies chose to

offer executive stock options, in the top 1000 companies in the United States. Stock options in the proportion of total income of executives have also risen from less than 20% in 1976 to 50% in 2000. The option gains even account for over 95% of the total income of executives, such as General motors, Coca-Cola, Johnson and Disney.

2.1.4 Period of stable development

In the 21st century, with the bursting of the stock market myths of a number of hi-tech companies, the bear market of the US stock market came, and the stock options previously granted on the bull market were greatly reduced to “out-of-the-money options" and lost value. Then, the outbreak of a series of financial fraud scandals such as Enron and WorldCom, forced people to further reflect on the development of equity incentive system for more than half a century. The introduction of the Sarbanes-Oxley Act (SOX) in 2002 also imposed restrictions on executive compensation. One of the key features of the Clawback Provision in Section 304 is based on the consideration of the company’s long-term performance. If the evidence in the future is sufficient to indicate that the executive has dereliction of duty, the board of directors has the right to recover the executives incentives such as bonuses already issued. The reason why this clause is beneficial to alleviate the agency problem and safeguard the interests of shareholders is that the short-term behavior of senior executives is difficult to be found at one time, but in the long run, it is not conducive to the development of the company, and the company's performance will be affected. Another change brought by the financial scandals to the equity incentive system was that the FASB issued SFAS No. 123(R) in 2004 to determine the fair value measurement method in the option accounting process. In 2005, the FASB issued the revised the Financial Accounting Standards Statement No. 123 - Share-based Payments, which requires enterprises to measure the share-based payment instruments at fair value on the date of grant of the share-based payment instrument. The company is required to present the fair value of stock options in the income statement, and the straight-line method can be used to amortize the expenses incurred during the grant period due to equity incentives. Undoubtedly, this change has played a positive role in regulating executive compensation and reducing the profit manipulation of listed companies.

After the incident of Enron, the famous accounting experts, Ge believes that the incidents of Enron should cause the social full attention from all walks of life especially of accounting profession. Because that it is not only the accounting information distortion

problem, but also exposed that the serious defects the system of United States in order to ensure the quality of accounting information.

Not long after the financial fraud incidents of Enron and WorldCom, in 2006, there was another “scandal wave” of listed companies in the United States: more than 200 listed companies were suspected of stock option backdating, and listed companies deliberately chose the date when the stock price was lower as the option grant date, in order to expand the excutive managers’ profitability. Due to the low share price on the grant date, the stock option cost presented in the listed company's book was underestimated, resulting in the overestimation of the listed company's earnings. Just as people thought that the crisis had passed, a bigger crisis came unexpectedly. The 2008 financial crisis broke out and quickly swept the world. Originated in the United States, this crisis jeopardized the world's major economies, and made multiple impacts on the world (Liu & Ge, 2012). Some studies found that the disconnection between management compensation of Wall Street financial institutions and risk management had tempted short-sighted decision-making by corporate executives and became one of the triggers of the financial crisis (Blinder, 2009). Wall Street financial institutions were delivering bonuses while receiving relief, which extremely dissatisfied the public, and made the supervision over equity incentives more stringent. This was not the first time that the huge cash rewards of financial executives had been exposed. In 2007, the average annual salary of the CEO of S&P 500 was USD 10.5 million, 344 times the annual salary of ordinary American workers. Even so, compared with the 525 times before the dot-com bubble burst in 2000, this gap had been already converged (Heather, 2008). In this context, the United States successively introduced the Emergency Economic Stabilization Act and the American Recovery and Reinvestment Act. It was stipulated that the companies under relief must remove from the incentive arrangements the clauses which motivate CEOs to assume unnecessary and excessive risks, thus prohibiting golden parachutes, and add the clauses of revenue recovery. At the same time, the government also introduced the regulations on the upper limit of executive compensation. In 2010, the Dodd-Frank Law was introduced and the provisions regarding the compensation supervision included: increasing the contents of information disclosure, such as revealing the relationship between executive compensation and corporate performance; increasing the shareholder's right to say on pay, requiring the company to vote for shareholder compensation at least once every three years, and raising the relevant requirements for salary recovery and salary structure disclosure.

Reviewing the history of the development of executive incentives in USA, we can find that this system has alleviated the principal-agent problem to a certain extent, and achieved the goal of “incentive compatibility”, which has effectively promoted the development and growth of enterprises. At the same time, equity incentives also have such problems as increasing corporate risks, triggering management opportunistic behaviors, and expanding the pay gap to a certain extent. Although this incentive system is far less perfect than people think, the criticizer suggests that by making use of the information asymmetry between corporate executives and shareholders, the corporate executives turn the equity incentives into a tool for their legitimate pursuit of personal interests. In a sense, it is the equity incentive system that promotes the myth of the US Silicon Valley and the entire hi-tech industry, thus boosting its global popularity in a short period of time. Since equity incentives are very important for promoting innovation and maintaining corporate vitality and cohesiveness, it is necessary to bring into full play the role of improving the corporate governance structure, strengthening the tax supervision by the government, and perfecting the information disclosure. As SEC Commissioner Roel C. Campos said at 2007 Summit on Executive Compensation, the SEC's role of regulating equity incentives is “more disclosure, not less compensation”.

2.2 Development of executive incentives in China

The executive incentive system has been widely used abroad, but its domestic use is still limited. Taking equity incentives as an example, only a few companies have tried and explored in some areas according to their own characteristics and the local socio-economic environment. Taking the official implementation of the Measures for the Administration of Equity Incentives of Listed Companies in 2006 as a symbol, the executive incentives of listed companies in China can be divided into two stages.

2.2.1 Development before 2006

In the 1980s, the profit retention system of enterprises could be said to be the initial form and germination of executive compensation incentive mode. In the development process of Chinese enterprises, it was the first time that executive compensation was linked with enterprise performance. Since then, the nationwide contract responsibility system has extended the reform to the field of control, realizing the separation of ownership and

management of state-owned enterprises. Although administrative salary and administrative power are still the main forms and influencing factors of executive compensation at this stage, material incentive has gradually become an important factor in executive compensation, and the changes at this stage have laid a solid foundation for the further development of executive compensation system. Before 2005, a small number of companies in China tried to adopt the forms of employee shares and trade union shares for equity incentive. The main characteristics of this equity incentive system are the welfare nature and the incentive period is generally short. Because there is no relevant national policy guidance, equity incentive is difficult to achieve the goal of long-term incentive. With the vigorous development of market economy and the introduction of modern enterprise management system, it is imperative to reform the executive compensation system. In 1992, Shanghai yingxiong jinbi factory and three other enterprises became annual salary system pilots, opening a new page in the reform of China's executive compensation system. In the same year, the state council issued the "trial measures on annual salary of enterprise managers". Subsequently, many enterprises in Shenzhen, Beijing, Liaoning, Sichuan and other places began to implement the annual salary system for senior executives. By 1997, over 10,000 enterprises in more than 20 provinces and cities had implemented the annual salary system for senior executives. At the same time, the disclosure of executive compensation information of listed companies in China also tends to be transparent. In January 1998, the former ministry of labor announced the suspension of the implementation of the annual salary system in the country, the reform of the annual salary system temporarily entered a period of low tide. This stage is not only a period of reform, but also a period of continuous attempts. The incentive mechanism of executive compensation of listed companies is in constant change, and the incentive factors and methods are increasingly rich. The amount of incentive has increased by leaps and bounds compared with the previous period. In this period, in addition to the executive annual salary system, the monthly salary system, bonus, bonus, contract system, stock holding, stock options and other compensation incentives coexist, which can be said to be a hundred flowers contend. In September 1999, the decision of the central committee of the communist party of China on several major issues concerning the reform and development of state-owned enterprises was passed, which once again pushed the annual salary system onto the stage of executive compensation incentive reform of China's listed companies. Since then, while vigorously implementing the annual salary system, it also began to gradually explore various ways of equity incentive. At this

stage, the state has successively issued some regulations, making relevant provisions on the ways, factors and standards of executive compensation incentives. Meanwhile, it has also tightened the information disclosure mechanism of executive compensation and made detailed requirements on the disclosure of executive compensation amount, way of receiving and assessment standards. At this stage, with the maturity of corporate governance mechanism, the perfection of information disclosure system and the increasing globalization of Chinese enterprises, the structure and level of executive compensation are more reasonable and perfect.

From the early 1990s to 2005, due to the government's lack of relevant supporting guidelines, only a few companies actually tried the equity incentives among executives. At this stage, China's equity incentives once existed in the form of employee stocks and trade union stocks, characterized by equity incentives of a welfare nature. It was difficult for employees to sell them in the short term after the company's listing to achieve the goal of long-term incentives. Prior to 2006, due to such restrictions as the prohibition of share repurchase and transfer of shares by executives during their term of office as stipulated in the Company Law, some listed companies could only seek the marginal zone of the law to carry out "equity incentives" in disguise. Representative practices such as TEDA mode, Wuhan mode, and Wu Zhong Instrument mode are summarized in Table 2-1. In general, during this period, the equity incentives of domestic listed companies were mostly individual explorations of some companies. The success depended largely on the support of local governments and, due to lack of guidance from national laws and regulations, there existed larger differences.

Table 2-1 Equity Incentive Modes before 2006

Abbreviation	Mode	Specific practices
Wu Zhong Instrument Mode	Option + Futures + Employee Stocks	Wu Zhong Instrument Co., Ltd., with the decision-making layer, management, major R&D personnel, key positions and other personnel as the incentive object, granted stock options, and realized the reduction of state-owned shares through employees who held the shares.
TEDA Mode	Incentive Fund to Buy Stocks	Tianjin TEDA Co., Ltd. extracted 0.2% of net profit after tax each year as incentive funds for executives and major business backbones. These

		funds could only be used to purchase the circulating shares of TEDA by the incentive object and be frozen accordingly.
Wuhan Mode	Deferred payment to purchase stocks granted	Wuhan State-owned Assets Department provided equity incentives to Wuhan Department Store Group Co., Ltd. and other companies to purchase circulating shares as part of the operator's annual pay. The legal representative of a listed company implemented the annual salary system. 30% of the income was paid in cash, and the rest was used to purchase in the company's stock one month after the company's annual report was announced. At the same time, the operator and the state-owned company signed a stock custody agreement, whereby the voting rights of the shares were transferred to the state-owned company. The shares purchased during the year would be awarded to the operators in batches based on actual results in future years.
Belling Mode	Simulated Stock Options	The main person in charge of Shanghai Belling Co., Ltd.., deferred the payment of the bonus of the annual income with reference to the principle and calculation method of stock options. It was a kind of simulated stock options rather than real ones.
INESA Mode	Futures	INESA Holding Group implemented the future-based award among its four controlling listed companies. The main person in charge of a listed company obtained a stock-based award based on his business performance and contribution while obtaining basic salary. However, this part of the stock was characteristic: the incentive object was entitled to dividends and share allotment which could not be redeemed immediately. Upon expiry of his term of office, he could redeem the futures

	or elect to hold shares continuously.

Data source: Sorted out by the author

In addition, Vanke, ZTE and other companies have also tried equity incentives, which ended in failure ultimately. Therefore, although listed companies have made modifications and attempts within the institutional framework through various “modes”, equity incentives have been slowly moving forward in wait-and-see and questioning.

2.2.2 Normative development stage

With the comprehensive opening of the share-trading reform on China's securities market, the Measures for the Administration of Equity Incentives of Listed Companies (Tentative) was implemented on January 1, 2006, marking the beginning of the equity incentives for domestic listed companies. As of 2011, five years witnessed that China's equity incentive system had been developed from scratch, from exploring to normative, and finally a relatively complete equity incentive system suitable for its own national conditions had been explored, as shown in Table 2-2.

Table 2-2 Relevant Regulations on Equity Incentives

No.	Laws and regulations
1	Measures for the Administration of Equity Incentives of Listed Companies (Tentative) (ZJGSZ [2005] No. 151)
2	Memorandum No. 1 on Issues concerning Equity Incentives (Department of Listed Company Supervision of the China Securities Regulatory Commission, March 17, 2008)
3	Memorandum No. 2 on Issues concerning Equity Incentives (Department of Listed Company Supervision of the China Securities Regulatory Commission, March 17, 2008)
4	Memorandum No. 3 on Issues concerning Equity Incentives (Department of Listed Company Supervision of the China Securities Regulatory Commission, September 16, 2008)
5	Notice of the Ministry of Finance and the State Administration of Taxation on the Issue of Levying Individual Income Taxes on Incomes from Individual Stock Options (CS [2005] No. 35)

6 Supplementary Circular of the State Administration of Taxation on the Relevant Issues Regarding the Individual Incomes Taxes Levied on Incomes Generated from Stock Options (GSH [2006] No. 902)

7 Notice of the Ministry of Finance and the State Administration of Taxation on the Issues concerning the Imposition of Individual Income Tax on Incomes from Stock Appreciation Right and Restricted Stock (CS [2009] No. 5)

8 Notice of the State Administration of Taxation about Issues Concerning the Individual Income Tax on Equity Incentives (State Administration of Taxation, August 24, 2009)

9 Trial Measures for Implementing Equity Incentive Plans by State Holding Listed Companies (Domestic) (State-Owned Assets Supervision and Administration Commission of the State Council, the Ministry of Finance, GZFFP [2006] No. 175)

10 Trial Measures for Implementing Equity Incentive Plans by State Holding Listed Companies (Overseas) (State-Owned Assets Supervision and Administration Commission of the State Council, the Ministry of Finance, GZFFP [2006] No. 8)

11 Notice of the State-owned Assets Supervision and Administration Commission of the State Council and the Ministry of Finance on Issues concerning Regulating the Implementation of the Equity Incentive System by the State-Controlled Listed Companies, GZFFP [2008] No. 171

12 Notice of the State-owned Assets Supervision and Administration Commission of the State Council on Matters concerning Strictly Regulating the Implementation of the Equity Incentive by State-controlled Listed Companies (Overseas), October 10, 2007, GZFFP [2007] No. 168

13 Memorandum No. 9 on the SME Board Information Disclosure: Obtaining and Granting of Equity Incentive Restrictive Stocks, SME Board Management Department of Shenzhen Stock Exchange, July 6, 2007, Revised in May 2010

14 Memorandum No. 8 on Growth Enterprise Board Information Disclosure: Obtaining, Granting, Exercise and Adjustment of Equity Incentive, Growth Enterprise Board Management Department of Shenzhen Stock Exchange, August 30, 2011

15 Memorandum No. 9 on Growth Enterprise Board Information Disclosure: Obtaining, Granting and Adjustment of Equity Incentive (Restrictive Stocks), Growth Enterprise Board Management Department of Shenzhen Stock Exchange, August 30, 2011

Data source: Sorted out by the author

The promulgation of the Measures for the Administration of Equity Incentives of Listed Companies solved the following problems for the standardized operation of the equity incentive system: First, the stock sources of equity incentives. With reference to the more common regulations in foreign countries, it has been clearly stipulated in the Measures that "issuing shares to incentive objects, repurchasing shares of the company, and other methods permitted by laws and administrative regulations" are taken as incentive sources. Second, the source of the subscription funds is regulated. The new system clearly stipulates that "a listed company shall not provide loans and other forms of financial assistance to the incentive objects to obtain relevant interests in the equity incentive plan, including providing guarantees for his loans." This indicates that the subscription funds must be the incentive object's own funds. Third, the content format of the incentive plan is clarified. The incentive plan "includes at least the object to be granted, the time of grant, the time of exercise, the price of the exercise, the lock-up period, the conditions of sale, and the subsequent clauses regarding the incentive object, the exercise time, the exercise price, the lock-up period," ①. Fourth, the shareholding ratio is defined. The incentive ratio cannot exceed 10% of the total share capital.

At present, there are three main ways of domestic equity incentives, which are summarized in Table 2-3, as Stock Options, Restricted Stock and Stock Appreciation Rights.

Table 2-3 Main ways of equity incentives

Incentive method	Main contents
Stock options	Stock options are essentially a kind of rights, i.e. the options of the incentive object to purchase the company's stocks. The incentive object can purchase a certain amount of stock of the company at the originally determined price within the agreed time. Whether the incentive object exercises the right or not is determined at the holder's discretion. The holder can either waive or exercise the right to purchase the company's stocks. If exercised, it is an incentive. The magnitude and incentive of the incentives depends on whether the relevant holders increase the company's stock price through their own hard work. The stock option in the equity incentive mechanism of a listed company is an option, but different from the general option mainly in the followings: Stock options serve as an incentive mechanism for listed

	companies and are non-transferable, and only two options can be chosen: exercised or unexercised. It is this feature that determines this type of stock option plan. The most critical issue in designing the exercise price of an option is how to determine the exercise price. Stock options can be divided into three types: phantom options, at-the-money options and in-the-money options.
Restricted stock	When the conditions stipulated in the equity incentive plan are met, the incentive object can obtain an agreed number of stocks from the listed company. In the equity incentive plan, the performance conditions for the incentive object to obtain restricted stock and the lock-up period are clearly defined. Only after the specified business performance or other objectives are met, the stocks can be sold for profit, and even in some companies, it is stipulated that in the case that the incentive object fails to meet the work target according to the regulations, the company has the right to take back the freely donated restricted stocks, or buy back the restricted stock at the price at the time of purchase by the incentive object. In terms of the way of obtaining, most foreign companies grant the incentive object a number of shares agreed in advance without consideration or at a nominal cost. It should be noted that during the lock-up period, the incentive object is not allowed to dispose of these stocks. In addition, if the holder leaves the company within the lock-up period, the restricted stock will automatically lapse. Within the lock-up period, the incentive object can receive the same dividend as other shareholders, and also has the voting rights of the corresponding shares.
Stock appreciation rights	The company grants managers a right. Although the incentive object neither owns the stock, nor participates in the allocation of dividends, he can get the cash rewards in proportion to the proceeds due from the increase of stock price or performance. The stock appreciation scheme is simple and easy: The incentive object does not have the ownership and derivative voting rights and share options, so there aren't such problems as equity dilution. The essence of the stock appreciation rights plan is also to link the interests of managers with the company's value for a long time.

2.2.3 Main problems of equity incentives

2.2.3.1 The autonomy of equity incentives is restricted

According to the author's statistics, in view of the current implementation of equity incentives, private enterprises account for more than 80% of the total companies having implementation equity incentives. In this context, the previous supervision over equity incentives was aimed at preventing the loss of state-owned assets and strengthening the management of insider control. For private enterprises, this regulatory approach is somewhat inappropriate. For example, most of China's private enterprises are family-owned, with relatively high concentration of ownership. Considering the majority shareholder is often the founder of the enterprise, the supervision and restraint over the equity incentive system is relatively strong, and there is less possibility of asset loss. It is stipulated in the Measures for the Administration of Equity Incentives of Listed Companies that “the total number of underlying stocks involved in all valid equity incentive plans of listed companies shall not exceed 10% of the total share capital of the company” and the current scale of the incentives of the target companies is 3.47%. In the short term, the limitations of this regulation are not obvious, but as the company expands, the 10% ceiling may mismatch the incentive needs, and the new employees will be difficult to be motivated because of the insufficient quota. In another example, the Company Law also has specific provisions on the transfer time and number of transferred shares acquired by senior executives. These regulations have certain effects on restricting the opportunistic behaviors of executives, retaining talents for the company, and maintaining market stability. Meanwhile, however, executives also have to bear huge pressures and costs during the waiting period. In order to exercise in advance, the phenomena of resignation before the lock-up period is expired also occur on the GEM.

2.2.3.2 The supporting system construction is relatively insufficient

The Accounting Standards for Business Enterprises No. 11 – Share-based Payment is an important basis for the implementation of the equity incentive plan for listed companies in China and details the relevant accounting and amortization. However, in the specific implementation process, some problems have been still exposed: How to reasonably estimate the value of stock options and restricted stocks is one of them. Since stock options are a special commodity and lack an open and active market, their value needs to be estimated by means of binary tree model and BS model, and the selection of such parameters as risk-free

rate of return and stock price volatility in these models is subjective. The different model parameters will affect the valuation of options, and ultimately reduce the comparability between companies. The Standards stipulate that the expenses of equity incentives are amortized during the waiting period. Considering the completion of performance indicators and the number of persons who can exercise the equity, there are still different ways of how to reasonably determine the appropriation period and how to divide the costs over the periods.

The State Administration of Taxation released a number of regulations, such as the Notice of the State Administration of Taxation about Issues Concerning the Individual Income Tax on Equity Incentives, to regulate the issues related to equity incentives. The income from the individual's equity incentive should be taxed according to the difference between the market price and the grant price at the time of exercise at the applicable tax rate of “Income from wages and salaries” up to 45%, which is higher than the international standard level. Considering that equity incentives are still in the initial stage in China, the excessive marginal tax rate will reduce the positive function of the company's incentives. Besides, the time of tax payment is when the incentive object exercises the rights, instead of actually selling the stock, which may cause the incentive object to have trouble in paying the individual tax. The reduction of the shareholding for tax purposes is not only restricted by relevant regulations, but also deviates from the purpose of equity incentives.

2.2.3.3 Excessive incentives hinder the healthy development of enterprises

What kind of incentive level is the most appropriate, closely relates to the company's own situation, and it is difficult to give an exact figure. Since the purpose of equity incentives is to bundle the incentives with the interests of shareholders and achieve a win-win situation, the key to the problem is not only the quantity of incentives, but also the incentive effect. Before the financial crisis, the US capital market was booming when the salary of listed company executives also showed a rapid growth trend. On the surface, this was related to the good operating performance of various companies at that time. However, in the long run, excessive incentives in the executive compensation led executives to unilaterally pursue high-risk and high-reward projects, thus laying a hidden danger for the bursting of the bubble in the future.

In order to prevent similar problems from occurring, many ministries and commissions jointly released the Guiding Opinions on Further Normalizing the Salary Management of

Persons in Charge of Central Enterprises, for standardization and management of the executive compensation of central enterprises. However, considering that most of the companies having implemented the equity incentives in China are private enterprises, they are not within the scope of this guidance. The major shareholders of private listed companies generally have strong control. Unlike state-owned enterprises, the conflict of interest between large shareholders and minority shareholders is the main manifestation of the principal-agent problem of private listed companies. Specific to the equity incentives, large shareholders may exercise the control over the company to “legally” encroach on the interests of small and medium shareholders, such as setting lower performance thresholds and shortening the waiting period to transfer benefits to senior executives. If equity incentives become executives' equity benefits, minority shareholders may suffer losses from equity dilution, which is clearly far from the purpose of equity incentives.

2.3 Summery of this chapter

By reviewing the development of executive incentives in the United States and China, we can see that the US executive incentive system is relatively complete, and equity incentives are widely used in the United States and serve as a catalyst for US economic development. In China, with the promulgation and implementation of the Measures for the Administration of Equity Incentives of Listed Companies in 2006 as a watershed, before 2016, emphasis was laid on compensation incentives. Equity incentives were initially tried in some companies. After 2016, we finally explored a more complete equity incentive system suitable for our national conditions, mainly composed of Stock Options, Restricted Stock and Stock Appreciation Rights. Due to the short period of implementation of equity incentives in China, in the process of practice, there are also many problems such as the restriction on the autonomy of equity incentives, the relative lack of supporting system construction, and the excessive incentives that hinder the healthy development of enterprises. Therefore, according to the specific situation of Chinese executives' incentives, a more in-depth and comprehensive study is carried out, focusing on how to establish a long-term equity incentive mechanism suitable for China's national conditions, and provide theoretical guidance and support to Chinese listed companies.

Chapter 3: Theoretical Basis and Literature Review

3.1 Theoretical basis and research progress of executive incentives

3.1.1 Theories on executive incentive

3.1.1.1 Principal-agent theory

As most cited in the research into stock option incentive, the principal-agent theory refers to “one or more agents appointing and employing some other agents to serve them according to a kind of express or implied contracts, while authorizing the latter certain decision-making rights and pay them relevant compensation based on the quantity and quality of services offered. An owner of assets shares residual claims on and relevant ultimate control over the assets according to the amount of capital contribution.” The principal-agent theory has three assumptions: the agent's behavior is not easy to observe; The asymmetry of principal and agent information and the maximization of agent effect of complete "economic man". This conflict between the agent and the shareholder will increase the cost of the shareholder. Generally speaking, this "agency cost" is manifested in three forms: supervision cost, keeping promise cost and residual loss. Supervision cost refers to the cost paid by shareholders to supervise the excessive consumption or other independent behaviors of senior executives. Compliance cost is the expenditure that an agent takes to restrain and guarantee his behavior in order to gain the trust of shareholders. Other losses caused by conflicts between the interests of the principal and the agent are residual losses (Jensen & Meckling, 1976). According to the analysis of agency theory in the Enterprise Theory: Manager Behavior, Agency Cost and Ownership Structure by Jensen and Meckling (1976): how to align shareholder interests with agent interests and reduce agency cost, there are two methods available to resolve this problem. One is an incentive and restraint mechanism, that is, to design a management plan to integrate shareholder’ capital income with manager’s labor income organically, achieve maximization of corporate value and ensure the win-win mechanism of shareholder and manager. However, such restraint mechanism is not perfect or flawless. When the constraint value is defective, it will lead to increase in company-paid

consumption, self-relaxation and reduction of labor intensity of managers. The other is the transfer mechanism of residual claims, with its nature of making a manager a shareholder and aligning their objectives. This is the source from which the design thought of stock option incentive system derive. Shareholder interests and manager interests are aligned when a shareholder transfers some of his residual claims to a manager. Despite the shareholder sacrificing some of capitalization earnings, the manager is encouraged with more confidence after becoming a shareholder and will work harder to be responsible for shareholder wealth. This contributes to increasing manager's labor reward and to realizing the maximization of corporate value. Therefore, the stock option incentive system can improve the alignment of manager and shareholder interests and alleviate the agency problems.

3.1.1.2 Optimal contract theory

Executive compensation is determined on the basis of optimal contract theory, the fundamental assumption is that a shareholder meeting authorizes the board of directors which represents the interests of shareholders. The board of directors chooses the optimal management and compensation contract characteristic of incentive compatibility to encourage the interest of senior managers and enable them to faithfully perform the obligations of managing companies on shareholder's behalf, so as to realize the maximized shareholder interests. According to this theory, when the compensation incentive contract can be featured by incentive compatibility, it will be able to maximize the combination of fluctuations in executive compensation with corporate performance. The optimal contract theory holds that both directors and managers can work dutifully, managers work hard, and boards of directors supervise managers' business decisions. When the behavior of managers infringes the interests of shareholders, the board of directors will take measures to reduce or even dismiss managers. However, the existing corporate governance is not perfect, managers have the right of management and control of the company, and directors, especially internal directors, tend to collude with managers. In this case, when managers' investment decisions damage the interests of shareholders, the board of directors cannot play its due role. Although the remuneration of managers is determined by the board of directors, managers often use their power to influence their remuneration or even set their own remuneration, which is not conducive to the board of directors to stop the self-interested behavior of managers. Therefore, the optimal contract theory cannot be achieved in the capital market, and the executive compensation formulated by the company cannot effectively reduce the agency conflict

between shareholders and managers.

As shown by the research conducted by Haugen and Senbet (1981), stock option is the most effective compensation incentive contract, for it can coordinate shareholder and executive interests and achieve the effect of convergence of interests. According to the optimal model contract of Holmstrom and Milgrom (1991), shareholder and executive are limited by incentive compatibility and constraints on participation. When the compensation contract is assumed to be effective, the core is to maximize shareholder interests under the condition of the optimal incentive contract constraints. Aggarwal and Samwick (1999) inspected and found that fluctuations in corporate performance are significantly negatively correlated with changes in executive compensation. In other words, when the fluctuations in corporate performance are significant, the executive compensation becomes less sensitive. This indicates to some extent that company executives conduct risk aversion to a certain degree. As the stock option incentive is widely applied as part of such practice, an increasing number of scholars have started research into the risks of stock option incentive, delivering inconsistent empirical results. Some literatures show that the risks of stock option incentive are positively correlated with compensation-performance sensibility (Core & Guay, 2002).

The residual claim theory is a theory related to the optimal contract theory. A residual claim is an important property right. A shareholder invests and sets up an enterprise, for one of the purposes being to achieve the residual claim and maximized shareholder interests. The so-called “residual” can be understood as those not defined clearly in the contract, while “claim” refers to such a fact that revenue claims not defined clearly in the contract, namely, claims on profit balance of the enterprise after deducting all of fixed contract payments, are relative to contract revenue right. Due to the objective existence of business risks in an enterprise, business income is uncertain, and the residual right also means a risk.

What differs from shareholder investment, capital invested by business operators in the business can be knowledge, skill and resource, and accumulates continually as the business develops. As manpower capital has the nature of private property, it is not suitable to use a completely unified standard for monitoring it. This problem is resolved by the existence of residual claims to a certain degree, with the business operators are enabled to achieve self-monitoring. Hence, executive compensation contract shall be embodied in owner right in manpower capital of operator to guarantee its legitimate residual claims.

According to Zhang (1995) in Business Entrepreneurs: Contract Theory, operators are

the most suitable ones to have residual claims. The method that a principal transfer a residual claim and allows a trustee to undertake some of the risks can reduce agency costs effectively to achieve optimal incentive effects. First of all, residual claims shall be distributed to operators who own information advantage at the company; otherwise, they also have opportunity to make use of their authority to distort the resource distribution of the company for their own benefits. Second, it is of vital importance that risk assumed capital owners become entrepreneurs to guarantee that they take managerial positions. Lastly, as the enthusiasm of company's core staff members is crucial to corporate development, it is necessary to allocate limited residual claims to the core staff members, which equals to strengthening the external monitoring over operators.

The residual claims distributed by a company to its executives shall be of long term and effective, since the manpower capital of the executives plays a crucial role in the course of its development. The widely used method of manpower capital participating in residual claim distribution specifically includes labor stock, employee stock ownership plan, and management shareholding, Furthermore, stock option has been increasingly adopted as an incentive tool that links operator income and owner revenue together at most.

3.1.1.3 Information asymmetry theory

If we assume that the capital market investors are absolute rational, and investors are expected utility maximization, the market is perfectly competitive, and the information on the market is in a valid state, each investor can get the same information, then we can say that the market is perfect capital markets, there won't be in such a market, the emergence of inefficient investment in reality, however, in the capital market investors and managers can't win at no cost under the premise of the same information. This is called as asymmetry theory which was proposed by American economist Joseph, Akerlo and Spence in 1970s.

According to the information asymmetry theory proposed by them, their initial explanation from the perspective of economics is that if the seller's market has more information than the buyer's market, the high-quality products will be gradually replaced by the low-quality products, resulting in the decline of the quality of products in the market. To understand this theory from a broader perspective, any different subject in the market with uneven information distribution will have one party with information advantage and the other party with information disadvantage. For example, in the capital markets, investors and

managers are in a state of information asymmetry, for managers, their capital of the company, business development, such as understanding to be more clear, so in the investment decision-making also know more about the benefits and risks of investment projects as a result of the information asymmetry exists objectively, on the enterprise management is "adverse selection" and "moral hazard". Compared with the principal, the agent has more information, and information asymmetry will adversely affect the principal's effective monitoring of the agent's behavior, which may cause the agent to not properly serve the interests of the principal. Adverse selection refers to the principal-agent relationship that determines that shareholders cannot fully grasp the market information and cannot accurately predict the behaviors of senior executives. Senior executives have the advantage of detailed market information and are likely to suffer from market efficiency reduction and infringement of shareholders' rights and interests in the process of managing and operating enterprises. Moral hazard refers to that people's behavior choices are self-interested. In the case of asymmetric information, shareholders' supervision of senior executives' behaviors is not in place, and senior executives may take self-interested behaviors that are not beneficial to shareholders but beneficial to themselves, without bearing adverse consequences for such behaviors.

In the principal-agent relationship, information asymmetry triggers non-efficient investment problems: according to Jensen and Meckling (1976), generally, a company’s shareholder does not take part in business management as a principal base but transfer its management right to its agent. Due to lack of relevant information, it is difficult for the principal to fully identify whether the company’s investment project can bring profits to the company, and he is unable to have a full understanding of the level of potential risks, namely, the extent to which the agent works hard. However, the agent grasps more information than the principal does on individual preference, economic environment, and operating conditions of the company. Accordingly, in selecting investment opportunities, the agent will be likely to conduct inefficient investment behaviors that impair enterprise interests based on assessment of personal occupational risk and personal income from additional investment projects of the enterprise.

3.1.1.4 Incentive theory

Incentive belongs to a theory in the field of Managerial Psychology. According to Maslow's Hierarchy of Needs Theory, a man has basic needs of living and security and higher-level needs of society, respect and self-actualization. According to Herzberg's Two-

Factor Theory, it is believed that desirable, healthy factors can eliminate our dissatisfaction, while motivating factors make more positive, noticeable effects. In executive incentive, proper incentive measures should be taken to satisfy the physical needs and spiritual needs of executives and give full play to the initiative and creativity of internal members. It is essential to create comforting working environments and offer proper compensation to meet their basic physical and security needs. Nevertheless, the executives, as a special group, make use of manpower capital to contribute to the enterprise, and they have spiritual needs of higher level, which need to be reflected fairly.

Process type incentive theory lay particular stress on exploring in incentive object motives to concrete implementation behavior of the process of psychological feelings, such as frum expectancy theory, and the theory of incentives house, which the frum expectancy theory put forward the incentive value of object by the subject matter and the possibility of two factors, in the incentive scheme, the exercise price of the stock and the conditions of the pre-set performance whether reasonable will influence the enthusiasm of incentive object; Lay particular stress on behavior modification type incentive theory for incentive motivation, namely when the person produces the corresponding motivation, external should be how to guide and correction and transform its behavior, skinner thought in his theory of reinforcement with positive reinforcement and negative reinforcement, and positive is the company needs to promote and strengthen, thus company should strengthen the happening of this kind of behavior, and the corresponding reward, whereas the negative reinforcement is down by an enterprise behavior, to the company before the behavior premise should be taken to stop the offender's next move. In the equity incentive, the owner advocates sharing interests and risks with the operator, hoping to make the owner and operator share profits and achieve a "win-win" situation through the share-right incentive scheme.

Practice has proven that an effective incentive mechanism in principal-agent relationship is to achieve the win-win system of shareholder and executive, that is, to satisfy the interests of both parties within the framework of the system. Rational incentive measures encourage executive’s work potential and help to achieve the enterprise goals on the one side, and on the other side, they contribute to reduction of conflicts arising from information asymmetry and alleviate agency contradictions.

3.1.1.5 Executive power theory

Executive compensation policies represent an optimal compensation contract for the game between executives and the board of directors. As argued by traditional compensation theory, as a reliable defender of shareholder interests, the board of directors launches the game with operators in the interests of shareholders and establishes reasonable compensation policies to motivate executives to work hard and achieve maximized corporate value. However, as found by Crystal (1991) research, CEO can conspire with the board of directors by influencing decision-making of the board through his right to speak and achieve the purpose of effecting the compensation policies for executives. In practice, as limited to corporate governance structure, members of the board of director work with executives for a long term, with closer relationships developed between them. The executives tend to make use of the power on hand to buy over and "capture" the board members and use their decisions to make compensation policies in favor of the executives.

According to the power division standard of Adams, Almeida, and Ferreira (2005), executive power can be divided into formal power and informal power. The official power of senior executives comes from the arrangement of system and organization, such as ownership power and organizational power. The informal power of senior executives is the power unrelated to the position of senior executives, and it is the power based on the personal knowledge, information, experience and charisma of senior executives. Management has long recognized that power affects the relationship of organizational members, shapes the structure of enterprises, and affects organizational efficiency, and plays a central role in the process of organizational operation and management. Fayol, founder of the management process school, divided executive power into institutional power and individual power. Institutional power, also known as position power, refers to the corresponding power generated by the division of labor that makes the senior executive in a certain position or position in the organization, which relies on the legitimacy granted by the organization. Personal power refers to the influence of executives due to some personal traits, such as knowledge, information, experience, charm, personality and moral character. Fayol believes that these two kinds of power complement each other. The implementation of institutional power endows senior executives with more knowledge, experience and information accumulation, improves their reputation, and is the source of their personal power. Personal power is the guarantee for the implementation of institutional power. Senior executives with high personal power are usually

more capable and better able to exert their official power. Therefore, a good manager should supplement institutional power with his personal power. As managers, senior executives' power as management experts, power granted by bureaucratic organizations and power of personal charm ensure their influence and control in organizational management decisions. In the final analysis, the determinants of executive power must be analyzed from the source of enterprise ownership allocation. Scholars have studied executive power from different perspectives and have formed executive ownership power based on enterprise ownership allocation, organizational right power based on organizational structure arrangement and power based on personal ability (Zhao & Xu, 2013). The first two are formal power derived from institutions and organizational arrangements, which is what fayol called institutional power. Power based on personal ability belongs to informal power and is formed based on the expert power and reputation power of senior executives, which is the personal power mentioned by fayol. Among them, expert power embodies the accumulation of senior executives' personal knowledge, information and experience, while reputation right is mainly formed based on the reputation, prestige and personal charm of senior executives.

As found by Bebchuk and Fried (2003) through research, executives have no impetus to achieve maximized corporate value and the incentive mechanism worked out by the board of directors has an incentive effect. However how does it stimulate the directors. This is a new agent issue. “Director” is a title which can bring about good returns and earn good social reputations. Director and executive develop a balancing role. Form the angle of corporate governance structure, an executive has a strong say in appointment of directors and in order to secure the directorship, the director-executive conspiracy becomes a possibility. For this reason, the independent director system has been widely introduced in modern enterprise management. However, the executive can take some approaches to make the company information unavailable to independent directors, whose decision-making is disturbed and influenced by the executive under the condition of information asymmetry. On the other hand, the executive has a big final say in appointment and removal of personnel of independent directors, making such independent directors not necessarily independent. Accordingly, the independent director system can easily become an eye candy, being neither independent nor director.

As found in empirical studies conducted in the 1990s, there is no significant relationship between the monetary compensation and performance of executives. In other words, when a

company achieves poor performance, an executive can earn attractive compensation, which is due to the subjective identification standard adopted for the bonus system at many companies. Even if an objective performance criterion is adopted, the compensation contract will be also influenced by executives and will not necessarily make an incentive effect. Additionally, from the perspective of investment opportunity, some company will also pay the executives huge bonuses to expand the company scale through acquisition of enterprises and resources. These cases make a weak correlation between non-equity compensation and corporate performance. For this purpose, some companies adopt the arrangement of stock option system to promote the incentive effect; yet problems exist that the executives make use of their power to receive non-equity compensation. The executive may earn profit by use of information asymmetry in a short term, but on the long run of development, this damages corporate interests.

It can be seen from the above analysis that the executive power theory denies the assumption that the board of directors is a reliable defender of shareholder interests. As it becomes a new agent issue, conspiracy will develop between the board of directors and the management. The compensation system designed by the board of directors will not reduce the costs of agency between shareholder and management but cause a certain degree of loss to corporate interests sometimes.

3.1.1.6 Human capital theory

The theory of human capital was founded by American economists Schultz (1961) and Becker (1962) in 1960s. This theory classifies people's learning ability and human capital, such as knowledge, skills and abilities, according to the degree of transformation between them and enterprises. Society promotes economic development by investing in human capital. Human capital theory focuses more on the characteristics, abilities and skills of individuals and less on their working environment. Since the marginal output of enterprise executives mainly depends on the effect of their personal experience, ability and education level on enterprises, according to the theory of human capital, executives with rich experience, higher ability and education background would expect to get corresponding salary (Gomez-mejia & Balkin,1992). The larger the company, the more difficult it is to manage, and the more human capital executives should have. As a result, larger enterprises tend to offer high salaries to attract high levels of human capital. According to the theory of human capital, entrepreneur is the most important human capital of an enterprise, which not only has the specificity and

exclusivity of other scarce material capital, but also has the irreplaceable material capital. As a result, executives should be paid as human capital and Shared in surplus value like any other material capital. In the compensation incentive system of enterprises, the compensation plan of senior executives should include short-term fixed salary and bonus, as well as long-term floating equity and options. (1) Combs and Skill (2003) found that the bonus in executive compensation mainly depends on executive power and corporate governance strength and is therefore a reflection of executive personal human capital and management skills. Human capital theory holds that human capital value includes both explicit and implicit values. Explicit value is the certainty of human capital that has been achieved and can be measured and expected. The so-called invisible value is the human capital that has not been realized and has uncertainty. Since explicit value can certainly bring corresponding returns to the enterprise, the corresponding part of fixed compensation is the compensation mechanism. However, the hidden value with uncertain risks can only be determined whether or not it can bring returns to the enterprise and how much it can bring after it is realized. In the compensation mechanism, the corresponding variable salary is determined according to performance. The sum of explicit value and implicit value constitutes the value of human capital, and the sum of fixed compensation and floating compensation constitutes the sum of executive compensation. Because different executives have different human capital characteristics, the ratio of explicit value and implicit value is also different. Therefore, the compensation structure and level of senior executives should be determined according to their unique human capital characteristics and structures. According to the theory of human capital, the value of corporate executives is reflected by their own knowledge, experience, ability, information, the more capable executives have these talents, the more scarce and more competitive they are. The scarce talents often mean that more compensation is needed to maintain them. By examining the educational background, work experience, working background, tenure and other human capital characteristics of senior executives, unmeasurable talents can be transformed into measurable variables, so as to provide more accurate standards and basis for the development of executive compensation.

To sum up, the final conclusion of all kinds of incentive theories is that enterprises should make correct incentives to make employees satisfied and improve their work enthusiasm. Two of the key points are the fairness of incentives and employee satisfaction. Incentive theory emphasizes the fairness of the evaluation of employees' work performance,

which is the basis for employees to be encouraged. No matter how strong the incentive is, an unfair evaluation system may cause employees to be dissatisfied and have negative emotions. Another key point is that when it comes to designing incentives from the perspective of employees' needs, the best incentives are to give employees what they need, while employees at different levels need different things. There are many ways of motivation, such as financial reward, salary promotion, vacation benefits, not every way can play a good incentive effect for every employee. Therefore, from the perspective of employees' needs, we should develop effective incentive plans. In the existing salary and reward system, some of them simply meet the basic needs of employees and fail to achieve the goal of satisfying employees and improving their work efficiency. To some extent, equity incentive recognizes the work performance, contribution and status of employees, which not only satisfies them psychologically, but also enables them to get economic rewards through their own efforts.

3.1.2 Overall situation of researches into executive incentive

Over the development of 80 years since Taussings and Baker (1925) started research into executive incentive, executive incentive research has become a key field of research in management, economics, organizational behavior and other academic disciplines. It can be divided into three development stages through arrangement of domestic and foreign research literatures.

Firstly, the original and early stage (from 1925 to the 1970s). The principal-agent theory provided a solid theoretical basis for the research into executive incentive. However, as the further study of executive roles was not started, it was quite difficult to obtain experimental data. At this stage, most of the studies were about theoretical explanation, while few were empirical researches. The subject of the studies was executive compensation and corporate performance instead of systematic research.

Secondly, the development stage (From the 1980s to the 1990s). As the manpower capital of senior managers was part of the basic elements of enterprise production, senior managers had enjoyed recognized positions, formed rapidly growing teams, received increasing amount of compensation and played increasingly important roles. This drew attentions of research institutes and scholars, which provided a subjective condition for the research into executive compensation. In U.S.A. and other developed countries, however, a disclosure mechanism for executive compensation had been worked out, providing objective

conditions for the research into many issues on executive compensation. Therefore, the research into executive compensation became a major domain of academic research from the 1980s to the 1990s. This stage saw the co-existence of such study methods as theoretical study and empirical study, and the researches into the influencing mechanism of executive compensation and into multifactor influencing executive compensation, instead of the single research into executive compensation and corporate performance conducted in the first stage.

Thirdly, the deepening stage (From 2000 to now). In the 21st century, the number of researches into the range and depth of executive compensation has increased greatly. Despite a variety of research subjects, scholars conducted the researches using data from different angles to draw conclusions at the time of resolving the same problems. At the stage, the researches became systematic and standardized gradually, laying more stress on empirical research as an increasing number of researchers focusing on corporate governance structure and executive compensation.

Although executive incentive plays an increasing important role in corporate governance, the number of academic research into stock option incentive was relatively small in the 1990s (Yermack, 1995). Through ISI Web of Science, the author made the statistics of the quantity of literatures on executive incentive studies over the world (Figure 3-1) and found a total of 5,046 related literatures. In trend terms, although there were individual scholars starting exploration into executive incentive in the 1980s, the academic community started to focus closely on executive incentive in the 1990s and kept higher research interest from then on.

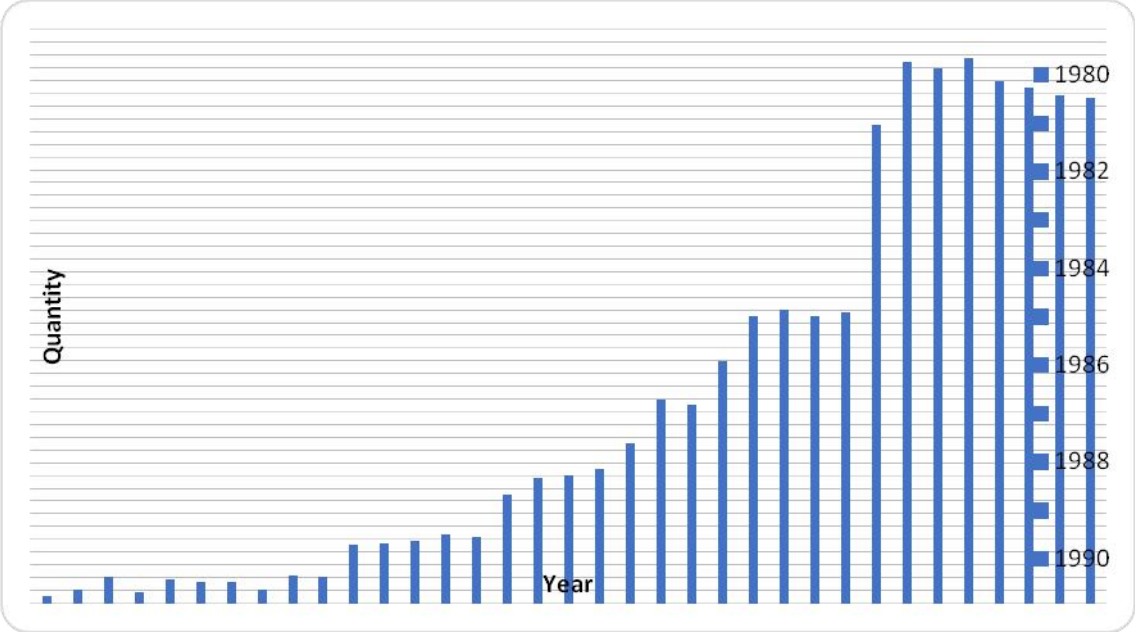


Figure 3-1 the quantity of annually published literatures on executive incentive research (Web of Science)

Over the past 20 years, under the background of increasingly widely applied executive incentive, an increasing number of scholars have given wide attention and conducted further studies into executive incentive. Moreover, a large number of works on executive incentive research have been published on finance, accounting and other major academic publications.

Table 3-1 Top 20 journals on executive incentive research (Web of Science)

Name of Journal	Article Quantity	Proportion
JOURNAL OF FINANCIAL ECONOMICS	146	2.89%
JOURNAL OF BANKING FINANCE	144	2.85%
JOURNAL OF FUTURES MARKETS	141	2.79%
JOURNAL OF FINANCE	134	2.66%
REVIEW OF FINANCIAL STUDIES	81	1.61%
JOURNAL OF FINANCIAL AND QUANTITATIVE ANALYSIS	74	1.47%
QUANTITATIVE FINANCE	63	1.25%
JOURNAL OF ACCOUNTING ECONOMICS	61	1.21%
FINANCIAL MANAGEMENT	55	1.09%

JOURNAL OF CORPORATE FINANCE	45	0.89%
JOURNAL OF TAXATION	43	0.85%
ACCOUNTING REVIEW	41	0.81%
MATHEMATICAL FINANCE	41	0.81%
EUROPEAN JOURNAL OF OPERATIONAL RESEARCH	40	0.79%
MANAGEMENT SCIENCE	38	0.75%
PHYSICA A STATISTICAL MECHANICS AND ITS APPLICATIONS	35	0.69%
JOURNAL OF ECONOMIC DYNAMICS CONTROL	34	0.67%
FOREST ECOLOGY AND MANAGEMENT	32	0.63%
JOURNAL OF BUSINESS	32	0.63%
HARVARD BUSINESS REVIEW	31	0.61%

Data source: Author's arrangement

Table 3-1 lists the top 20 journals publishing most of the executive incentive, which indicate a notable trend that there is an increasing number of works on executive incentive research published on economic, managerial, accounting, financial and other top journals. For example, numerous studies on stock option incentive research were published by Journal of Finance (JF), Journal of Financial Economics (JFE), Journal of Accounting Economics (JAE), Accounting Review (AR), Journal of Corporate Finance (JCF), Harvard Business Review (HBR) and other journals. According to Tzioumis (2008), the research on executive incentive shows an ever-increasing, thriving development trend in the terms of the number of published articles, monographs, scientific research projects providing executive incentive and academic seminars on executive incentive.

Under the global background of the rapid development and wide application of executive incentive in economy, executive compensation as a major part and equal pay for equal work has drawn aroused the concern of the academic community of China and been gradually incorporate into the field of academic research. There are two stages of the reform for the research into the pattern of stock option incentive in China.

The first stage is before the reform of non-tradable shares from 1990 to 2005. When there was no formal law or regulation standardizing executive incentive, the pattern of stock

option incentive was diverse and the research into it by scholars was extensive. For instance, Li (2000) took the listed companies in 1998 as sample and examined the relation between corporate performance and executive. The research found that salaries of senior managers at Chinese listed companies were uncorrelated with corporate performance and executive incentive failed to play its due role. With the listed companies in 2001 as research sample, Zhou and Sun (2003) examined the relationship between stock option incentive for management and improvement in corporate performance and drew the conclusion that higher shareholding of executives represents more significant improvement in business performance.

The second stage is after the Regulations for Stock Option Incentive of Listed Companies (Trial) were published in 2005. For instance, with the companies publishing their drafted plans of stock option incentive from 2005 to 2008 as the sample, Lv, Zhen, Yan, and Xu (2009) distinguished welfare-oriented companies from motivation-oriented companies through comparison of exercise indicators with those in prior three years and through examination of the valid period of incentive. Su and Lin (2010) took Earning Management as example and found that stock option incentive has a negative impact on corporate governance effect. Taking executive shareholding as substitution variable, Zhou and Gao (2012) found that the impact of major shareholder-controlling on the management has a marked impact on stock option incentive effect and showed a positive correlation between the shareholding ratio of first major shareholder and the effect of stock option incentive for executives.

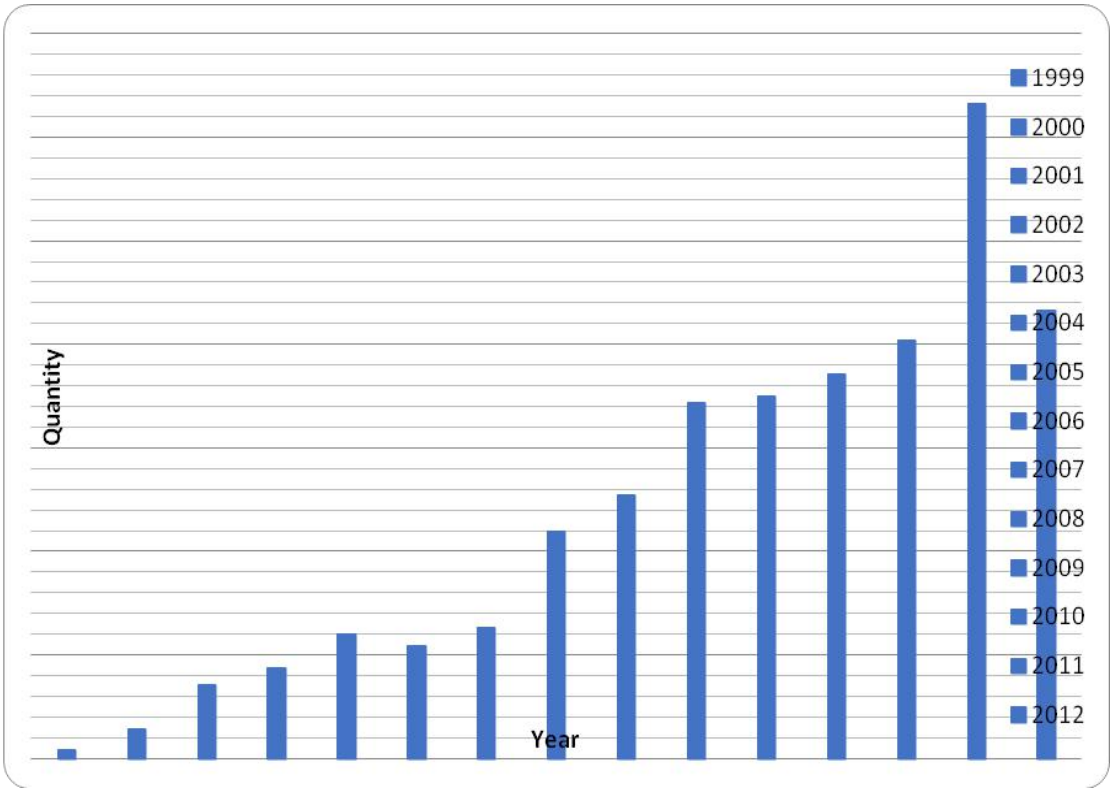


Figure 3-2 The quantity of annually published literatures on executive incentive research (CNKI)

Similar to foreign researches, there was a lack of researches in the field of stock option incentive in China. However, in recent years, the research into stock option incentive has become increasingly active. After 2006 when the Regulations for Stock Option Incentive of Listed Companies (Trial) was published, relevant national departments standardized the stock option incentive and there was an increasing number of discussions on such issue (Figure 3-2). Trough analysis of the development of researches into stock option incentive by China's academic community, there have been three major characteristics found: (1) Due to limited data availability, variables of research into stock option incentive tend to be replaced with management shareholding or with whether stock option incentive is implemented, with small size of standardized samples using stock option incentive; (2) Few articles involve impacts made by stock option incentive on business performance management, earning evaluation and impacts made by stock option incentive on fluctuations of corporate profit and share price; (3) Since it is difficult to quantify the investment opportunity indicator, there have been few studies on the impacts of stock option incentive on investment opportunity and corporate growth.

It can be seen from the domestic researches into stock option incentive that it has provided us with many subjects that are worthy of study and further discussion. And

researches into such issues will not only contribute to theoretical study of stock option incentive but they also help to provide some reference for applying stock option incentives at the listed companies practicing stock option incentives.

Bonus plan hypothesis, debt contract hypothesis and political cost hypothesis constitute the three major hypothesises of positive accounting theory (Watts & Zimmerman, 1986). According to positive accounting theory, the research into compensation incentive for managers focuses on examining whether it helps to alleviate agency problems and promote corporate performance. China's positive accounting research can be traced back to the 1990s. Since the listed companies were weak in the development of the rules and regulations of executive incentive and it was hard to obtain the data of manager compensation at that time, early researchers on positive accounting failed to discover the existence of correlation between corporate performance and manager compensation (Wang, 2000). In the recent years, the research into executive compensation at home and abroad showed two trends: first, researching non-cash compensation instead of cash compensation; second, researching reduction of agency costs, expansion of investment opportunity and the impacts on corporate growth instead of examining the correlation of economic consequences of executive compensation with the performance.

Since Berle and Means put forward in 1932 the proposition that ownership and control should be separated from each other, the academic community had been discussing the problem of governance structure of modern companies all the time. As pointed out by Zhang (2005), the effectiveness of corporate governance structure depends on institutional arrangement of such four aspects as enterprise ownership, national legal system, market competition and reputation mechanism. These four aspects are interrelated, with both substitutability and complementarity existing among them to a certain degree. In economic literatures, the relation between market competition and corporate governance tends to be understood with Darwinism (Alchian, 1950; Machlup, 1967). According to this view, enterprises that survive in the highly competitive market environment should have the best corporate governance structure, while unable to adjusting their corporate governance structure timely according to the market environment will exit from the market due to business failure. Market competition plays the role of selective mechanism of the survival of the fittest. If this view can be valid, whether it means that incentive for executives helps them grasp the opportunities in the competition, and whether increasing the proportion of stock option

incentive is more beneficial to promoting this trend? As an emerging market economy, China has a team of professional managers to grow and a system in its development stage. The above-mentioned research on executive compensation incentive has theoretical and practical significance to China.

3.2 Basic methods for option pricing

3.2.1 Investment opportunity and growth option

As an investment opportunity is a kind of growth option, research into investment opportunities is studied in the field of growth options. Theoretical research into growth options started in the 1970s. Myers and Tumbull (1977) believed that investment opportunity of a company is a growth option of the company, namely the right of the company to pay investment costs (agreed price) and obtain project values (underlying assets). Based on the research by Myers and Tumbull (1977), Kester (1984) discussed the growth option from a strategic, competition perspective and identified that investment opportunity makes more than half of the contributions to corporate valuation, and even makes 70%-80% of the contributions to corporate valuation at enterprises with high risk. Ottooa (1998) held that only when a company obtains a growth option and has it implemented after winning in the technical innovation competition, succeeding in research and development, and continuing with commercial production, and technology inventors get returns, can investment opportunity be the growth opportunity of the company ultimately and be priced using the option pricing method.

3.2.2 Option pricing method

Financial Mathematics is a basic tool for option pricing. Black and Scholes (1973) adopted differential equations and deduced conditions that must be met by the prices of any financial derivative securities based on shares without dividend payment, that is, the well-known option pricing formula of Black-Scholes. Merton (1976) made some important expansions on the base of Black-Scholes model and expanded it to be Black-Scholes-Merton formula. The Black-Scholes-Merton formula is given by assuming that share price is not restrained by a geometric Brownian motion but it meets the Jump-Diffusion Process. According to the Arbitrage Pricing Theory (APT) put forward by Ross (1976), it is based on

the law of one price that assets with the same risks and the same returns cannot be sold at the same price, and the asset returns are related to a group of factors, which represent some basic factors of yields on securities.

The Black-Scholes-Merton model has harsh assumptions which are limited to European option pricing. The Binomial Pricing Model was proposed under relatively easier assumptions. Based on the assumptions that the underlying asset price obeys the binomial distribution; this model uses the risk neutral pricing principle and deduces the option price. The Binomial Pricing Model has the same principle as the B-S model. For example, both of the models deduce the same option prices when the considering time is short. However, the pricing method of Binomial Pricing Model can be widely applied to the pricing of wider derivative products. The 1960s and the 1970s represented an era of rapid development of asset pricing theory, which era saw the landmark research results including William Sharpe's capital asset pricing theory (CAPM) and the Black-Scholes Model by Black and Scholes.

As the expected return on assets is related to its conditional variance and covariance, it is necessary to understand the conditional heteroscedasticity of the return to have an understanding the dynamic behavior of the expected return. Engle (1982) put forward a new analytical method which is called Autoregressive Conditional Heteroskedasticity (ARCH). Granger (1981) brought forward co-integration method. He believed that when the involved economic time series are quite unbalanced, one should not handle the mutual relationships between these economic time series directly but identifies the relation first on how to make the unbalanced changes offsetting each other. Such relationship is exactly the so-called "co-integration relationship".

Over recent years, along with the change and development of market environments, new challenges and requirements have been raised for Financial Theory and Financial Mathematics. The previous studies have made some breakthroughs in pricing risk measurement, investment analysis and other fields. These results not only make direct impacts on the continuous innovation of financial derivative products and the effective operation of financial market but they also contribute to maintaining the stability of financial market and promoting the risk management of financial institutions.

3.3 Literature review

3.3.1 Research on the impacts of compensation incentive on business performance

Before the emergence of principal-agent theory and modern finance theory, compensation researches made by scholars laid more stress on the relationships between compensation and enterprise scale. As the principal-agent theory arises and the financial data of listed companies are widely used, there have emerged a large number of empirical researches on executive compensation and corporate performance. Compensation is a measuring tool for performance evaluation and staff management; in nature, it is a reaction to final results of managing persons. In order to reduce agency costs, a series of motivation measures are designed for modern corporate governance, hoping that executives are provided with incentive measures for residual claim through a performance contract and compensation contract. Therefore, research on the correlation between enterprise performance and executive compensation. There are two methods of executive compensation and performance evaluation: accounting income and stock returns. By referring to research purposes and research orientation of this article, the literature review focuses on the impacts of executive compensation on company stock returns.

Murphy (1999) believed that CEO compensation has sensitivity reactions to corporate performance in explicit and implicit ways. The explicit ways are embodied by bonus and share price, while the implicit ways are embodied by changes in annual salary, bonus, and share, Lambert and Larcker (1987), Sloan (1993) empirically examined the impacts of executive compensation on the sensibility of corporate performance and on the share price and found that corporate performance can improve the effectiveness of compensation contracts. This proves that there is a positive correlation between executive compensation and corporate performance, namely, executive compensation can improve corporate performance and share price. As found by Rosen (1992)'s research, when company stock returns increase from 10% to 20%, operator compensation increases by 1%. In other words, compensation has a 0.1-0.2 elasticity to stock returns, which indicates that the motivation method in which operator compensation is paid by performance is not sufficient for executive incentive. Aggrawal and Samwick (2003) examined the impacts of executive positions on corporate performance and the correlation between them and found that general manager's

compensation is most sensitive to corporate performance, and department manger's compensation is least sensitive, indicating that compensation incentive is less sensitive at a lower position. With 478 U.S. listed companies from 1980 to 1994 as the sample, Hall and Liebman (1998) examined and proved the existence of a positive correlation between executive income and share market-value. Main, O'Reilly and Wade (1995) conducted a comparative study of executive compensation data in U.S.A. and Britain and found great executive mobility in both of the countries. With great difference in tax system and external control system, there is a big gap between the executive compensations of the two countries. Such gap is even more obvious on a global scale. However, executive compensation has positive impacts on corporate performance, without government intervention in executive compensation excluded surely. In fact, government intervention in compensation policies of large companies has existed all the time in many countries.

Considering that the stock option compensation of listed companies is not widely applied in China and to analyze the comprehensiveness of the problem, researches made by domestic scholars on the relationship between executive compensation and corporate performance usually combine cash compensation and stock option compensation to be analyzed together. As found by Wei (2000) in research, executives of listed companies receive lower annual cash income with simple compensation structure. There are obvious differences in income of executives in different industries, with those in finance, telecommunications and other industries receiving the highest income. Liu and Wang (2000) believe that the business performance of a company is positively correlated with the decentralization of ownership structure, the ownership size of the company owned by managers and employee stock ownership, and negatively correlated with the size of state shares and the salary of managers. Zhang and Chen (2002) concluded through empirical research that there is a significant positive influence between the remuneration of the management layer and the shareholding ratio of the enterprise and the enterprise performance. Gao and Song (2007) researched the relationship between executive compensation mechanism and corporate performance by using data of A-share listed companies from 2002 to 2003 and believed that the average executive compensation increases by 1.58% as the market return of a listed company increases by 10%; the average executive compensation increases by RMB 38 as the shareholder value of a listed company increases by RMB 1 million. This indicates the market return of a listed company and the shareholder return has an obvious positive impact relationship with executive

compensation. Du and Wang (2007) conducted examination research into the correlation between cash compensation of executives at listed company and corporate performance and drew the conclusion that executive compensation is positively correlated with the changes in company and shareholder wealth. They also studied the relationship between returns on net assets and compensation and found that the returns on net assets and the returns on equity have positive impacts on the level of executive compensation. Chen (2002), Zhang and Song (2003), Chen, Liao, and Wang (2005); Yu (2006)； Ji and Wang (2014) have concluded that there is significant positive influence between enterprise value and shareholding scale of enterprise managers.

3.3.2 Research on the impacts of stock option incentive on business performance

The stock option incentive is intended to improve corporate performance, while whether the corporate performance is improved serves as the standard by which the effect of stock option incentive is tested. On the effect of stock option incentive, there are two hypotheses: one is the convergence of interests hypothesis (Jensen & Meckling, 1976), proposing that corporate value is increased as the shareholding level of executives increases, and the other is managerial entrenchment hypothesis. Fama and Jensen (1983) believed that if the shareholding level of operators is too high, resource allocation will be made through mergers and acquisitions on the market, thus leading to impairment of corporate value. Through arrangement of Chinese and foreign related literatures, the author sums up that the stock option incentive affects the corporate performance in the following four ways:

3.3.2.1 Linear correlation

Yermack (1995) conducted a research using B-S model and with nearly 800 listed companies granting executives stock options from 1984 to 1991 in the US and found that the use of stock options to motivate executives can significantly reduce agency costs. Murphy (1999) conducted a research with nearly 1,500 CEOs within 10 years as the study object and found that there is a significant positive correlation between stock option compensation for CEO and business performance. Willianms and Rao (2006) established a model to research the relationship among stock option, risk incentive and business scale and found that the effect of stock option on risk incentive is related to business scale. If the business scale is small, the positive correlation between the motivation effect of stock option and the return on

equity becomes more obvious.

A Chinese scholar Liu (2009) conducted a research on small and medium-sized enterprises in Shenzhen during the early reform and drew the conclusion that comprehensive corporate performance has a positive effect on executive shareholding. According to Li (2000), when managers hold a certain number of shares of the company, the shareholding ratio has a significant impact on the performance of the company. According to Xu and Xu (2010), China have been qualified for implementing stock options as the Regulations for Stock Option Incentive of Listed Companies was promulgated in 2006, relevant national policies and regulations were issued and further revisions made into the Company Law and the Securities Law, and additionally as the executives grew more conscious of risks. Meanwhile, it was pointed out that it is more suitable for companies with small scale and listed companies in growth period to choose the method of stock option incentive. Starting with the level and fluctuation of business performance, Gong and He (2013) verified and analyzed through multiple regression the relations between the differences in executive power and stock option compensation and the business performance and drew the conclusions that there is a significant positive correlation between the differences in stock option compensation and the level and fluctuation of business performance. Yan (2005) believed that the implementation of equity incentive in Chinese state-owned enterprises is conducive to the sustainable development of state-owned enterprises. The internal and external conditions for the implementation of equity incentive are gradually mature. The results of He (2008) show that listed companies in China tend to choose the average incentive ownership distribution structure; The main influencing factors of ownership distribution structure are company size and ownership concentration.Lv, Zheng, Yan, and Xu (2009) found that China's listed companies have their own unique system background and corporate motivation in choosing equity incentive schemes. These motives interact with each other, and the influence of corporate governance is more important. Zhou and Gao (2012) found that the shareholding ratio of the largest shareholder was positively correlated with the equity incentive effect of senior executives. According to the research and analysis of Feng (2014), the earnings of listed companies implementing equity incentive plans in the event window period are significantly positive, which reflects that investors in the market hold a positive attitude towards equity incentive events. Zhang (2014) concluded through empirical research that equity incentive events have a positive impact on the financial performance and market

response of listed companies that implement equity incentive plans. Zhang and Xiao (2012) concluded that the equity incentive plan with stock options as the subject matter is significantly negative.

3.3.2.2 Non-linear correlation

McConnell and Servaes (1990) classified shareholders into substantial shareholder, internal shareholder, strategic investor and dispersed small shareholder. A research based on the examination of 2,266 companies listed with American Stock Exchange and New York Stock Exchange from 1976 to 1986 found that (1) there is no significant correlation between the shareholding of substantial shareholder and business performance; (2) internal shareholders have certain relations with corporate performance in the early period, but such relations change to be non-linear correlation when exceeding a certain proportion.

Zhang (2010) conducted a research using data of listed companies in 2009 to examine whether there is an interval effect between stock option incentive and business performance and concluded that there is a non-linear correlation between them, and that they show negative, positive and negative correlations successively with the inflection points of 11.77% and 60.05%. Wang and Wang (2014) conducted an empirical study of the motivation intensity, business performance, scale and level, and business type of 78 A-share listed companies which announced the implementation of stock option incentive plans for the first time in 2011, and found that there is a non-linear correlation between the intensity of stock option incentive and the indicator of business performance, but with a small correlation coefficient.

3.3.2.3 Linear independence

Demsetz and Lehn (1985) set up a model for data of more than 500 enterprises in previous 5 years to empirically examine the impacts of stock equity concentration on corporate performance and found that the shareholding level of executives has no significant impact relation with corporate performance. Based on this, Himmelberg, Hubbard, and Palia (1999) further deepened the model by increasing the number of variables representing corporate characteristics and drew the same conclusions Demsetz and Villalonga (2001) conducted an empirical study with the number of shares held by executives and the number of shares held by top five shareholders as independent variables to examine the relationship between the shareholding level of executives and the business performance, and still drew the conclusions that there is no significant correlation between them.

Yuan and Wang (1999) found that the correlation between the shareholding ratio of executives of listed companies and corporate performance was very low. Zhan and Feng (2008) performed an empirical examination of the effects of stock option incentive for the management of 192 high-teach companies, and the results indicated that there is no significant correlation between stock option incentive for the management and business performance. He (2010) carried out a regression analysis of the relationship between stock option incentive and earnings per share of 41 sample companies from 2005 to 2007, and the results indicated that there is no significant correlation between stock option incentive and earnings per share. Cao, Nie, and Li (2013) made statistics and regression analysis of 205 A-share listed companies on Shanghai stock market and Shenzhen stock market and explored the implementation effect based on more detailed analysis of factors related to stock option incentive plans. The results indicated that the outcome of stock option incentive for the management is not obvious enough overall compared with the expectations, and the motivation effect on business performance is not significant enough.

3.3.2.4 Negative linear correlation

There are also scholars believing that stock option incentive does not prove corporate performance but increase the rent-seeking behavior of executives, impairing corporate interests. Brown , Liang, and Weisbenner (2007) conducted a study of 1,700 U.S. companies from 2003 to 2007, with findings showing that the higher shareholding of substantial shareholders and executives of a company, the lower the share price of the company is. Every standard deviation by which the shareholding of executives increases represents a 1.7% decrease of the share price. This further indicates that after tax reduction in 2003, the probability of dividend distribution increased as executive shareholding increased, which is a specific manifestation of conflict between substantial shareholder and executive authorities of agency.

As found by the research conducted by Gu and Zhou (2007), the effect of long-term equity motivation for executives at Chinese listed companies is not significant; if industrial factors are considered, transportation industry makes the best motivation effect. Du and Qi (2008) examined the convergence of interests hypothesis and the entrenchment hypothesis, and the research found that the more competitive the industry in which a company operates, the better motivation effect the management shareholding makes; the motivation effect is the worst in monopolized industry. Additionally, the research by Wang (2002) also indicates that

the corportate performance increases as the executive shareholding increases and decreases after the latter increases to a certain level. Lv et al. (2009) divided the companies implementing stock option incentive into motivation-oriented companies and welfare-oriented companies. The research found that due to combination of two positions, the differences in corporate governance of the companies at which chairman draws his pay may distort the intension of stock option incentive, causing the companies to be welfare-oriented ones. Su and Lin (2010) conducted analysis from the perspective of earning management, with a sample of companies listed after 2006. The research found that earning management makes it more possible for executives to exercise their power for companies proposing or adopting stock option incentive, and after that, the corporate performance declines more substaintially.

To sum up, foreign and domestic scholars have not reached a consistent conclusion in researches on compensation for senior managers and stock option incentive and performance. It can be found in comprehensive analysis that there is a great difference in studying the setting, timing, sampling and other apects of variables, and this may be the reason for which the consistent conclusion has not been reached ever in researches in this area.

3.3.3 Research on the impacts of stock option incentive on investment opportunity

According to Smith and Stulz (1985), stock options can motivate executives to mitigate risks and choose the projects which have risks or high risks but the net present value must be greater than zero. This proves that the executives are more prudent in selecting an investment opportunity under the conditions of implementing the stock option, which is beneficial to the long-term development and growth of the company. Accordingly, stock option becomes an important method for coordinating the shareholder and executive interests. Lareker (1983) found that the market has a positive response to a corporate compensation plan. Coughlan and Schmidt (1985), Tehranian, Travlos, and Waegelein (1987) found that the market has a positive excess rate of return for stock option grants and long-term performance compensation plans. Mehran (1995) selected 153 ones at random from the manufacturing companies from 1979 to 1980 for research, and found a significant positive correlation between Tobin Q, return on assets of the companies and the proportion of executive shareholding, the proportion of equity compensation to total compensation. Guay (1999) conducted a research on 278 U.S. companies from 1988 to 1993 and found that the stock option can significantly increase the sensibility of CEO wealth to equity risks, which sensibility has a significant positive

correlation with the investment opportunity of the company. Greater potential loss caused by waiving projects of value and risk represents higher motivation for executives investing in the risky projects. This shows that stock option incentive strengthens the mutually beneficial mechanism for sharing risks between CEO and shareholder and helps to improve the corporate performance.

Core and Larcker (2002) suggested that rational degree when choosing investment projects related to city managers hold the shares of the company, the higher the managers stake, corresponding to show more rational when choosing investment projects, according to the self-interest behavior, managers in the investment decision-making will be fully estimated investment risks and rewards of the project, because the benefit of project managers is directly related to their own benefits, you will be able to access while strive to maximize the enterprise value maximize their own interests. The main way of equity incentive is restricted stock and stock options, and points out that both in restricted stock and stock options can optimize the worker's compensation system, and excite the work enthusiasms of management, mitigation and management of the principal-agent problem between Boumosleh (2009) study found that companies such as investment risk associated with the manager's pay structure, management holds stock options to improve the efficiency of the company's investment, but if outside directors hold stock options will increase the management risk of the enterprise. It argues that in stock as compensation management, can make managers share the enterprise surplus value, which allows them to work harder, but makes them deliberately concealing the negative news of the enterprise, accept the NPV < 0 of the investment project, after the management of this kind of practice may be resulted in the capital of the company's share price since the market is overvalued, some people are in danger of collapse.

Wang, Sun, and Yang (2005) believed that equity incentive could restrain the excessive investment of listed companies. She believed that equity incentive had the optimal equity ratio and analyzed this equity ratio by building a model. Luo, Ran, and Du (2008) innovatively studied the interaction between equity incentive and investment decision of senior executives and found that the implementation of equity incentive for senior executives can significantly promote the investment of companies. However, this research only makes an overall study on inefficient investment without distinguishing between excessive investment and insufficient investment. Lv and Zhang (2011), selected the implementation of equity incentive plans of listed companies as research samples, in order to study the implementation of equity incentive

plan's influence on the investment behavior of listed companies, the study found that equity incentive plan could significantly inhibit the excessive investment behavior of listed companies, at the same time also can alleviate under investment problem. Luo and Shen (2013) examines the equity incentive, ownership structure, agency cost and the relationship between the investment efficiency, the study found that the implementation of equity incentive plans can significantly inhibit the inadequate investment of listed companies, and this effect is more obvious in non-state-owned enterprises, and in non-state-owned enterprises, the agency costs of the mediation effect of even more significant, and agency cost in state-owned enterprises did not show obvious intermediary effect. Xu (2014) brought environmental uncertainty into the scope of investigation and found that environmental uncertainty would significantly reduce the investment efficiency of enterprises, resulting in excessive investment or insufficient investment, but the implementation of equity incentive plan could significantly inhibit such inefficient investment. Xu and zhang (2012) believe that equity incentive, as an integral part of corporate governance mechanism, has a good governance effect, but this effect is more significant in non-state-owned enterprises, and the effect of equity incentive on the improvement of investment efficiency in state-owned holding enterprises is not obvious. Wang, Lu, and Zhu (2013) found that listed companies of small and medium-sized board manufacturing industry that implement equity incentive plan are more prone to inefficient investment, and equity incentive plan does not reduce agency cost.

As found by the research by Li, Yang, and Liu (2018), the rational investment in capital market and risk pricing of investment opportunity by executives can examine the effect of stock option incentive. This indicates that to carry out long-term stock option incentive for executives is an important approach to promote innovation investments and achieve corporate growth and value increase. The key to examine the effect of stock option incentive for executives lies in whether it can produce or create more value increase opportunities for the enterprise.

3.3.4 Research on the impacts of investment opportunity on stock returns

Researches on the impacts of investment opportunity, namely, growth option, on stock returns have achieved certain results abroad. However, most of them are theoretical derivation and model assumption and few are empirical results. Berk, Green, and Naik (1999) connected the characteristic variables of a company such as average stock return, systemic risk, company

size and book-to-market ratio dynamically and established a model to conduct a research. In this model, the present asset value and growth option value of an enterprise equal to the corporate value. The research found that an investment opportunity with lower systemic risk is more attractive to a company, and the market value of the company will increase substantially when assuming other conditions remain unchanged. After the investment opportunity is translated into a substantial investment, the systemic risk and actual return of the cash flows of the company decrease and the risks related to the basic proportion of assets of the company are reflected in book-to-market ratio (B/M). This embodies the relative importance of growth options and existing assets. In a word, the establishment of the model has positive significance to researches on the impacts of exercising real options of investment opportunity on business performance and related risks. This model was extended to have general balance setting and emphasized that size and book-to-market ratio can account for stock return, for they are related to the real condition β. Conclusions were drawn that growth options have more risks than existing assets, the realization of the growth option of investment opportunity has a negative correlation with subsequent returns, and the strength of such correlation depends on the number of on-going projects of the company relative to growth options.

A research conducted by Grullon et al. (2012) proves that real options can lead to fluctuations in individual stock return, and there is a positive relationship between the individual stock return and the ratio of fluctuation in individual stock return. A company with more investment opportunities has more real options, with a stronger relationship between the individual stock return and the ratio of fluctuation. The sensibility of corporate value to the ratio of fluctuation decreases significantly with the realization of real options. On the basis of Option Pricing Theory, Galai and Masulis (1976) established an asset pricing model and conducted a research into the relationship between company-specific risk and growth. It was believed that for enterprises with operating leverage, more choices will increase the number of projects with company-specific risk when executives who exercise their rights on the interests of shareholders.

Wu, Tang, and Zhou (2010) conducted a research into the value characteristics of China's GEM listed companies by using the growth option theory and establishing an IPO valuation model. They drew conclusions that assets and growth opportunities are realized to jointly constitute the value of GEM companies, is embodied in their investment opportunities. The

mutual relationship between the number of additional stocks issued by the listed companies and the stock price change found that endogenous growth opportunities have a marked impact on the number of additional stocks issued by the companies. In other words, an enterprise having a greater growth opportunity issues a greater number of additional stocks. Issuing excessive additional stocks will produce a significant negative impact, while prudent issuance will lead to a slump in stock price. He (2012) introduced to the determination model of stock price the functions of the difference between marginal revenue and marginal cost as the future growth opportunity of a company and analyzed how the company with a growth opportunity identifies its financing policy in terms of asset cost, financing policy and other contents, so as to maximize the shareholder value of the company. As found by Xu (2010)'s research, a real option has an impact on stock value, and corporate investment means an investment opportunity forms the real option, thus influencing the corporate value. The investment opportunity of the company takes idiosyncratic risk as a proxy variable and produces a positive impact on stock returns; however, the investment acts as a proxy variable for exercising the company's option to invest and makes a negative impact on stock returns.

3.3.5 Researches on the relationship between volatility and return of individual stock

As to specific risk research, an empirical research can be conducted in two directions: one is to forecast returns on market risks (time sequence). An example is the forecast of GDP Growth made by Campbell, Lettau, Malkiel, and Xu (2001); the other is to focus on specific explanation of the impacts of equity risks on individual stocks. This thesis mainly studies the forecasting role of idiosyncratic volatility on different stock returns from the cross section.

As found by the research conducted by Ang, Hodrick, Xing, and Zhang (2006), idiosyncratic risks of individual stocks have a negative correlation with subsequent returns on assets by using the idiosyncratic risks estimated by Fama-French Three-factor Model to form a group. This correlation remains when the leverage ratio, mobility and other characteristic factors of a company are under control. A further research indicates that this characteristic is also found in the examination of stock markets in 23 developed countries over the world. Fu (2009) believed that time has a marked impact on idiosyncratic risks of individual stocks. Therefore, the idiosyncratic risks of individual stocks in the previous period are considered as inaccurate to be the estimates of future idiosyncratic risks.

As found by the research conducted by Bali and Cakici (2008), the selection of research

methods makes a significant impact on the examination of the relationship between the idiosyncratic volatility of individual stocks and the future return and its significance. Specifically, by using monthly data to estimate specific fluctuations, and using equal-weighted asset portfolios, or removing the small and mid cap stocks, and stocks with lower price and poor liquidity, they found that the unique volatility and lower volatility of the differences between high-yielding investment portfolios no longer show the average stock yield curve. However, the study of them has been insufficient in that the market value and volatility factors are not removed, thus effecting the research findings. As indicated by the research conducted by Jiang, Xu, and Yao (2009), quarterly data were used to examine the negative correlation between idiosyncratic volatility and stock return, mainly because there is a signifaicant negative correlation between the idiosyncratic volatility and the unpredictable future stock returns. Using the Fama-MacBeth model, they found there is no significant relation between the idiosyncratic volatility and the future stock returns, and after controlling the unpredictable stock returns in subsequent quarters, such negative correlation becomes weaker when the information disclosure of a company is higher and investors are more rational. As found by Huang, Liu, Rhee, and Zhang (2009), the reason for the negative correlation between idiosyncratic volatility and stock return identified in the literature lies in that the one-phase-hysteretic returns are not included into the regression process, leading to estimate deviations arising from lack of regression variables. They found such negative correlation disappeared when the one-phase-hysteretic returns are included. On the contrary, there is a positive correlation between idiosyncratic volatility and stock return by using estimates of monthly data, and such results remain robust for reversal effect.

Boehme, Danielsen, Kumar, and Sorescu (2009) found that the relation between idiosyncratic volatility and stock return is also affected by short-sale constraint and investor recognition. Idiosyncratic volatility and stock return have a positive correlation for stocks with low investor recognition and low short-sale proportion; idiosyncratic volatility and stock return have a negative correlation for stocks with high short-sale proportion or high investor recognition. From an empirical point of view, they indicated that it may be both Merton (1987) and Miller (1977) theories playing a part jointly on the market.

Standardized research and empirical research have different explanations and findings for the relationships between idiosyncratic volatility and future stock return. Through an overview, we can find different explanations and conclusions on the relationships between

idiosyncratic volatility and future stock return, which is estimated to be related to the data frequency of idiosyncratic volatility adopted. According to literatures using monthly data to estimate the idiosyncratic volatility, there is a positive relation between idiosyncratic volatility and future stock return, which supports the Merton (1987) theory. It was found by using daily transaction data in a month or quarter to estimate the idiosyncratic volatility that there is a negative relation between idiosyncratic volatility and future stock return, which supports the Miller (1977) theory.

3.4 Brief evaluation of foreign and domestic researches on executive incentive

There are so rich theories on executive incentive so that we can see the complexity of the issue. The evolving theories on executive incentive enrich the contents of variables effecting executive incentive from different points of view and cover economic, political systems and other aspects. The research on the issue of executive incentive and the resulting sustainability research mainly focus on the following three aspects:

(1) The correlation of executive incentive with business performance, business size and corporate governance structure has been widely accepted, but such correlation is not simple correspondence. On the one hand, the incompleteness of the contracts weakens the effect of executive compensation contract being disturbed by many factors; on the other hand, changes in national macro-economic policy, impacts of external environments on corporate governance, and earnings management behavior by executives disturb the business performance. Therefore, subsequent researches divert the attention into the impacts of social, political, strategic, industial and other aspects on the process of developing executive compensations. An empirical research also turns to use a comprehensive model instead of exploring specific factor to include different variables such as organizational labor division, personal ability, industrial competition, equity concentration, content of compensation incentive and incentive system arrangement, incentive efficiency, fairness, and satisfaction, , to examine the impacts of different factors on executive compensation incentive at the same time with a more systematic method, so that the omission of variables can be avoided.

(2) As affected by managerial power, the heterogeneity of compensation contracts showing “coherent” characteristic (Jackson, Lopez, & Reitenga, 2008) reduces the effect of

compensation contracts. A correlation exists between compensation incentive and business performance, but it does not mean that compensation and business performance change in the same direction and in the same range. Is the increase or decrease in business performance in sync with that in executive compensation? Executive compensation may increase as the business performance decreases, but it will not necessarily decrease as the business performance decreases. It is a key subject to be studied to improve the "coherent" problem of compensation. Especially for Chinese enterprises in an economic environment featured by incomplete capital market system and corporate governance mechanism, executive compensation is affected by economic, political and industrial aspects, and has "coherent" characteristics which are more significant than those of private enterprises.

(3) The impacts of investment opportunity on business performance are to be further studied. It is rare to find the literatures on empirical study of executive incentive in terms of investment opportunity abroad, with the theoretical analysis of the impact of investment opportunity on enterprise executive incentive found in other articles on corporate governance. It is prevalent that overinvestment or under-investment is resulted from executive's improper grasping of investment opportunity at Chinese enterprises. This is the main reason for which the executive compensation incentive has been criticized. Under the premise of executives making efforts of the same degree, enterprises with high investment opportunity receive far more profits than those with low investment opportunity and assume far lower business and financial risk than the latter do. This indicates that executive compensation of enterprises with high investment opportunity is less sensitive to business performance, and that the business performance based on which executive compensation is assessed is not simply the result of hard work by executives, but also the result of contributions by returns on investment opportunity of the enterprise. When production reaches balance, should the price of each production element equal to the marginal contribution generated by such element? Namely, executive compensation equals to the marginal contribution generated when the executives serve the enterprise with the production element and investment opportunity owned. The production element of an enterprise is an invested asset in place, while the investment opportunity is a future asset to be invested by the enterprise. The more invested assets in place and investment opportunities the executives have, the more productive the enterprise is, the higher marginal revenue it will generate, and the higher compensation incentive the executives will receive therefore. However, how the investment opportunity will form a future

asset depends on decision-making of enterprise executives. How do we identify how much of the business performance comes from the value created through executive management over existing assets in place and how much is a result of executives using, grasping and creating investment opportunities. Therefore, it becomes a key subject to be studied in the future to conduct an empirical examination of the effects of executive incentive from the perspective of investment opportunity.

3.5 Summery of this chapter

This chapter provides a brief introduction of such basic theories on executive incentive as principal-agent theory, optimal contract theory, information asymmetry theory, incentive theory and executive power theory, and a revive of literatures on the overall situation of researches on executive incentives. According to the growth option theory, the investment opportunity can be described as a growth option of a company and the option pricing for the investment opportunity can be conducted.

Through an overview of foreign and domestic literatures on executive incentive, we find that foreign and domestic scholars have not reached consistence conclusions in researches on the correlation between compensation & equity incentive for executives and performance; there is a positive correlation between equity incentive for executives and the impacts of investment opportunity; the research on the impacts of investment opportunity, namely, growth option, on stock returns remain at the stage of theoretical study, with few empirical research. Some scholars have found that a corporate investment means that an investment opportunity forms a real option, and thus affects the corporate value. The real options formed by an investment opportunity can lead to fluctuations in individual stock return, and there is a positive relationship between the individual stock return and the ratio of fluctuation in individual stock return.

This chapter provides a brief evaluation of foreign and domestic researches on executive incentive. Through the above-mentioned analysis, the author believes that the nature of the executive incentive is (1) to reduce the agency cost through the optimal compensation contract; (2) to overcome the effect of information asymmetry, prevent the executives from abusing their powers and impairing the corporate interests; (3) it is the most important to arrange a long-term valid mechanism for stock option incentive, promote the realization of

executive's growth options, enable the enterprise to grow for a long term and achieve maximized corporate value and win-win situation of shareholder and executive interests. Starting with the investment opportunity, this thesis empirically examines the effect of executive incentive with the main thread being that the research on investment opportunity is of great importance to an enterprise, for the investment opportunity has a great impact on the growth of the enterprise and also on its market valuation. It is even the most important influencing factor. The value of investment opportunity is embodied ultimately in stock returns; an executive of a company decides upon grasping an investment opportunity, and one of his main jobs should be to grasp the investment opportunities beneficial to the enterprise and even create the investment opportunities which are beneficial to corporate growth. Hence, executive incentive should focus on motivating an executive to grasp and create the investment opportunities, or should aim at his abilities to capture, grasp and create the investment opportunities. The strength of executive incentive determines the number of the investment opportunities for an enterprise, while the effects of executive incentive are finally reflected by stock return and mobility, especially by relations between the two.

Chapter 4 Research hypotheses and empirical design

4.1 Preface

The risk premium of return on assets is a basic problem in financial research, and the volatility of return on stocks is of great significance for risk management, portfolio selection and option pricing. Since many modern models of asset pricing are based on investor risk aversion, the positive correlation between asset risk and risk premium has become one of the implicit hypotheses of these models. The test of whether and to what extent this correlation exists in the actual financial market is directly related to such important issues as the applicability of different asset pricing models and the rationality of asset allocation decisions. In financial research, the variance of rate of return is often used to measure risk, and the rate of volatility is used as the synonym of risk. Therefore, the study of risk premium in financial market can be realized by examining the correlation between volatility and excess return. Because the change of volatility affects the risk of investment portfolio, and the change of inter-market correlation affects hedging strategies. Therefore, finding out and testing the model which can help to analyze and predict the real variable volatility of the stock market are undoubtedly very important for asset portfolio and asset management, because the return rate of general financial assets is closely related to the market volatility, that is, the risk. Analyzing the impact of bull and bear news on the volatility of earnings is very helpful for understanding the characteristics of individual behaviors of market investors. In this research, descriptive statistics and the two-step regression method of Fama-Macbeth are used to further compare the roles of equity compensation and cash compensation in enabling enterprises to expand investment opportunities and improving corporate performance. First of all, the impact and effect of investment opportunities on the relationship between stock return and volatility are examined, and then how investment opportunities affect the pricing of enterprises is examined; Secondly, through the comparative analysis of the impact and effect of investment opportunities under different executive incentive modes under the grouping of incentive intensity, the effect of executive incentive is empirically tested from the perspective

of investment opportunities.

4.2 Research hypotheses

4.2.1 The relationship between the volatility change of individual stocks and the rate of return on individual stocks

A unified conclusion has not yet been reached in the previous studies on the relationship between the volatility change of individual stocks and the rate of return of individual stocks. This research attempts to study the relationship between them from the perspective of option pricing, using the method of Grullon et al. (2012) and the data of Chinese A-share market to examine the relationship between the volatility change of individual stocks and the return on individual stocks. Due to the imperfect system, there are a large number of non-standard phenomena in the A-share market. First, earnings management is common among listed companies, information disclosure is untimely, information quality is not very high. Next, institutional investors play a limited role in stabilizing market sentiments, and moreover, institutional investors often use their information advantages and capital advantages to induce and manipulate stock prices, thus increasing the volatility risk of the market. The serious asymmetry of information makes investors more inclined to private information when investment decisions are made and inclined to hold a smaller number of stocks rather than a fully decentralized stock portfolio.

The existence of aforementioned factors increases the volatility of stocks on the market, which does not come from the risk factors emphasized in the rational asset pricing model, but from the market incompleteness and investor information difference and other factors. These conditions provide a good opportunity for testing the relationship between specific risk and asset return. Based on the above analysis, the following hypothesis is presented:

Hypothesis 1: The volatility change of individual stocks and the return on individual stocks are positively correlated. The greater the volatility change of individual stocks, the higher the return on individual stocks.

4.2.2 The regulating effect of investment opportunities on the relationship between the volatility change of individual stocks and the return on individual stocks.

The growth, market valuation and stock return of an enterprise will all depend on its future investment opportunities. As found out by Smith and Watts (1992) by studying the impact of the investment opportunities of enterprises on their capital structure, management compensation and dividend policy, enterprises with more investment opportunities have relatively low debt levels, tend to select an equity-based incentive plan as a form of paying compensation to their management, and tend to select a policy of low dividend payment. Along with the increase of investment opportunities, because enterprise owners do not have the professional skills of the management and are unable to know all the investment opportunities available for the enterprises, the behaviors of the management will become less observable, and the agency conflict may become more intense accordingly, resulting in impairment to enterprise value. Myers (1984) suggested that the value of an enterprise depends on the sum of the value of the investment decision option and the value of the AIP (Asset in place) when the net present value is positive (NPV > 0) in the future. Therein, the value resulting from the implementation of an investment decision option with its net present value being positive in the future is called an investment opportunity. In an enterprise with a higher investment opportunity, the owners or shareholders need to monitor the behavior of their management all the more. Gaver and Gaver (1993) and other scholars divided the research sample into 237 enterprises with high investment opportunities and 237 enterprises with low investment opportunities according to the size of their investment opportunities and used their data for an empirical test and study and obtained a similar result. They found out that enterprises with high investment opportunities have significantly lower debt equity ratios and dividend yields. Gul (1999) selected the relevant economic data of Japanese listed enterprises from 1988 to 1992 for analysis and found out that investment opportunities and the debt levels of enterprises are significantly negatively correlated. That is, the liability-asset ratios of the enterprises with high investment opportunities are relatively low. Given that, on the one hand, expanding investment opportunities can help enterprises to boost corporate performance and enhance investor confidence in them. On the other hand, taking advantage of investment opportunities can also increase the volatility of the enterprises. This research hereby presents the following hypothesis:

Hypothesis 2: Investment opportunities have a regulating effect on the positive

correlation between the volatility change of individual stocks and the return on individual stocks. The more future investment opportunities an enterprise has, the more significantly the volatility of individual stocks and the return on individual stocks will be positively correlated.

4.2.3 The test of the incentive effect of executives based on the regulating role of investment opportunities

Executive incentive can reduce agency problems. In terms of investment, executives are more likely to capture, or even actively create investment opportunities. Therefore, reducing agency costs can help to promote the acquisition of investment opportunities. Murphy (1999) held the opinion that the sensitivity of CEO compensation performance can be changed by both explicit and implicit means, and explicit incentives are based on bonus and stock price appreciation, while implicit changes are based on annual salary, bonus, stock, According to the research findings of Kato, Lemmon, and Luo (2005), the higher the proportion of options granted to board members is, the greater the excess return will be when the implementation of equity incentive is announced. According to the research findings of Morck, Shleifer, and Vishny (1988) the level of executive shareholding is generally low, while the level of CEO shareholding is correlated with corporate performance under certain conditions. Therefore, we should increase the incenti e for executives.

This research holds the opinion that since the executive salary incentive plan is to alleviate the agency problem and further improve the company performance, the greater the incentive to the management, the more incentive effect can be achieved to a certain extent. Moreover, this incentive effect can be achieved by expanding the investment opportunities and increasing the stock volatility of the company. In general, compared with cash compensation, equity compensation is more difficult to achieve, and is directly linked to the company performance, so it is more binding upon management, and has a more obvious incentive effect. Based on the above analysis, this chapter presents the following hypothesis:

Hypothesis 3: Compared with salary incentive, along with the increase of the intensity of equity incentive, the positive regulating effect of investment opportunities on the relationship between the volatility change of individual stocks and the return on individual stocks will be stronger.

Hypothesis 4: The greater the intensity of executive incentive, the stronger the positive regulating effect of investment opportunities on the relationship between the volatility change of individual stocks and the return on individual stocks.

4.3 Empirical design

4.3.1 Data source and sample selection

The data of 2533 A-share listed companies in Shanghai and Shenzhen stock exchanges from January 2004 to December 2013 were selected as the research sample of this research, with a total of 206,838 monthly observations. All the data come from CSMAR Database for Chinese Stock Exchange and RESSET Financial Database. The sample data were presented and screened according to the following criteria: (1) eliminating 52 companies in the financial sector, (2) eliminating 77 companies with missing variable values used in regression, (3) eliminating 34 companies with a listing age of less than one year. The finally-adopted sample included 2,370 companies with a total of 140,290 complete observations.

Table 4-1 shows the sample distribution by industry and year, in which the 2012 CSRC industry classification standards are adopted for the industry classification.

Table 4-1 Distribution of sample enterprises by industry

Industry/year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
A: Agriculture, forestry, animal husbandry, fisheries	13	18	16	17	19	20	19	27	27	28	38
B: Mining	35	33	29	36	41	38	42	38	42	43	61
C: Manufacturing	546	597	578	640	723	720	718	960	1,117	1,154	1,534
D: Electric power, thermal power, fuel gas and water production and supply	55	59	56	58	63	52	55	53	52	50	78
E: Building	20	24	23	27	30	32	30	39	47	45	60
F: Wholesales and retails	95	107	98	105	108	110	103	100	99	91	149
G: Transportation, warehousing and	44	42	46	50	52	51	48	50	45	44	70

postal service											
H: Accommodation and catering	5	6	7	4	11	10	8	9	6	8	12
I: Information transmission, software and information technology services	23	27	24	27	33	38	42	69	95	104	122
K: Real estate	102	89	88	90	93	96	108	94	86	77	132
L: Lease and commercial services	11	11	9	10	14	13	12	16	19	18	22
M: Scientific research and technical services	1	0	0	1	3	3	5	8	8	11	11
N: Water conservancy, environment and utilities management	12	15	13	13	17	11	10	15	19	19	25
P: Education	0	0	1	1	1	1	1	1	2	3	4
Q: Health and social work	11	11	6	11	9	8	9	13	18	20	27
R: Culture, sports and recreation	22	22	19	21	17	15	16	14	15	12	24
S: Others	13	18	16	17	19	20	19	27	27	28	38
Total	996	1,062	1,014	1,112	1,235	1,218	1,227	1,507	1,698	1,727	2,370

Data source: sorted and collected by the author

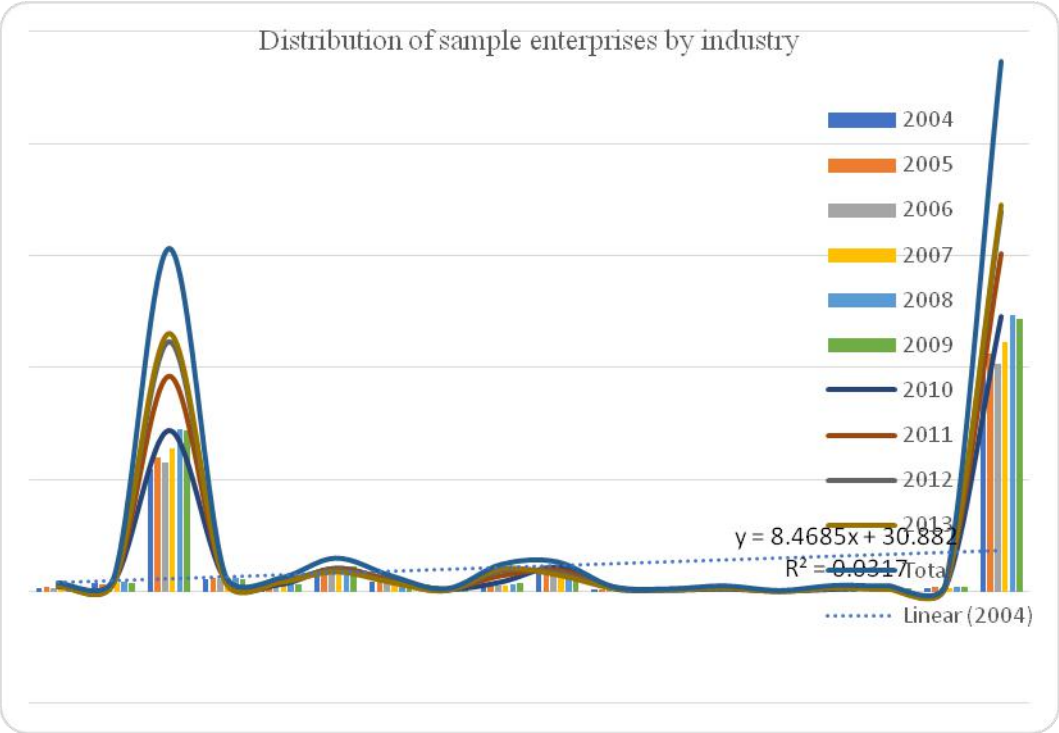


Figure 4-1 Distribution of sample enterprises by industry

4.3.2 Descriptive statistics of the sample

According to the distribution of sample enterprises, this research makes descriptive statistics on the top three executives' compensation and shareholding ratios of sample enterprises, as well as the situation of the companies which adopt the stock incentive. Tables 4-2, 4-3 and 4-4 show the compensation and shareholding ratios of executives by industry and by year.

Table 4-2 The top three executives' compensation by industry and by year (unit: 10,000 yuan)

Industry/year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average
A: Agriculture, forestry, animal husbandry, fisheries	12.00	13.92	13.91	17.05	19.18	26.65	32.35	34.00	41.15	36.66	26.88
B: Mining	14.52	17.05	22.24	28.66	31.58	36.13	44.57	52.25	57.46	56.63	37.64
C:	19.6	20.9	24.1	30.9	34.5	38.0	46.6	51.8	53.14	55.47	40.70

Manufacturing	6	5	2	8	9	7	6	3			
D: Electric power, thermal power, fuel gas and water production and supply	22.42	20.33	22.35	29.37	29.98	35.15	36.79	40.78	46.46	47.58	32.77
E: Building	22.99	23.37	27.02	29.22	36.92	42.38	51.58	57.84	56.52	59.71	44.30
F: Wholesales and retails	21.53	20.92	26.30	37.25	39.92	46.33	56.21	61.80	63.34	68.14	44.00
G: Transportation, warehousing and postal service	25.26	26.63	30.72	38.20	40.45	42.42	48.78	55.05	58.02	60.25	42.80
H: Accommodation and catering	16.76	13.32	18.09	25.37	22.57	25.82	29.12	34.44	49.86	40.11	28.22
I: Information transmission, software and information technology services	38.40	30.01	32.71	37.21	45.73	54.04	59.60	57.86	57.14	59.22	51.75
K: Real estate	24.56	29.49	30.86	45.65	54.90	61.57	66.74	86.37	101.18	124.06	62.03
L: Lease and commercial services	37.76	25.17	31.67	39.52	42.29	48.67	52.56	68.54	69.76	91.65	54.72
M: Scientific research and technical	18.33	N/A	N/A	22.33	47.45	45.05	53.01	54.89	63.81	63.47	55.94

services											
N: Water conservancy, environment and utilities management	17.05	19.07	23.45	24.52	23.16	25.88	35.49	40.00	42.60	45.18	30.86
P: Education	12.33	9.47	11.67	30.17	25.47	N/A	39.51	34.80	30.29	N/A	24.50
Q: Health and social work	N/A	N/A	10.43	14.63	18.52	39.13	18.67	29.94	41.14	51.64	33.38
R: Culture, sports and recreation	16.38	18.23	19.71	32.30	47.86	52.23	58.33	56.72	65.79	61.90	44.92
S: Others	19.00	20.36	24.60	36.37	42.88	35.15	50.17	63.33	60.22	61.58	38.99
Average	21.08	21.86	25.12	32.87	36.63	41.06	49.12	54.74	56.82	59.68	42.45

Data source: CSMAR Database, sorted and collected by the author

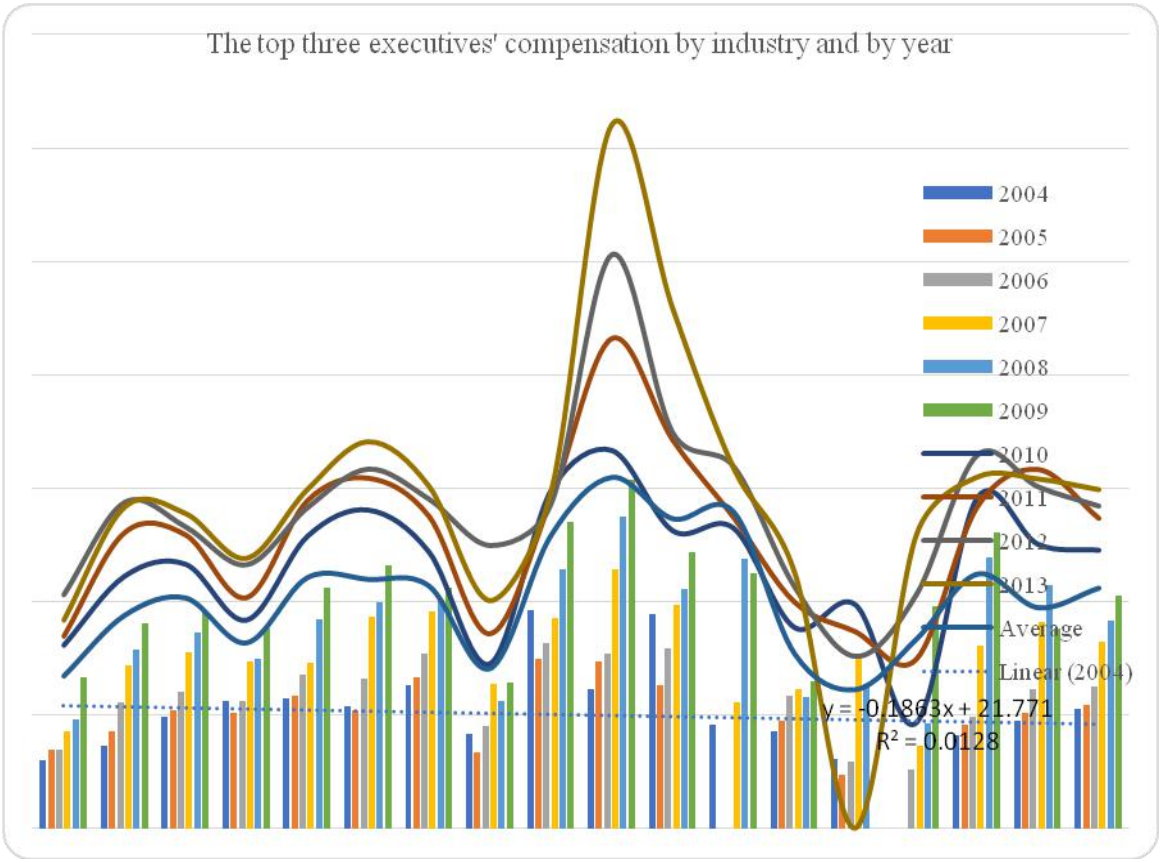


Figure 4-2 The top three executives' compensation by industry and by year

The top three executives' compensation by industry and by year. The statistical analysis in Table 4-2 shows that from 2004 to 2013, the compensation of executives in various industries shows a trend of year-by-year increase. In the industries covered by the sample, the average compensation of executives in the real estate industry is the highest, and that in agriculture, forestry and animal husbandry is the lowest.

Table 4-3: The top three executives' shareholding ratios by industry and by year (%)

Industry/year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average
A: Agriculture, forestry, animal husbandry, fisheries	0.002	0.002	0.004	0.313	0.984	1.843	0.899	5.626	13.069	11.338	4.395
B: Mining	0.00	0.00	0.00	0.00	0.00	0.49	0.50	0.14	5.04	6.33	1.39

	6	3	6	6	8	1	2	8	2	5	9
C: Manufacturing	0.007	0.016	0.152	0.182	0.713	1.331	2.872	7.696	13.769	16.016	5.755
D: Electric power, thermal power, fuel gas and water production and supply	0.004	0.004	0.007	0.006	0.019	0.043	0.033	0.036	0.034	0.294	0.044
E: Building	0.000	0.007	0.003	0.003	0.615	0.793	0.993	3.983	9.557	11.989	3.819
F: Wholesales and retails	0.007	0.009	0.007	0.056	0.055	0.157	0.328	1.151	3.352	4.633	0.918
G: Transportation, warehousing and postal service	0.002	0.002	0.004	0.003	0.002	0.003	0.058	0.675	0.799	1.080	0.254
H: Accommodation and catering	0.002	0.020	0.002	0.015	0.004	0.009	0.001	4.716	7.004	4.267	1.695
I: Information transmission, software and information technology services	0.003	0.003	0.007	0.037	0.624	2.652	6.147	14.308	20.729	26.485	12.249
K: Real estate	0.013	0.014	0.009	0.038	0.547	0.651	0.833	0.958	1.440	1.466	0.599
L: Lease and	0.02	0.00	0.01	0.01	0.00	0.14	0.34	4.78	8.14	6.17	2.61

commercial services	0	5	6	0	7	5	1	4	7	5	3
M: Scientific research and technical services	0.000	N/A	N/A	0.000	0.480	0.303	11.563	20.509	22.657	24.090	17.014
N: Water conservancy, environment and utilities management	0.004	0.005	0.003	0.377	0.244	0.012	0.014	2.675	7.707	9.373	2.667
P: Education	0.000	0.000	0.000	0.000	0.000	N/A	0.000	0.000	0.000	N/A	0.000
Q: Health and social work	N/A	N/A	0.000	0.000	0.000	0.000	27.191	27.042	32.546	35.185	18.001
R: Culture, sports and recreation	0.012	0.018	0.032	0.019	0.465	0.005	0.798	4.638	7.170	9.516	3.108
S: Others	0.012	0.017	0.012	0.009	0.008	0.008	0.009	0.005	0.004	0.006	0.010
Average	0.007	0.012	0.090	0.125	0.522	0.998	2.073	6.052	11.412	13.685	4.399

Data source: CSMAR Database, sorted and collected by the author

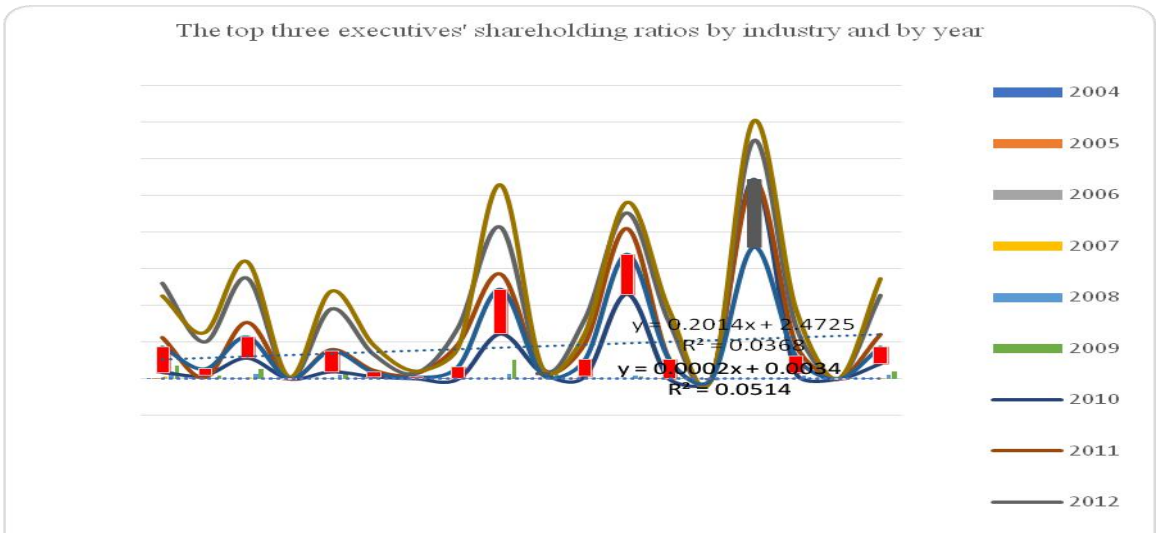


Figure 4-3 The top three executives' shareholding ratios by industry and by year

Table 4-4 The proportions of the companies which adopt equity incentive by industry and by year (%)

Industry/year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average
A: Agriculture, forestry, animal husbandry, fisheries	7.69	5.56	18.75	17.65	31.58	40.00	36.84	59.26	59.26	67.86	50.00
B: Mining	14.29	15.15	24.14	27.78	19.51	15.79	23.81	21.05	35.71	39.53	24.59
C: Manufacturing	12.27	14.91	23.70	24.69	25.73	32.64	41.92	51.98	63.03	68.11	52.54
D: Electric power, thermal power, fuel gas and water production and supply	18.18	18.64	30.36	29.31	28.57	19.23	27.27	22.64	23.08	32.00	33.33
E: Building	0.00	12.50	8.70	7.41	10.00	18.75	33.33	43.59	57.45	60.00	45.00
F: Wholesales and retails	14.74	14.95	19.39	23.81	23.15	30.91	28.16	32.00	43.43	46.15	30.87
G: Transportation, warehousing and postal service	6.82	9.52	19.57	14.00	13.46	19.61	20.83	22.00	33.33	36.36	22.86
H: Accommodation and catering	20.00	66.67	42.86	50.00	36.36	50.00	37.50	66.67	66.67	75.00	58.33
I: Information transmission, software and information technology services	4.35	7.41	16.67	18.52	21.21	31.58	52.38	69.57	78.95	83.65	72.95
K: Real estate	16.67	20.22	27.27	23.33	21.51	25.00	32.41	36.17	37.21	45.45	25.76

L: Lease and commercial services	9.09	9.09	33.33	20.00	28.57	30.77	33.33	50.00	47.37	66.67	45.45
M: Scientific research and technical services	0.00	N/A	N/A	0.00	33.33	33.33	80.00	87.50	87.50	90.91	81.82
N: Water conservancy, environment and utilities management	8.33	13.33	23.08	30.77	29.41	36.36	20.00	40.00	63.16	63.16	36.00
P: Education	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Q: Health and social work	0.00	0.00	0.00	0.00	0.00	0.00	11.11	7.69	11.11	15.00	11.11
R: Culture, sports and recreation	4.55	4.55	5.26	9.52	17.65	20.00	25.00	42.86	53.33	83.33	45.83
S: Others	30.77	22.22	25.00	23.53	26.32	20.00	26.32	22.22	22.22	14.29	13.16
Average	12.65	15.16	23.27	23.56	24.45	30.05	37.65	47.58	58.13	63.81	47.76

Data source: CSMAR Database, sorted and collected by the author

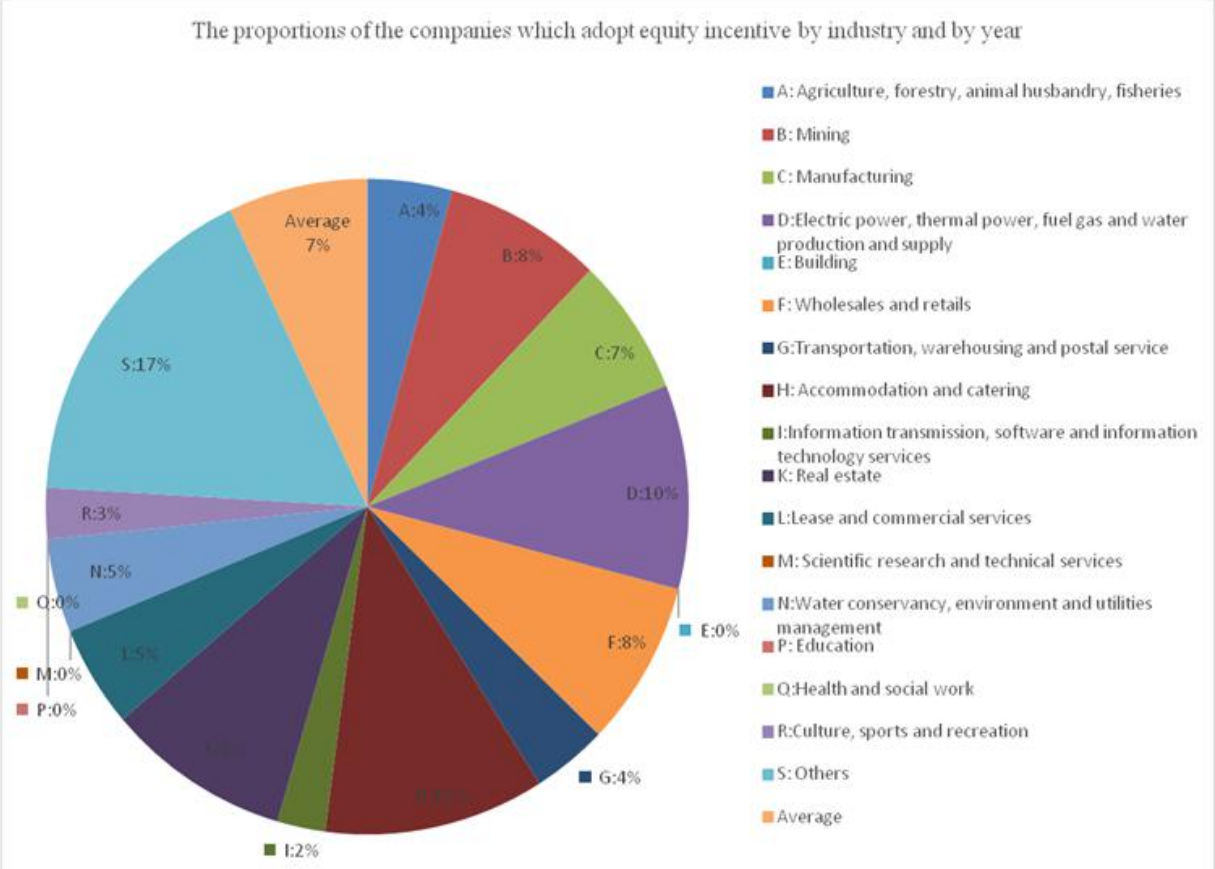


Figure 4-4 The proportions of the companies which adopt incentives by industry and by year

The statistical analysis in Table 4-3 shows that the shareholding ratios of executives in various industries increase year by year from 2004 to 2013. In particular, the shareholding ratios of executives have increased rapidly in recent years. Among the industries covered by the sample, the shareholding ratios of executives in the industry of health and social work are the highest, with an average of 18.001%, followed by the industry of scientific research and technical services, with an average of 17.014%. The results of Table 4-4 show that more than 50% of the enterprises have begun to adopt equity incentive in the last 10 years, which indicates that the stock incentive mechanism of listed companies in China is constantly improved. Among scientific research, information, software and other industries, the shareholding ratios of executives are much higher than those of other industries.

4.3.3 The definition and description of variables

First, this research needs to test the regulating effect of investment opportunities on the relationship between stock return and stock price volatility, and then to test whether the regulating effect varies among different incentive intensities and incentive modes of

executives. Therefore, here, we respectively define the variables and measure the indexes of stock return, volatility, investment opportunities and executive incentive of companies. The relationship between the third-party factors introduced by investment opportunities as a research perspective and executive incentive and stock performance (return and volatility) is as follows:

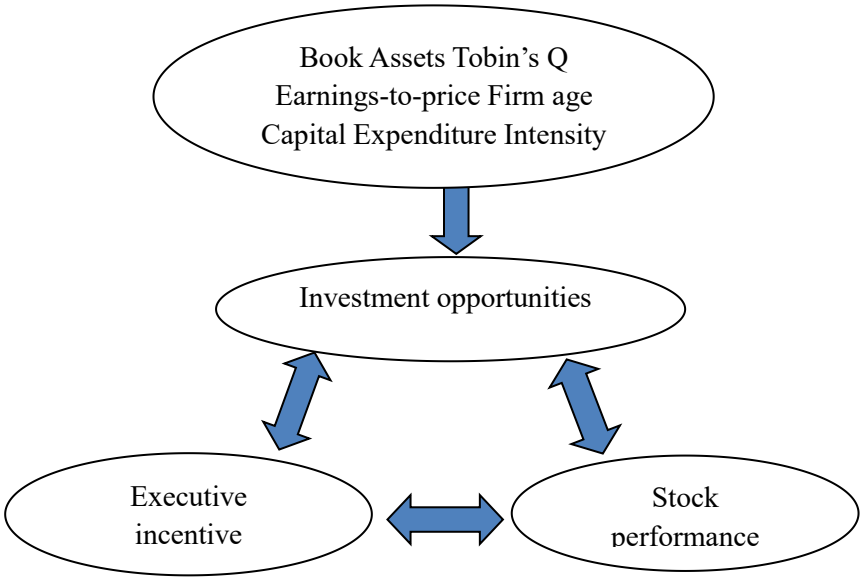


Fig 4-5 The relationship between executive incentive, investment opportunities and stock performance

4.3.3.1 Return and volatility of individual stocks

Return: takes into account the monthly rate of return on individual stocks reinvested in cash dividends;

Volatility: as an index for measuring the uncertainty in the operation course of the company, according to the Grullon et al. (2012), the method of calculating the volatility of individual stock in month t is the standard deviation of the daily rate of return on the stocks of the company i in month t.

$$VOL_{i,t} = \sqrt{\frac{\sum ret(r_{i,t} - \overline{r_{i,t}})^2}{n_t - 1}} \tag{4.1}$$

Therein, $r_{i,t}$ denotes the rate of return on the stocks of the company i on the date $\tau \in t$. $\overline{r_{i,t}}$ indicates the average daily rate of return on the stocks of the company in month t, and nt indicates the number of effective observations in the month. The change of volatility in the month $\Delta VOL_{i,t}$ is the difference between the volatility in the month t and the volatility in the

month t-1.

$$\triangle VOL_{i,\ t} = VOL_{i,\ t} - VOL_{i,\ t\text{-}1} \quad (4.2)$$

The risk-free interest rate (Risk-free rate), which is used to calculate excess returns, adopts the one-year deposit rate for monthly bank lump-sum deposit and withdrawal. In this research, the monthly excess return on individual stocks (defined as the monthly return minus the monthly risk-free rate) is regarded as the only explained variable.

4.3.3.2 Controlled variables

According to the usual capital pricing theory, e.g. Fama and French (1993), it is necessary to control the market Beta, market size and book/market value ratio in the regression test of excess returns. Therein: the market Beta estimate $\mu MKT_{i,t}$ can be obtained through regression from all historical monthly excess return data before the current month and the monthly market excess return OLS. The data used in this research are selected from "RESSET Database". In addition, in order to control momentum or reversal strategy, we also take the historical return performance of the stocks for 6 months [t-7, t 2] as a controlled variable, and also take the trading volume as a controlled variable according to Karpoff (1987).

4.3.3.3 Investment opportunities

By referring to the general practices regarding investment opportunities in the previous literatures, this research selects book assets, Tobin Q, earnings-to-price, firm age and capital expenditure intensity as proxy variables.

Book Asset: A large proportion of the value of a large company often comes from its existing assets. A company with relatively small-scale assets relies, all the more, on investment opportunities to create value for the company (Brown et al., 2007). Therefore, the size of the company can be used as a proxy variable for investment opportunities. This research uses the total book assets of the company to indicate the size of the company.

Tobin Q (Tobin's Q): Tobin Q is the ratio of the total market value of the stock of a company to the replacement cost of its assets (James, 1969). If the ratio is more than 1, the company will be better off if it buys newly produced capital products, which will increase the investment demand. If the ratio is less than 1, the purchase of ready-made capital products will be cheaper than newly generated capital products, which will reduce the capital demand.

Therefore, Tobin Q ratio is a positive proxy variable of investment opportunities.

Tobin's Q is widely used by domestic and foreign financial circles to study enterprise value. (James, 1969) proposed that the ratio relationship between the expected net present value of new assets and the replacement cost of enterprises is an important factor for enterprises to decide on their investment, and he named this ratio Tobin's Q. Tobin's Q is used in the field of industrial economics, as an index for measuring the expected profitability and monopoly power of a company (Lindenberg & Ross, 1981). Lang, Stulzst held the opinion that: Tobin's Q theory provides the best explanation for the correlation between investment and stock price, and Tobin's Q is an important proxy variable of enterprise value and company performance.

EP (Earnings-to-price) is the reciprocal of price-to-earnings ratios, and Kester (1984) used it as a proxy variable for investment opportunities. Instead of the price-to-earnings ratio, the EP variable is chosen to prevent this variable from becoming meaningless when the return is zero. If other conditions remain unchanged, the smaller the value, the greater the investment opportunities of the enterprise.

Firm age: Companies with a longer history tend to have most of the value expressed in existing assets (Lemmon & Zender, 2010). In line with previous studies, this research defines firm age as the year in which the sample data are located minus the year in which the company was established or the year in which the data first appeared in CSMAR Database. The older the company is, the fewer investment opportunities it has.

Capital expenditure intensity (CAPTA). Capital asset investment expenditure density is the ratio of capital asset investment expenditure to asset market value or book value. Smith and Watts (1992) used this variable to measure investment opportunities. In general, the higher the ratio is, the greater the investment opportunities will be. Capital asset investment expenditure includes R & D expenditure, new product development or existing product expansion expenditure, equipment or plant renewal expenditure, exploration. Therefore, compared with R and D density, capital asset investment expenditure density can reflect the enterprise's investment activities more comprehensively.

4.3.3.4 Executive incentive

Annual salary (Salary): Annual salary is one of the common ways of executive incentive. This research counts the average of the top three executives' compensation in each company

every year and takes it as one of the indexes for measuring executive incentive intensity. The data come from CSMAR Database.

Shareholding ratios (Equity) Equity incentive is another important way of executive incentive. This research defines it as the percentage of the shares held by the senior management of the company every year in the total shares of the company.

Please note that the relevant variables of executive incentive collected in this research are not directly used for regression testing but as the grouping basis of executive incentive intensity. The specific definition and description of each variable are shown in Table 4-5.

Table 4-5 Definition and description of variables

Type	Name and symbol	Denition and description
Explained variable	Stock excess return (R)	Considering the difference between the monthly rate of return on cash dividend reinvestment and the one-year deposit interest rate of the bank lump-sum deposit and withdrawal in the current month
	The change of volatility (ΔVol)	The difference between the standard deviation of the daily rate of return in the corresponding month and the standard deviation of the daily rate of return in the previous month
Explaining variables	(log(BA)) Book assets (log(BA))	The natural logarithm of the total book assets of enterprise at the end of the year
	(Age) Firm age (Age)	The year in which the sample is located minus the year in which the company was established or the year in which its data first appeared in the CSMAR Database
	Tobin Q ratio (QVal)	The ratio of the sum of stock market value and net debt to the current value of tangible assets at the end of the year, directly downloaded from the RESSET Financial Database

Controlled variables	EP virable (EP)	The ratio of annual net profit to year-end stock market value. The data are the reciprocal of the price-earnings ratio data directly downloaded from the "RESSET Financial Database"
	Capital asset expenditure density (CAPTA)	The ratio of the current year's capital expenditure to the year-end total book assets, in which the capital expenditure is the cash paid for the operating lease, plus the cash paid for the purchase and construction of fixed assets, intangible assets and other long-lived assets, minus the net cash value recovered by the disposal of fixed assets, intangible assets and other long-lived assets
	Market Beta (Beta)	The Beta value obtained through regression to the excess returns data of all historical months before the current month and the monthly market excess return OLS. The data are directly downloaded from CSMAR Database
	Book/market value ratio (B/M)	The shareholders' equity at the end of the previous financial year divided by the total market value of the stock. In the total market value of stock, the total market value of non-tradable shares is the stock market multiplied by the share price of tradable shares. The data are directly downloaded from the CSMAR Database
	Company market value (log(MV))	The natural logarithm of the total stock market value of the company at the end of the previous financial year. The data are downloaded from CSMAR Database
	Historical performance (HP)	The holding period return (HPR) of stocks from the beginning of the seven months before the month in which the sample is located to the end of the two months before the month in which the sample is located, calculated on the basis of monthly rate of return data

Executive incentive	Trading volume (log(Volume))	The natural logarithm of the monthly trading volume of individual stocks. The data are downloaded from the CSMAR Database
	Salary incentive (Salary)	The total compensation of the top three executives in the current year. The data are directly downloaded from CSMAR Database
	Equity incentive (Equity)	The ratio of the number of shares held by executives at the end of year to the total number of shares at the end of year. The data are downloaded from CSMAR Database

4.3.4 Empirical methods and steps

In order to investigate the regulating effect of investment opportunities on the positive relationship between stock return- volatility change, we first need to test whether there is a positive correlation between Chinese stock market return and volatility change. Specifically, by drawing on the testing method of the relationship between enterprise return and volatility mentioned by Grullon et al. (2012) about Duffee (1995;2002) and Albuquerque, Eichenbaum, and Rebelo (2012), we use the two-step method of Fama-MacBeth (1973) to carry out the following regression on the change of the company's monthly stock excess return to the change of volatility:

$$r_{i,\,t} - r_{f,t} = \alpha_t + \beta_t \Delta VOL_{i,t} + r_t \mu MKT_{i,t} + \delta_t \chi_{i,t} + \varepsilon_{i,t} \tag{4.3}$$

Therein, $\gamma_{i,\,t}$ is the monthly return on the stocks, $\gamma_{f,\,t}$ is the risk-free interest rate of the stocks, and $\Delta VOL_{i,\,t}$ is the differential component of the monthly volatility. $\mu MKT_{i,\,t}$ is market Beta, $\chi_{i,\,t}$ is a vector describing the characteristics of the company, composed of a series of controlled variables. According to commonly used asset pricing theories (such as: Fama & French, 1993, Jegadeesh & Titman, 1993, Cooper, Gulen, & Schill, 2008), these controlled variables are the natural logarithm of the company's total market value and the book-market value ratio of the year prior to the year in which month t is located, historical performance (return on the corresponding stocks in the holding period of [t-7 / t-2] months). In addition, the natural logarithm (Karpoff, 1987) of monthly turnover is also taken as a controlled variable. The coefficient β_t of volatility change $\Delta VOL_{i,\,t}$ is tested.

This chapter draws on the model adopted by Grullon et al. (2012), using the change of volatility as an explaining variable. Such a way of setting is more consistent with the theory of physical option. According to the theory of option pricing, volatility is one of the factors that determine the value of the option, thus affecting the stock value of the company. The explained variable in the model is the rate of return, that is, the change in the value of stocks, so it should correspond to the change of the volatility, that is, $\Delta VOL_{i,t}$.

Furthermore, we examine the regulating effect of investment opportunities on the relationship between stock volatility and return, that is, whether the positive relationship between stock return and volatility change varies among different investment opportunities. Specifically, on the basis of regression model (3), the cross term of investment opportunity and volatility change is introduced, and the Fama-Macbeth two-step regression method is also used.

$$r_{i,\,t}\text{-}r_{f,\,t} = \alpha_t + \beta_t \Delta VOL_{i,\,t} + \nu_t GR_{i,\,t} \Delta VOL_{i,\,t} + \gamma_t \mu MKT_{i,t} + \delta_t \chi_{i,t} + \xi_{i,t} \quad (4.4)$$

Therein: $\nu_t GR_{i,\,t} \Delta VOL_{i,\,t}$ is one of the products of the five proxy variables of investment opportunities, including the logarithm of the change of volatility and the company's book assets in the current year, firm age, capital asset expenditure density, Tobin Q value and EP variable. In order to make the result more intuitive, we standardize the five indexes by subtracting the mean value of their sample and dividing the result by the standard deviation of their sample. The other variables are the same as model (3). The coefficient ν_t of the cross term $\nu_t GR_{i,\,t} \Delta VOL_{i,\,t}$ is tested when different measurement indexes of investment opportunities are adopted.

Finally, this chapter sorts the top three executives' compensation (executives' shareholding ratios) of each company each year, divides the sample into two groups: high compensation and low compensation (high shareholding ratios and low shareholding ratios), and uses the regression equation (4) to regress each sub-sample. By comparing the difference and significance of the coefficient ν_t of the cross-term $\nu_t GR_{i,\,t} \Delta VOL_{i,\,t}$ between the two sub-samples, the research tests whether the regulating role of investment opportunities to the return-volatility change performs differently due to the difference of the incentive modes of

the executive, and the difference of incentive intensity under different modes.

4.4 Summary of this chapter

The main content of this chapter is the research hypotheses and empirical design. With regard to research hypotheses, on the basis of previous studies, from the perspective of option pricing, the method of Grullon et al. (2012) is used for reference during the study of the relationship between them. By using the data of Chinese A-share market, this research tests the relationship between the volatility change of individual stocks and the return on individual stocks. Hypothesis 1: The change of volatility of individual stocks and the rate of return on individual stocks are positively correlated. The greater the change of volatility rate of individual stocks, the higher the rate of return on individual stocks. The growth, market valuation and stock return of an enterprise will all depend, to a great extent, on the future investment opportunities of the enterprise. Investment opportunities have a regulating effect on the return and the change of volatility. Hypothesis 2: Investment opportunities have a regulating effect on the positive relationship between the volatility change of individual stocks and the return on individual stocks. The more investment opportunities an enterprise has in the future, the more obvious positive correlation between the volatility of individual stocks and the return on individual stocks it will have. The incentive plan of executive compensation is to alleviate the agency problem, and thus improve the performance of the company. Then, the greater the incentive for management, the stronger incentive effect will occur to a certain extent. Moreover, this incentive effect can be achieved by expanding the investment opportunities of the company and increasing the volatility of stocks. Hypothesis 3: Compared with the salary incentive, along with the increase of the intensity of the equity incentive, the positive regulating effect of investment opportunities on the relationship between the volatility of individual stocks and the return rate of individual stocks will be stronger. Hypothesis 4: The greater the intensity of executive incentive, the stronger the positive regulating effect of the investment opportunities on the relationship between the volatility of individual stocks and the return on individual stocks.

In terms of empirical design, the 2,533 A-share listed companies in Shanghai and Shenzhen stock exchanges from January 2004 to December 2013 were included in the research sample, with a total of 206,838 monthly observations, and the sample data were

eliminated and screened. The finally-adopted samples included 2,370 companies with a total of 140,290 complete observations. Firstly, according to the method proposed by Grullon et al.(2012), this research tests the relationship between the volatility of and the return on individual stocks. Secondly, by referring to the general practices of investment opportunities in previous literatures, the research selects book assets, Tobin Q, earnings-to-price, firm age and capital expenditure intensity as proxy variables, and adopts the two-step method of Fama and MacBeth (1973), to test the regulating effect of investment opportunities on the return-the change of volatility; Thirdly, the research further examines the regulating effect of investment opportunities on the relationship between stock volatility and return, that is, whether the positive relationship between stock return and volatility change varies among different investment opportunities. Specifically, on the basis of regression model (3), the cross term of investment opportunities and volatility change is introduced, and the two-step method of Fama-Macbeth is also used for regression.

Chapter 5 Empirical results and analysis

5.1 Descriptive statistic results

According to the average compensation of the top three executives and the ratios of shares held by executives to the total issued shares released by the annual reports of various companies, the research divides every year's executive incentives of various companies into groups in terms of strength. Specifically, the total compensation of the top three executives of the company in the year is considered strong/weak if more/less than the median of the total compensation of the top three consecutives of all companies in the current year. The shareholding ratios of executives are also treated in the same way. Finally, according to the sizes of the two indexes, the separately independent test samples are divided into two groups.

5.1.1The volatility change of individual stocks and the return on the stocks

This research first analyzes the explaining variables, the explained variables and the controlled variables used in multivariate regression, with the results shown in Table 5-1.

Table 5-1 Descriptive statistic results

The symbol of variable (name)	Mean value	Standard deviation	Median	Number of observations
ER (Expected excess return)	0.0159	0.1488	0.0069	140,290
Vol (Volatility)	0.0292	0.0116	0.0270	140,290
ΔVol (The change of volatility)	0.00002	0.0115	-0.0002	140,290
Beta (Market Beta)	1.0165	0.2296	1.0101	140,290
B/M (Book-market value ratio)	0.5734	0.2463	0.5616	140,290
Log (MV) (Market value scale)	22.2122	1.0214	22.0809	140,290
HP (Historical performance)	0.1202	0.4981	0.0075	140,290

Log (Volume) (Trading volume)	18.0023	1.2188	18.0541	140,290
Log (BA) (Book assets)	21.5611	1.1076	21.4400	140,290
Age (Firm age)	8.5693	4.9273	8	140,290
Qval (Tobin Q)	2.4522	3.4010	1.8462	140,290
E P (Earings-to-price)	0.0314	0.0334	0.0235	140,290
CAPTA (Capital expenditure strength)	0.0591	0.0667	0.0435	140,290

Data source: CSMAR Database, RESSET Financial Database, sorted by the author

The descriptive results show that the average monthly excess return is about 1.6% and the standard deviation is 14.9%. The monthly average of the standard deviation of the daily return is 2.92 % and the median is 2.70%. Compared with the statistics of (Grullon et al., 2012) to American stock market (monthly excess return 0.6%, volatility 3.17%), Chinese A-share market has a higher return and lower volatility, a smaller change of monthly volatility, a mean value of 0.0018, and a standard deviation of 1.15.

5.1.2 Executive incentive

5.1.2.1 The mode and intensity of executive incentive

According to the average compensation of the top three executives and the ratios of shares held by executives to the total issued shares released by the annual reports of various companies, the research divides every year's executive incentives of various companies into groups in terms of strength. Specifically, the total compensation of the top three executives of the company i in the year t is considered strong/weak if more/less than the median of the total compensation of the top three consecutives of all companies in the current year. The shareholding ratios of executives are also treated in the same way. Finally, according to the sizes of the two indexes, the separately independent test samples are divided into two groups. According to the statistical results of the executive shareholding ratios, executive shareholding ratios have been increasing rapidly in recent years, and more than 50% of enterprises have begun to adopt equity incentive in the last 10 years, which indicates that the equity incentive mechanism of listed companies in China is constantly improving. Executive

shareholding ratios in scientific research, information, software and other industries are much higher than those of other industries.

5.1.2.2 Descriptive statistics under the grouping of executive incentive mode and intensity

Table 5-2 carries out high/low grouping to samples respectively according to the top three executives' compensation and executive shareholding ratios, and carries out descriptive statistics and variance tests to the mean and median of the related variables

Table 5-2 Descriptive statistics and variance tests under the grouping of executive compensation and shareholding ratios

Salary incentive grouping	Variable	Mean value difference, Average executive compensation (10,000 yuan)	ER	Vol	Beta	Log (MV)	B/M	HP	Log (Volume)
Low	Mean	19.4700	0.0151	0.0296	1.0276	21.8584	0.5702	0.1073	17.8603
	Median	17.9000	0.0065	0.0274	1.0175	21.7689	0.5563	-0.0049	17.9310
High	Mean	62.8514	0.0167	0.0288	1.0067	22.5259	0.5763	0.1319	18.1284
	Median	50.7267	0.0073	0.0266	1.0033	22.4233	0.5681	0.0188	18.1675
The mean value		43.3815	0.0	-	-	0.6675	0.0061	0.0246	0.2681**

difference between the high and low group		*** (224.81)	016 ** (2.007 3)	0.0009 *** (-14.028 1)	0.0209 *** (-17.095 6)	*** (130.86 13)	*** (4.5977)	*** (9.2351)	* (41.4429)
Equity incentive grouping	Variable	Executive shareholding ratios	ER	Vol	Beta	Log (MV)	B/M	HP	Log (Volume)
Low	Mean	0.0001	0.0 159	0.0295	1.0111	22.231 6	0.5957	0.1253	18.0193
	Median	0.0000	0.0 065	0.0273	1.0069	22.101 5	0.5943	0.0080	18.0936
High	Mean	14.5530	0.0 161	0.0285	1.0272	22.173 7	0.5301	0.1107	17.9692
	Median	1.0475	0.0 076	0.0264	1.0172	22.042 8	0.5058	0.0069	17.9850
The mean value difference between the high and low group		14.5528 *** (46.005 1)	0.0 002 (0.220 3)	-0.0010 *** (-16.100 2)	0.0162 *** (12.23 24)	-0.0579 *** (-10.408 7)	-0.0656 *** (-48.184 3)	-0.0146 *** (-5.4083)	-0.0501*** (-7.5492)

Data source: CSMAR Database, RESSET Financial Database, sorted and designed by the author (***, ** and * denote that t test is significant at the level of 1%, 5% and 10% respectively).

5.2 Multiple regression analysis

First, the work tests the relationship between stock return and volatility change. Next, the

research examines the role of investment opportunities in regulating this positive relationship. Finally, the research groups the listed companies according to the intensity of annual executive incentives. By examining the intensity of the role of investment opportunities in regulating the positive relationship between the return and volatility change under different incentive intensities and incentive modes, the research tests the effects of executive incentive on the grasp of the investment opportunities, even the creation of investment opportunities and thus on the performance of stocks.

5.2.1 The test of the positive relationship between the return on and the volatility change of individual stocks

In order to test the relationship between stock return and volatility of listed companies in China, this research makes a regression analysis to formula (3), that is, by taking the excess return of stock as the explained variable, taking the volatility change as the explaining variable, and taking the market Beta, the logarithm of the book/market value ratio and current market value of the company in the previous fiscal year, the return of the holding period from the 7 months to the 2 months before the month of observation, and the natural logarithm of the monthly trading volume as the controlled variables, and using the two-step method of Fama and Macbeth (1973), this research carries out multiple regression analysis: First, this research carries out the OLS cross section regression to all sample enterprises every month. Then, against the regression coefficient obtained by each month's cross-section regression, this research carries out the statistical test by using the mean value of the regression coefficient time series of 120 months in 10 years as the final regression coefficient, with the regression results shown in Table 5-3.

Table 5-3 The regression result of the effect of volatility change on the return

Beta	0.0145*	0.0152**	0.0144*	0.0147*	0.0052	0.0072
	(1.82)	(1.99)	(1.82)	(1.96)	(0.68)	(1.01)
B/M	0.0061	0.0052	0.0062	0.0056	-0.0090**	-0.0065
	(1.05)	(0.91)	(1.12)	(1.04)	(-2.06)	(-1.52)
Log (MV)	-0.0033*	-0.0032*	-0.0031*	-0.0030*	-0.0116***	-0.0100***

	(-1.92)	(-1.94)	(-1.89)	(-1.86)	(-6.1)	(-5.27)
HP			-0.0012	0.0022	-0.0013	0.0021
			(-0.20)	(0.36)	(-0.23)	(0.38)
Log (Volume)					0.0170***	0.0138***
					(12.01)	(10.07)
ΔVol		2.6737***		2.7233***		2.604***
		(12.33)		(12.76)		(12.35)
C	0.0735*	0.0724*	0.0680*	0.0646*	-0.338	-0.0150
	(1.82)	(1.85)	(1.76)	(1.73)	(-0.95)	(-0.45)
Cross-section average number of samples	1169	1169	1169	1169	1169	1169
Adj-R2	0.0658	0.1522	0.0825	0.1683	0.1122	0.1907

Note: ***, ** and * denote that t test is significant at the level of 1%, 5% and 10% respectively.

The regression results show that there is a positive correlation between the stock return and the volatility change in the same period, and it is significant at any significant level, which supports Hypothesis 4.1. The regression results show that the stock return is positively correlated with the volatility change in the same period, which is consistent with the conclusion reached by Duffee (1995), You, Wang, and Shi (2010), Grullon et al. (2012).

5.2.2 The regulating effect of investment opportunities on the relationship between the volatility change of and the return on individual stocks

Then, this research carries out regression analysis to model (4), that is, this research adds a proxy variable of company's investment opportunities and the cross term of volatility change, and uses different proxy variables of investment opportunities respectively, to test the impact of investment opportunities on volatility-return relationship. Please note that, in line

with the practice of (Grullon et al., 2012）, this research standardizes the five proxy variables of investment opportunities, that is, subtracting their sample mean and dividing the result by their sample standard deviation, so as to facilitate the comparison between the variables. The regression results are shown in Table 5-4.

Table 5-4 The regression results of the regulating effect of investment opportunities on the return-volatility relationship

	Proxy variables of investment opportunities				
	Log (BA) (Book assets)	CAPTA (Capital asset expenditure density)	Qval (Tobin Q value)	EP (EP variable)	Age (Firm age)
Beta	0.0072	0.0074	0.0068	0.0070	0.0074
	(1.02)	(1.03)	(0.96)	(0.99)	(1.03)
B/M	-0.0069	-0.0064	0.0030	-0.0055	-0.0063
	(-1.64)	(-1.50)	(0.69)	(-1.32)	(-1.47)
Log (MV)	-0.0102***	-0.0100***	-0.0092***	-0.0093***	-0.0099***
	(5.06)	(-5.31)	(-4.89)	(-4.91)	(-5.19)
HP	0.0022	0.0022	0.0002	0.0016	0.0021
	(0.38)	(0.38)	(-0.04)	(0.28)	(0.38)
Log (Volume)	0.0138***	0.0138***	0.0132***	0.0137***	0.0138***
	(10.06)	(10.08)	(9.70)	(9.93)	(10.10)
ΔVol	2.6017***	2.6310***	2.5776***	2.6204***	2.6317***
	(12.04)	(12.51)	(6.86)	(12.38)	(12.44)
Investment*ΔVol	-0.1062	0.1451	0.7051***	-0.2270**	0.0713
	(-1.27)	(0.98)	(6.86)	(-1.98)	(0.96)
C	-0.0083	-0.0136	-0.0270	-0.0277	-0.0177
	(-0.23)	(-0.41)	(-0.81)	(-0.83)	(-0.53)
Cross-section average number of observations	1169	1169	1169	1169	1169

Adj-R2	0.1941	0.1931	0.2043	0.1948	0.1942

Note: ***, ** and * denote that t test is significant at the level of 1%, 5% and 10% respectively.

In the first column, we take the company size expressed by year-end book assets as the proxy variable of the quantity of relative investment opportunities, and the estimate of the coefficient β t of the volatility change (ΔVol), that is, the sensitivity of the stock return of a company with a scale equivalent to the sample average level to volatility changes, is 2.6017, with a high significance. The cross-term coefficient of such two variables as Log (BA) and ΔVol is -0.1062, indicating that the natural logarithm of the company's book assets is reduced by one standard deviation relative to its sample average, and then the coefficient of change of return and volatility increases by 0.1062. This conclusion is consistent with the theory of (Brown et al., 2007), but the cross-term coefficient is not significant, which indicates that the company size, as a proxy variable of investment opportunities, does not have a strong impact on the volatility-return relationship among the selected samples. Similarly, in the second column, the capital asset expenditure density is used as a proxy variable for investment opportunities, which has a cross-term coefficient of 0.1451 with volatility change. Although the symbol is consistent with expectations (Smith & Watts, 1992), it is not significant in the statistical sense.

The third proxy variable is Tobin Q value, that is, the ratio of the sum of stock market value and net debt to the current value of tangible assets of the company at the end of the year. Similarly, the coefficient value of the cross term between the variable and the volatility change (Δ Vol) is estimated to be 0.7051, which is larger than the absolute value of the corresponding coefficients in the above two columns, with a high significance at any significant level. The coefficient shows that if the Tobin Q value of the sample company increases by a standard deviation relative to its sample average, the coefficient between return and volatility change will increase by 0.7051.

In the fourth column, the proxy variable of the investment opportunities is the EP, that is, the ratio of the annual net profit to the year-end stock market value of the company. The cross-term coefficient of the variable and volatility change is estimated to be -0.2270, with a high significance, which is consistent with the expectation (Kester, 1984). Although its absolute value is not as large as the coefficient of the cross term between Tobin Q value and volatility change, it is still of great significance: With regard to the companies whose EP

variable (earnings-to-price) is two standard deviations lower than the sample average, the sensitivity of their stock return to volatility change will be 40% higher than the companies whose EP variable (earnings-to-price) is two standard deviations higher than the sample average.

In addition, this research attempts to take the company's existing years as a proxy variable of investment opportunities, as shown in the data of the last column in the table. Theoretically, the longer a company has been existing, the less investment opportunities it would have. However, according to the test in this research, the coefficient of the cross term of the firm age and volatility change is positive and not significant. For this result, in connection with the previous descriptive statistics and the actual situation of the Chinese market, our explanation is that a vast majority of listed companies have been existing for less than 20 years, and most of them are at the growth stage, because of the late start of the Chinese stock market. Therefore, the quantity of relative investment opportunities cannot be accurately embodied through the index of existing years.

In conclusion, such two variables as Tobin Q and EP (earnings-to-price), can very well serve as proxy variables of investment opportunities, supporting Hypothesis 4.2. At the same time, we cannot deny the validity of book assets and capital asset expenditure density as proxy variables of investment opportunities because their regression coefficients are not statistically significant. Therefore, in the following model of grouping regression testing of executive incentive strength, this research adopts four proxy variables of investment opportunities including Tobin Q value, EP, book assets and capital asset expenditure density.

5.2.3 The test of the effect of executive incentive

In order to indirectly test whether the executive incentive is effective or not, this research groups the executive incentive intensity of each company each year and uses model (4) to carry out regression respectively, to compare the size of the effect of its investment opportunities on the volatility-return relationship. We anticipate that the intensity of executive incentives will have an impact on the effect of investment opportunities on the positive relationship of volatility-return.

In the empirical tests before this research, Tobin Q value (Qval) and EP variable (EP) as proxy variables of investment opportunities have an expected significant impact on the stock return-volatility relationship. However, the natural logarithm (Log (BA)) of book assets and

the capital asset expenditure density (CAPTA) have a non-significant but expected effect on the relationship between stock return and volatility. In the next part of this research, we will carry out a regression test on the basis of model (4) against the grouping of executive incentive strength, and carry out a variance test against the regression coefficients of different groups of executive incentive strength, focusing on comparing the difference of the coefficients of interactive terms $GR_{i,\ t}\Delta VOL_{i,\ t}$. Among the interactive terms, the substitute variable of investment opportunities, $GR_{i,\ t}$, is the Tobin Q value of company i in the year to which month t belongs. The regression results are shown in Table 5-5.

Table 5-5 The regression results of the regulating effect of Tobin Q on the relationship between volatility change and return under executive incentive grouping

	Salary incentive		Equity incentive	
	High group	Low group	High group	Low group
Beta	0.0048	0.009	0.0024	0.0077
	(0.68)	(1.22)	(0.32)	(1.07)
B/M	0.0083*	0.0046	0.0048	0.0043
	(1.73)	(1.24)	(0.96)	(1.12)
Log (MV)	-0.009***	-0.0141***	-0.0094***	-0.0099***
	(-4.8)	(-7.01)	(-4.21)	(-5.31)
HP	0.0032	-0.0036	0.0034	-0.001
	(0.5)	(-0.6)	(0.56)	(-0.16)
Log (Volume)	0.0127***	0.0161***	0.0144***	0.0143***
	(8.83)	(11.66)	(9.37)	(10.26)
ΔVol	2.6454***	2.5794***	2.7024***	2.6161***
	(11.67)	(13.14)	(12.71)	(12.72)
ΔVol * Qval	0.2636**	0.1201	0.5966***	0.1495*
	(2.02)	(1.39)	(3.84)	(1.77)
C	-0.0209	0.022	-0.043	-0.0313
	(-0.61)	(0.64)	(-1.08)	(-0.96)
Cross-section	674	673	396	854

average observations				
Adj-R^2	0.2060	0.1832	0.2225	0.1883

Data source: sorted and designed by the author (***, ** and * denote that t test is significant at the level of 1%, 5% and 10% respectively).

The higher the Tobin Q value (Qval) as a proxy variable of investment opportunities, the more the investment opportunities. In the table, the coefficient of the Δ Vol * Qval interactive term in the high salary incentive group is 0.2636, and is significant at the significant level of 5%, and the coefficient in the low compensation group is -0.1201 and is not significant. Similarly, there is also a significant difference in the coefficient of the interactive term between the high group and the low group. The results show that with regard to both compensation and equity incentive, the increase of executive incentive intensity will enhance the regulating effect of investment opportunities on the positive relationship between volatility and return, which supports the research hypothesis very well. At the same time, we have found out that the regression coefficient of the interactive term in the high salary incentive group is obviously smaller than that of the high equity incentive group, which shows that the high equity incentive intensity can more obviously strengthen the regulating effect of investment opportunities, which supports the research hypothesis very well.

5.2.4 Robustness test

In the following part of the research, we will use different proxy variables of investment opportunities, (Log (BA), EP and CAPTA) to test the robustness of the model. The results are shown in tables 5-6 to 5-8.

Table 5-6 The regression results of the effect of EP on the relationship of between return and volatility change under executive incentive grouping

	Salary incentive		Equity incentive	
	High group	Low group	High group	Low group
Beta	0.0046	0.0079	0.0026	0.007
	(0.65)	(1.06)	(0.36)	(0.98)
B/M	-0.0007	-0.0033	-0.0035	-0.0032
	(-0.15)	(-0.89)	(-0.69)	(-0.8)

Log (MV)	-0.0082***	-0.0133***	-0.0078***	-0.0094***
	(-4.42)	(-6.51)	(-3.54)	(-5.15)
HP	0.004	-0.0022	0.0049	-0.0001
	(0.65)	(-0.38)	(0.83)	(-0.02)
Log (Volume)	0.0122***	0.0164***	0.0134***	0.0141***
	(8.41)	(11.66)	(8.85)	(9.94)
ΔVol	2.6239***	2.5752***	2.5606***	2.6513***
	(11.6)	(11.83)	(11.08)	(12.28)
ΔVol * EP	-0.2551*	-0.256	-0.5405***	-0.1246
	(-1.88)	(-1.56)	(-3.00)	(-1.00)
C	-0.0234	0.006	-0.0542	-0.0366
	(-0.7)	(0.17)	(-1.38)	(-1.15)
Cross-section average sample	640	590	366	763
Adj-R^2	0.2079	0.1936	0.2269	0.1934

Data source: sorted and designed by the author (***, ** and * denote that t test is significant at the level of 1%, 5% and 10% respectively).

EP (earnings-to-price) is used as the positive proxy variable of investment opportunities. In line with the preceding part of the research, the test results show that the interactive term coefficient of the group with high intensity of executive equity incentive is significantly higher than that of the low group, but the difference between the high and the low group of salary incentive is not significant. The results support the research hypothesis 3.4 very well, but do not reflect whether the salary incentive works.

Table 5-7 The regression results of the regulating effect of capital asset expenditure intensity on the relationship between volatility change and return under executive incentive grouping

	Salary incentive		Equity incentive	
	High group	Low group	High group	Low group
Beta	0.007	0.0082	0.0044	0.0082
	(0.98)	(1.08)	(0.61)	(1.12)
B/M	-0.0038	-0.0068*	-0.0058	-0.0052

	(-0.76)	(-1.71)	(-1.09)	(-1.29)
Log (MV)	-0.0092***	-0.0144***	-0.0099***	-0.01***
	(-4.94)	(-6.9)	(-4.61)	(-5.44)
HP	0.005	-0.0027	0.0057	0.0002
	(0.81)	(-0.49)	(0.98)	(0.04)
Log (Volume)	0.012***	0.0165***	0.0136***	0.0142***
	(8.38)	(11.65)	(9.14)	(9.91)
ΔVol	2.6311***	2.6562***	2.6517***	2.6307***
	(11.51)	(13.09)	(10.95)	(12.64)
ΔVol * CAPTA	0.105	0.1441	0.2423	0.0956
	(0.58)	(0.9)	(1.17)	(0.57)
C	0.0019	0.0281	-0.0111	-0.0221
	(0.06)	(0.77)	(-0.28)	(-0.68)
Cross-section average sample	619	550	387	772
Adj-R^2	0.2056	0.1937	0.2227	0.1926

Data source: sorted and designed by the author (***, ** and * denote that t test is significant at the level of 1%, 5% and 10% respectively).

When capital asset expenditure density is used as a proxy variable of investment opportunities, the interaction coefficient is not significant no matter whether the executive incentive is high or low. The reason for this result is that, in the opinion of the author, the capital asset expenditure density is mostly used to measure the existing investment, but it is difficult for it to reflect the future investment opportunities of the enterprise.

Table 5-8 The regression results of the effect of company size on the relationship between volatility change and return under executive incentive grouping

	Salary incentive		Equity incentive	
	High group	Low group	High group	Low group
Beta	0.0054	0.0089	0.003	0.0076
	(0.76)	(1.2)	(0.4)	(1.05)
B/M	-0.001	-0.0023	-0.0035	-0.0029

	(-0.21)	(-0.63)	(-0.76)	(-0.75)
Log (MV)	-0.0086***	-0.0143***	-0.0089***	-0.0095***
	(-4.75)	(-6.91)	(-3.85)	(-5.22)
HP	0.0047	-0.0029	0.0048	0.0001
	(0.76)	(-0.48)	(0.79)	(0.02)
Log (Volume)	0.0122***	0.0158***	0.0142***	0.0137***
	(8.54)	(11.52)	(9.29)	(9.95)
ΔVol	2.635***	2.6018***	2.512***	2.609***
	(11.36)	(12.06)	(10.45)	(12.13)
ΔVol * Log (BA)	-0.1854**	0.0164	-0.3709***	-0.0291
	(-2.44)	(0.18)	(-3.35)	(-0.4)
C	-0.0172	0.0338	-0.047	-0.0272
	(-0.51)	(0.94)	(-1.11)	(-0.85)
Cross-section average sample	710	703	402	891
Adj-R^2	0.2059	0.1817	0.2199	0.1887

Data source: sorted and designed by the author (***, ** and * denote that t test is significant at the level of 1%, 5% and 10% respectively).

The result of grouping regression with the logarithm of book assets as a substitute variable of investment opportunities shows that, the absolute value of interactive term coefficient is high and significant in the group with high intensity of salary incentive and the group with high equity incentive, but the coefficient is low and not significant in the low group. In addition, the absolute value of the interactive term coefficient in the group with high intensity of equity incentive is also obviously higher than that in the group with high intensity of compensation incentive. Therefore, in line with the preceding part of this research, this result supports the research hypotheses 3.3 and 3.4 very well.

5.3 Summary of this chapter

Through the statistics and the regression analysis of the descriptive results of the volatility change of individual stock, the stock return and executive incentive, this research

first tests the relationship between the stock return and the volatility change. Next, the research examines the role of investment opportunities in regulating this positive relationship. Finally, this research groups the listed companies according to the intensity of annual executive incentives. By examining the intensities of the roles of the investment opportunities in regulating the positive relationship between the return and volatility change under different incentive intensities and incentive modes, the research tests the effect of executive incentive on the grasp of the investment opportunities, even the creation of investment opportunities and then the performance of stock.

The results of regression analysis show that there is a significant positive correlation between the volatility of individual stocks and the return on the stocks, and this positive relationship is more obvious in the enterprises with more investment opportunities in the future. Further research indicates that according to the size of the incentive intensity of the sample enterprise executives, the group test results show that: the greater the incentive intensity of executives, especially the incentive intensity of equity compensation, the more obvious the reinforcing effect of investment opportunities on the positive relationship between the volatility of individual stocks and the return on the stock. The important economic prediction of this result lies in: when designing the incentive mechanism for executives, enterprises should reinforce the incentive of executive compensation, especially equity compensation, so as to promote their ability to grasp and create investment opportunities, and ultimately promote the company's income. The results of regression analysis support the hypotheses in Chapter 4, and the empirical results are summarized in Table 5.9.

Table 5.9 Summary table of empirical results

Classification	Research hypothesis	Hypothesis description	Empirical results
The change in stock volatility vs. stock return	Hypothesis 1:	There is a positive correlation between the volatility change of individual stocks and the return on individual stocks. The greater the volatility change of individual stocks, the higher the return on individual stocks.	Support
Role of investment opportunities in the volatility-return	Hypothesis 2:	Investment opportunities have a regulating effect on the positive relationship between the volatility change of individual stocks	Support

relation		and the return on individual stocks. The more investment opportunities an enterprise has in the future, the more obvious the positive relationship between the volatility change of individual stocks and the return on individual stocks.	
Effectiveness of executive incentives	Hypothesis 3:	Compared with salary incentive, along with the increase of the intensity of equity incentive, investment opportunities have a stronger positive regulating effect on the relationship between the volatility change of individual stocks and the return on individual stocks.	Support
	Hypothesis 4:	The greater the incentive intensity of executives, the stronger the positive regulating role of investment opportunities on the relationship between the volatility change of individual stocks and the return on individual stocks.	Support

Chapter 6 Conclusion

This chapter will summarize the research of the entire research, with the specific structure as follows: The first section summarizes the main research conclusions of this research. Based on the findings of this research, the second section extracts relevant enlightenments and further puts forward policy suggestion. The third section analyzes the possible limitations in the research process of this research and the direction in which further research can be done in the future.

6.1 Summary of the entire research

Based on the background of Chinese institutional environment in the current economic transition period, this research unfolds its research along the following main lines: the study of investment opportunities is of great significance to enterprises, and investment opportunities have a great impact on the growth of enterprises, and also have a great impact on the market valuation of enterprises, and are even the most important factors, which are eventually reflected in the stock return. The grasp of investment opportunities is chiefly decided on by company executives. The main task of the executives is to grasp the investment opportunities that are beneficial to the enterprises, and even to create investment opportunities. Therefore, the incentive for executives should focus on encouraging executives to grasp and create investment opportunities, or the incentive for executives should be aimed at their ability to capture, grasp and create investment opportunities. The intensity of executive incentive determines the quantity of investment opportunities, and the effect of executive incentive is ultimately reflected by the return and volatility of stocks, especially the relationship between them. The answers to the above questions can provide theoretical support for China to perfect its market-oriented reform and promote the executive incentive mechanism of its listed companies, which has important academic value and practical significance.

The following important research conclusions have been reached in this research:

First, this research establishes a regression model to test the relationship between stock

return and volatility of listed companies in China. By taking the excess return on stocks as the explained variable, taking the volatility change as the explaining variable, and taking the market Beta, the logarithm of the book/market value ratio and current market value of the company in the previous fiscal year, the return of the holding period from the 7 months to the 2 months before the month of observation, and the natural logarithm of the monthly trading volume as the controlled variables, and using the two-step method of Fama and Macbeth (1973）, this research carries out multiple regression analysis: First, this research carries out the OLS cross-section regression to all sample enterprises every month. Then, against the regression coefficient obtained by each month's cross-section regression, this research carries out the statistical test by using the mean value of the regression coefficient time series of 120 months in 10 years as the final regression coefficient, It is found out that there is a positive correlation between the volatility of individual stocks and the return on investment, and the higher the volatility of individual stocks, the higher the return on investment.

Secondly, this research examines the effect of stock volatility on return under the impact of investment opportunities. In this research, five different proxy variables of investment opportunities are used to test the impact of investment opportunities on the relationship between volatility and return by using the interactive multiplicative terms of proxy variables of investment opportunities and volatility changes of companies. In this research, the five proxy variables of investment opportunities are all standardized, that is, subtracting their sample mean and dividing the result by their sample standard deviations, so as to facilitate the comparison between the variables. It is found out that the interaction between enterprise investment opportunities and volatility of individual stocks will affect the return on investment. The greater the investment opportunities and the volatility of stocks， the higher the return on stocks.

Thirdly, this research groups the executive incentive intensity of each company every year according to such two indexes as the average compensation of the top three executives and the ratios of shares held by executives in the total issued shares released in the annual report of each company, and respectively compares the sizes of the effects of their investment opportunities on volatility-return relationships. It is found out that the intensity of executive incentive has an impact on the positive relationship between volatility and return. The stronger the intensity of executive incentive, the stronger the reinforcing effect of investment opportunities on the positive relationship between the stock return and volatility change of

enterprises.

Fourthly, we use a method similar to the above to group equity compensation and compare the difference of volatility and return relationship between the high and the low group. It is found out that compared with the promotion of salary incentive, the promotion of equity incentive is more helpful for highlighting the reinforcing effect of investment opportunities on the positive relationship between stock return and volatility change.

6.2 Research enlightenments and suggestions

At present, the laws and regulations on executive incentive in China are being gradually perfected, and some practical effects have been achieved in executive incentive, but some problems have also been exposed through the research. Based on the research conclusions of this research and the problems detected in the process of data collection and sorting, to enable the executive incentive system to eventually improve the performance of listed companies, this research puts forward the following suggestions:

6.2.1 Cultivating the market of professional managers

The so-called professional manager refers to a professional enterprise operation and management expert who takes the responsibility of maintaining and increasing the value of legal person's property in an enterprise with the separation of ownership and has legal person's property right and management right. Professional managers are fully responsible for the operation and management of the enterprise, and they have the operation and management right over the legal person's property. Professional managers are responsible for the operation and management of enterprises, the maintenance and appreciation of enterprise assets and the satisfaction of shareholders. And professional managers do not take investment risk and venture risk. In business activities, professional managers only assume the risk of company operation for their own management and execution.

A perfect market of professional manager records professional managers' professional credit and working ability, produces an invisible binding force on every professional manager, and to a certain extent, urges professional managers to maintain their personal reputation consciously, work hard and follow market rules, and ultimately reduces the risk of moral hazard among executives. The Chinese market of professional managers is still at the early

stage of development, and a unified market evaluation system has not yet come into being, and a mechanism for the sharing of manager information has not come into being, either, which also leads to the lack of binding force on the behaviors of professional managers. It is important to ensure the normal operation of the manager market by formulating the operation rules and effectively supervising the market operation; The basic quality of professional managers can be guaranteed by formulating professional standards for professional managers. By establishing and perfecting laws and regulations on professional managers, the rights and responsibilities of enterprises and professional managers are effectively protected and restrained. At present, the relevant government departments should speed up the formulation and improvement of professional manager entry standards, including professional qualification, professional credit, vocational training, professional ethics, job responsibilities, On the other hand, the professional manager talent pool should be established, and the network management should be implemented. The system of professional manager evaluation shall be implemented, and an evaluation index system shall be formulated scientifically. The work of professional managers shall be evaluated regularly by authoritative personages and social intermediaries and recorded in the talent pool as data. The behavior and operation and management activities of professional managers have great risks and uncertainties in the future, which require great trust, understanding and support from stakeholders such as shareholders, creditors, employees, government and customers. Such understanding and support largely depend on people's recognition of the reputation of professional managers. This is the prerequisite for the fundamentally benign development of the professional manager market. Through further cultivating and standardizing the operating mechanism of the manager market, an effective competitive professional manager market can be established. In addition, the executives of many state-owned listed companies are appointed and dismissed by higher authorities, which makes it more difficult to evaluate the performance of managers correctly.

6.2.2 Establishing and perfecting the structure of corporate governance

Although all listed companies have established modern corporate governance structures such as boards of directors, boards of supervisors and management levels in accordance with their articles of association, they have failed to put corporate governance into practice as a matter of fact, and the phenomenon of "insider control" is extremely serious. However, these

insiders are often the grantees of incentives. For their own interests, and through the right in their hands, these insiders may carry out black box operation and insider trading to the whole process of equity incentives including design and implementation, thus resulting in the failure of incentive plans. The Chinese market of professional managers is still at the early stage of development, and a unified system of market evaluation has not yet come into being, and a mechanism for the sharing of manager information has not come into being, either, which also leads to the lack of binding force on the behavior of professional managers. In addition, the executives of many state-owned listed companies are appointed and dismissed by higher authorities, which makes it more difficult to evaluate the performance of managers correctly. The corporate governance structure of the company should be established and improved so that the remuneration committee can determine the specific plan of equity incentive for senior managers relatively independently and sign a legally effective document with it. At the same time, the company's financial supervision mechanism should be standardized and improved to prevent senior managers from using their authority to prepare financial statements in their favor by legal or illegal means, so as to ensure the healthy operation of stock option incentive mechanism.

Enterprises should establish a high-quality internal control system, respectively from the control environment, risk assessment, control activities, information communication and supervision and other elements of internal control construction, reasonable allocation of resources, build a perfect risk prevention mechanism. Meanwhile, the soul of internal control lies not only in design, but also in execution. Therefore, enterprises should pay attention to the effective operation of internal control. To be specific, first of all, the approval and authorization system for senior executives to make investment decisions and conduct business activities should be clarified, so as to form a good situation where different departments and positions can both assist and restrict each other. Secondly, the internal audit institutions should be given enough power to match their responsibilities and have stronger authority to inspect and supervise the economic results of enterprises, so as to give better play to the role of the internal audit departments and improve the investment efficiency of enterprises.

6.2.3 Fairness and efficiency should be taken into account for executive incentive

A long-term problem affecting the development of Chinese enterprises is the lack of

executive incentives. However, along with the continuous improvement of business efficiency, the rapid increase of executive compensation and the phenomenon of excessive incentive should arouse more attention. At the current stage when the income gap continues to widen, government departments and boards of directors should pay more attention to fairness while formulating managers' compensation. Particularly, in state-owned enterprises, priority to fairness should be regarded as a basic principle of manager incentive. According to the fairness theory proposed by Adams (1963), people in the social exchange relationship will subjectively think that they should be paid according to their individual contribution. The judgement of the fairness of compensation based on work performance comes mainly from the comparison with others in the organization. When they feel that the input-output ratio of their work is almost the same as the reference people, they will feel the fairness of the distribution, otherwise they will feel unfair. However, there are three ways for people to deal with the frustration caused by unfairness: changing one's view toward one's own or the reference people's work input and output; changing one's own behavior, such as reducing one's work input or trying to get a higher reward; leaving the organization where one works and venting complaints. Cowherd and Levine (1992) examined the issue of salary fairness among 102 business units and found out that the smaller the salary gap between the top and lower levels of the organization, the higher the quality of the products. Evidently, lower-level employees would care about the salary of managers and increasing the salary of executives and widening their salary gap with employees would be at the expense of lower company performance.

6.2.4 Perfecting the long-term incentive mechanism

Most Chinese listed companies adopt base salary, bonus, allowance and other short-term incentives as their executive compensation incentives, while ignoring long-term incentives which can be in the form of manager shareholding, performance stock, virtual stock, stock appreciation rights, deferred payment, and stock option. From the perspective of long-term incentive carried out to managers in Western countries, stock option is generally regarded as the main incentive mode. When adopting the stock option incentive, we should focus on establishing a long-term incentive mechanism for executives to grasp investment opportunities, create growth opportunities for enterprises and promote the development of enterprises by leaps and bounds.

Although more and more listed companies in China begin or plan to carry out the stock option plan, we must also be aware of the disadvantages of the stock option plan. The current capital market in China is not an effective one. There is a strong speculative atmosphere, and the stock price does not truly reflect the value of the companies. When the stock market is in a long period of downturn, companies that run stock option programs are likely to see the collapse of their entire option incentive plan because of their low share prices. As the stock market climbs, managers of listed companies carry out earning management by any means, even through malicious accounting fraud, for the purpose of raising stock prices. The outbreak of the Enron incident in the United States was also caused by stock options to a certain extent. Since then, some large companies in the United States, represented by Microsoft, have abandoned stock options and turned to performance stock incentives. Therefore, it may be a better choice for Chinese listed companies to adopt other long-term incentives for managers, such as performance stock, virtual stock, deferred payment.

6.2.5 Establishing a long-term mechanism of investment opportunities for executive compensation and enterprise performance appraisal

As a result of the proxy problem, there is a high risk in the grasp and creation of investment opportunities for executives, possibly because investment decisions affect executives' own interests. For example, the increase in investment in the current year may lead to a decrease in income in the same period, and thus the decline of executives' compensation in the same period. As a result, most executives are reluctant to spend too much money on investment opportunities. Objectively, enterprises are required to establish a more scientific and standardized mechanism of compensation and performance appraisal. During the establishment of the mechanism, the growth of the company should be fully considered, and the assessment index of investment opportunity should be set up. Performance refers to the achievements, benefits and achievements made by entrepreneurs during their working years. A set of scientific and reasonable performance evaluation index system should reflect the business performance, social benefits and economic benefits created by the management. It is the basis of the enterprise's equity incentive plan. Equity incentive as a long-term incentive mechanism, on the one hand, affects the choice of executives to investment opportunities, and thus affects the investment decisions of executives. On the other hand, through investment opportunities, it can bring growth options to companies, increase

corporate performance, and enhance the level of executive equity incentive. Therefore, when establishing the long-term evaluation mechanism of corporate compensation and performance, we should fully consider the balanced relationship between the growth of the company and the interests of the executives, thus enabling executives to grasp, create investment opportunities, and avoid the occurrence of short-term behaviors of executives.

Balanced Scorecard-it is a performance measurement system founded by professors Robert s. kaplan and David p. NORTON of Harvard Business School in the United States. Currently, it is very popular abroad, especially in the United States. According to statistics, more than 6,096 of the 1,000 excellent enterprises evaluated by happiness magazine have used the comprehensive balanced scorecard, and many companies have finally transformed it into the core organizational framework of corporate management process. The theoretical circle thinks that the comprehensive balanced scorecard drives a revolution of performance evaluation and management system. The author thinks that the comprehensive balanced scorecard is the implementation of modern enterprise manager option of optimizing the performance evaluation system, the combination of the specific way is will's comprehensive score of the qualified people with grant, awarded quantity and exercise conditions, to encourage eligible to participate in the plan of employees according to the enterprise standard of performance, both in the cultivation of competitive advantage for the enterprise to work hard.

In addition, we need to improve the regulatory environment for executive compensation. The practice of salary management at home and abroad shows that it is an important way to improve the effectiveness of salary management to strengthen the information disclosure system, increase the voice of shareholders and improve the legal and policy environment. In recent years, the global economic crisis has led to economic downturn in various countries and the decline of corporate profits, which makes enterprises more dependent on senior executives. Therefore, many enterprises have seen a contradiction between the decline of profits and the increase of executive compensation. With the gradual recovery of the current economy, regulators and shareholders in various countries begin to pay attention to the relationship between executive compensation and performance and pay more attention to the long-term performance of enterprises and the effectiveness of executive compensation. New regulations and policy guidance have been issued on the composition of executive compensation, incentive methods, risk management and information disclosure. American

TATP limit to encourage the pursuit of "excessive risks" incentives, put forward the system of annual salary back, make a more detailed executive compensation disclosure and shareholder's voting system allows shareholders to submit the relevant manager's proposal to pay (Yermack, 2010), pay more attention to improve the manager compensation performance sensitivity, and use tax as an effective means of salary regulation. In order to avoid the moral hazard caused by the compensation arrangement, the compensation rebate system is set up. The financial services authority of the United Kingdom gives principle guidance to the main performance indicators after risk adjustment. It proposes that the board of directors shall determine the long-term compensation ratio and deferred ratio and conduct independent assessment of the risk of compensation incentives. The G20 proposed further strengthening of risk management, emphasizing transparency in compensation decision-making and the independence of compensation committees. In general, national regulatory agencies are working to establish a sound regulatory environment to improve the effectiveness of executive compensation incentives. Formulated the perfect management rules and regulations, and also need to establish and improve the legal supervision system in accordance with the law, legally endowed with various supervision groups to participate in the specific item management of administrative approval authority, the excessive concentration of indirect agency authority proper allocation from the Angle of law, in accordance with the use of direct interest groups to the supervision of company's business functions, let more people to supervise the management of listed companies, the performance of legal procedures in accordance with the law, make the company governance on a path to legalization, establish an effective supervision system, to direct interest relationship with real play supervision shall have the effect, form a kind of effective checks and balances. Through the formulation of relevant laws and regulations, we will improve and strengthen the investigation and punishment of shareholders, directors, supervisors, senior executives and committee members for violations of laws and regulations, so as to make them more honest and self-discipline, make corporate governance more objective and standard, and provide a good legal guarantee and legal environment for the smooth implementation of equity incentive. Listed companies should strictly follow the relevant equity incentive measures and formulate effective equity incentive plans according to the provisions. On May 4, 2016, the China securities regulatory commission deliberated and approved the measures for the administration of equity incentive of listed companies, which took effect on August 13, 2016. The new measures have more

explicit provisions on the objects, conditions, sources, information disclosure, supervision and management of equity incentives, and give guidance on some issues in the implementation process. In the past, the poor performance of equity incentive in listed companies was largely due to the imperfect supporting laws and regulations. Now, with the introduction of new measures, companies should be more strict in the system and standard procedures to truly exert the effective role of equity incentive.

6.3 Research Limitation and Prospects

From the perspective of finance, this research systematically analyzes the theoretical basis of executive incentive of listed companies, the influence factors and economic consequences of executive incentive, and supports many hypotheses of executive incentive of listed companies in China through empirical tests. Although the composition of this research lasted four years from topic selection, data collection, statistical processing to finalization, and the research process of this research involved a relatively comprehensive, in-depth consideration and analysis of the development of executive incentives of Chinese listed companies. However, the research field of executive incentive is complicated, the relevant literatures are vast, so it is impossible to incorporate everything into this research. Due to the limitations of the author's research level, sample sources and statistical data, there are still some limitation in this research, and further research can be improved in the following aspects:

First, this research cannot eliminate the inherent defects of all empirical studies, that is, the test results can support but cannot certify the corresponding research hypotheses. To some extent, this research further verifies existing opinions, rather than presenting new opinions.

Second, Chinese capital market is affected by non-market factors all the more, and the prices of myriads of stocks rise or fall at the same time now and then. In such a context, the test of the relationship between the volatility of individual stocks and the return on investment is inevitably affected by systemic risk, which would have a certain impact on the research results of this research.

Third, since the interaction between government intervention and market economy plays an important role in the capital market and the process of transformation in China, equity incentive as an economic behavior of the listed companies is also considerably influenced by government intervention. Moreover, this influence is especially prominent among state-owned

enterprises. In the future research, we can investigate the influencing factors in the process of executive incentive from such perspectives as the industry to which the enterprise belongs and the degree of regional development.

Fourth, the essence of equity incentive is a kind of compensation, so the measurement of its effectiveness cannot be separated from the category of "executive compensation". In the future research, we can, by case, model and other means, compare the merits and demerits and role-playing conditions of different compensation modes, such as equity, cash, bonus in an attempt to find out an optimal compensation structure.

Fifth, Chinese equity incentive is a kind of institutional arrangement different from foreign equity incentive. And there is a big difference between senior executive incentive and foreign enterprises. Even in China, due to the different ownership systems of enterprises, state-owned enterprises and private enterprises have many different incentive methods for executives. State-owned enterprises tend to adopt fixed salary incentive methods, such as annual salary system. While private enterprises tend to adopt variable salary incentive methods, such as stock options. In the future studies, the fixed and variable executive incentive salaries can be compared from the perspectives of ownership and enterprises in different industries. Then, we investigate the remuneration levels of enterprises with different ownership systems and enterprises in different industries from the perspective of investment opportunity. And we attempt to establish and improve a scientific executive incentive evaluation system.

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