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IMPACT OF EQUITY INCENTIVE AND INNOVATION INPUT ON BUSINESS PERFORMANCE OF A-SHARE LISTED ENTERPRISES IN SHANGHAI AND SHENZHEN

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Abstract

In modern corporate governance mechanisms, equity incentive, as an important way to alleviate agency conflicts, are the primary plan for listed enterprises to manage human resources. There is a close relationship between equity incentive for senior managers and business performance of listed enterprises. By studying the influence of equity incentive for senior managers on business performance on listed enterprises, it can further enrich modern corporate management theories and promote the optimization of corporate governance structures. At the same time, can equity incentive promote operators to actively carry out high-risk, high-yield R&D and innovation activities? Will innovation input have a significant impact on the company's expenses and profits? Can it improve the company's core competitiveness to obtain excess profits? These problems are urgently to be clarified and resolved for the development of enterprises. On this basis, it is of great significance to explore the relationship between equity incentive for senior managers, innovation input and business performance of listed enterprises. This article mainly combines the current research status at home and abroad, and puts forward research hypotheses on the basis of related equity incentive theory to discuss. Taking a-share listed enterprises in Shanghai and Shenzhen as research samples, regression analysis and mediation model were used. The shareholding of executives was selected as the independent variable, return on equity and earnings per share as the dependent variables, and R&D investment as the mediating variable. At the same time, the growth rate of net profit, company size, revenue growth rate of main business, asset-liability ratio and total asset turnover ratio are selected as control variables for empirical analysis. The empirical results show that: (1) Equity incentive for senior managers can promote the improvement of business performance and have a significant positive correlation. That is: the greater the intensity of equity incentive for senior managers, the more obvious the incentive effect. By implementing equity incentive, companies align the

personal interests of executives with the interests of shareholders, thereby incentivizing executives to focus more on the company's future long-term growth and improve business performance.(2) Equity incentive for senior managers is conducive to promoting corporate executives to increase investment in research and development innovation, that is, the higher the shareholding of executives, the more it helps companies to increase research and development investment and actively carry out innovation activities. A reasonable equity incentive mechanism can reduce the motivation of executives to avoid risks, enhance technological innovation capabilities through R&D investment, and ensure that enterprises have an advantageous position in the competition. The implementation of equity incentive for executives will make them allocate more resources to innovative research and development, and drive economic growth of enterprises through innovative behavior.

Keywords: Equity incentive for senior managers; Innovation input; Business performance; Listed enterprises

INTRODUCTION

As the Chinese capital market matures gradually, and the corporate governance improves continuously, listed enterprises has applied equity incentive as an effective incentive method for management. By the end of December 2017, 1,154 Chinese listed enterprises have announced specific enforcement schemes of equity incentive. Do listed enterprises carrying out the equity incentive need to have a clear understanding of the enforcement status? Can it effectively improve business performance? What are the problems with the enforcement plan? For the academic community, it is greatly meaningful to make research and analysis on the above issues, explore solutions, and provide listed enterprises with theoretical support to formulate effective schemes of equity incentive, which will further improve business performance and enhance their core competitiveness.

Some researchers believe that the system of equity incentive is able to settle the enterprise's principal-agent issues, resolve the divergence between the benefits of shareholders and senior managers and converge the benefits of them. As the equity incentive system is carried out, senior managers have the company's right of management in addition to the enterprise's ownership, which greatly encourages senior managers to more focus on the company's value and greatly improve business performance. As a compensation system, the system of equity incentive allocates the enterprise's equity to the senior managers, heightens the senior managers' passion for work, and encourages the senior managers to add and increase the company's value unlike the previous salary increase. Therefore, the policies of equity incentive are able to mobilize senior managers' passion for work to a large extent and motivate them to a greater extent by comparing with previous salary increase policies. In the companies carrying out the system of equity incentive, the company's benefits decides the

compensation level of senior managers instead of the annual salary system, which is the same for senior managers whether they do well or badly. The result is that senior managers are maintaining the enterprise's long-term growth and gaining greater profits by increasing the enterprise's short-term performance changes. senior managers who create more profits for the company will get more incentives (Merickson, Hanlon, Maydew, 2009; Chen & Zhou, 2014; Zheng, 2016; Xu, 2017; Zhang, 2017; Li, 2017; Zhang, 2017; Zhang & Feng, 2018; Zhang, 2018; Li & Nie, 2018).

Problem Statement

In recent years, theoretical and empirical research on issues related to executive stock incentives has been the focus and difficulty of academic research. Abdallah (2016) believes that the equity incentives for senior managers is a way to use listed enterprise stocks as a target and continue to effectively motivate the enterprise's senior managers. As a great change in corporate material incentives, equity incentive settles the agency issue between shareholders and senior managers, realizes the correspondence between residual claims and control rights, encourages managers to overcome short-term acts, and focuses on the company's sustainable development for a long term. The enforcement of the equity incentives for senior managers has reduced the enterprise's agency cost and improved the enterprise's management efficiency. In this way, the objectives of improving business performance and enhancing market competitiveness have been achieved.

Through carrying out the system of equity incentive, it is conducive to improving the listed enterprises in performance and increasing the company's management efficiency. This is a view that has been recognized and trusted by many shareholders and experts. However, in the specific enforcement process, a lot of problems have arisen, for example, the equity incentive scheme formulated and the actual situation of the company are not suitable. According to the analysis of the financial performance indicators, the equity incentive scheme carried out by some companies at the beginning of the year was cancelled or temporarily suspended. For instance, there were 350 Chinese listed enterprises attempting to carry out the system of equity incentive in 2012. However, among them, only 118 companies were actually carried out, and the enforcement percentage was only 35.14%. However, such a low percentage is much higher than the enforcement proportions in other years, which shows that some companies do not consider the feasibility of equity incentive scheme and its suitability for the status quo of their own companies in the development of equity incentive scheme.

Li Chunling and Nie Jingsi (2018) found that some listed enterprises had too simple requirements when setting exercise conditions. The performance appraisal index data is not comprehensive, only carries on the evaluation according to the financial data index, moreover lacks the necessary legal stipulation restriction. As the basis of adjusting equity incentive schemes, the enterprise's performance indicators are

connected with the evaluation on the senior managers' performance of listed enterprises. Meanwhile, a well-designed performance indicator system will exert an important impact on the enterprise's system of equity incentive. Nowadays, the performance evaluation indicators of most Chinese listed enterprises are mainly on the basis of return on equity and earnings per share and other financial indicators, which are biased toward evaluating the changes in the senior managers' performance of the listed enterprises. However, they were unable to accurately assess the influence of the enterprise's long-term growth, which greatly reduced the effectiveness of the equity incentive system.

One of the fundamental reasons why there are many problems for Chinese listed enterprises to carry out the mechanism of equity incentive is the flawed corporate governance structure. listed enterprises have established various management and administrative bodies, such as shareholder meetings, boards of directors and supervisory boards. These institutions have the power to determine the corporate operation and management. However, due to the excessive transfer of management rights from shareholders to senior managers, the supervision and management levels of the shareholders' general meeting, the board of directors and the board of supervisors are excessively high, or senior managers are also the members of board of directors or the board of supervisors, which will lead to poor oversight of senior managers. In the case of poor supervision, senior managers will pursue their best benefits, which may lead to too much risk in business operation.

In addition, in the existing research literature, there are various researches on equity incentive, innovation input, and business performance, while there are few researches on the association between the three. Now China is advocating "Mass entrepreneurship and innovation", Technological innovation will become the primary productive force. In the listed enterprises, it is urgent for us to test and explore the internal mechanism whether innovation input can play a role of mediation effect between the equity incentive for senior managers and business performance, thereby improving business performance.

Research Questions

In order to provide Chinese listed enterprises with an empirical basis of carrying out the equity incentive policies for senior managers, use effective equity incentive programs to make senior managers committed to corporate innovation, and thereby further increase the company's core competitiveness, the association among the equity incentive for senior managers, innovation input and listed enterprises' business performance, and the mediation effect of innovation input between the equity incentive for senior managers and business performance are mainly discussed in this paper. Research questions are shown below specifically:

- (1) What is the association between the equity incentive for senior managers and business performance? Is there a positive correlation?

(2) What is the association between the equity incentive for senior managers and innovation input? Is there a positive correlation?

Research objectives

Based on reading and analyzing existing literature at home and abroad, through relevant management theories, on the basis of sufficient theoretical support, and selecting the financial data of 40 sample companies from listed enterprises at Shanghai and Shenzhen Stock Exchanges from 2014 to 2017 as research samples, I establish an empirical research model, research and analyze the association among the equity incentive for senior managers, innovation input and corporation performance of listed enterprises, and test whether innovation input has a mediation effect between the equity incentive for senior managers and business performance.

LITERATURE REVIEW

Equity Incentive for Senior Managers

In the documents available for review, there is currently no precise definition of the equity incentives for senior managers, and researchers have their own unique understanding, and some of them explain the equity incentives for senior managers by category. For example, Zhi Yayuan (2015) divided the definition of the equity incentives for senior managers into a narrow sense concept and a broad sense concept. In a narrow sense, the equity incentive for senior managers means compensation incentives; however, broad-based equity incentive includes not only providing high-level compensation benefits, but also high-level company equity distribution. Wang Wenke (2014) divided the equity incentives for senior managers into three categories: the first is senior equity plan; the second is executive equity plan; the third is executive acquisitions. Other researchers define the equity incentives for senior managers as long-term effective incentives. Su Cuifei (2014) believes that equity incentive for senior managers can turn the enterprise's top management into shareholders. This change is not just a simple change of identity but is intended to encourage the senior managers to obtain greater benefits, so they will do their best to serve the enterprise and increase more value for the company. Compared with previous compensation incentives, this incentive model is a continuous incentive. Slobodan (2015) argues that the equity incentives for senior managers measures use some methods to allocate the enterprise's equity to senior managers and allow senior managers to become shareholders of the company. This incentive model is long-term. Other researchers have connected the system of equity incentive with senior managers (Wang, 2014; Cheng, 2015; Zhang, 2016; Gao, 2016; Zhu & Xiang, 2017; Tang, Zhou, Yang & Yang, 2017; Wang & Xu, 2017; Chen, Li & Huang, 2018).

In order to better guide listed enterprises to carry out the system of equity incentive

reasonable and suitable for the current economic situation, China securities regulatory commission (CSRC) has issued and formulated some policies. Currently, more than 1,000 companies have carried out the system equity incentive in China. Some scholars have made an in-depth analysis of the earnings changes of listed enterprises after the system of equity incentive was carried out, and researchers have explained the situation that many companies have chosen the system of equity incentive. However, compared with foreign studies, domestic studies are not in-depth enough, and more studies are needed in this field. Wang zhen (2014) pointed out that the principal relies on some appropriate methods to make the agent and the principal have common benefits according to the principal-agent theory, which can greatly reduce the agent cost. Both Xu Xiaopeng (2017) and Gao Jie (2016) believe that the enterprise's senior managers have more information about the enterprise's operations and future development trends by comparing with the board of directors.

Business performance

Directly reflecting the overall financial situation and operating results brought by the enterprise's operating activities and the company ability to pay debts, profitability, and development, business performance means the operating profits and achievements of managers in a certain fiscal period. It is based on authentic and just accounting statements. For example, the judgment of the financial position is directly based on the balance sheet, cash flow statement and related notes. Operating results are on the basis of the statements of profit and loss and their notes. It does not consider controllable or uncontrollable factors in the performance evaluation process (Slobodan, Stanistic, Radojevic & Radovic, 2015; Zhou & Wang, 2015; REAbdallah & Ismail, 2016; Chen, 2016; Hu & Fan, 2017; Yang, Yuan & Yang, 2017; Liu & Liu, 2017; Yin, Sheng & Li, 2018). As a static evaluation on a company's state, business performance should objectively show the facts and avoid being subjective.

Study of the positive association between the enforcement of the equity incentive for senior managers and business performance

Because of the imperfect development of China's capital market, listed enterprises appeared late compared with that in western developed countries. Therefore, the system of equity incentive is applied by only a few listed enterprises in China in recent years. Even if the company adopts this system, there is relatively small percentage of shares held by the senior managers. Since the system of equity incentive has been accepted by many enterprises, many scholars started studying the influence of executive equity on business performance. Applying 60 listed enterprises as reference samples and selecting profitability and return on equity as research variables, Han Fang (2014) measures company performance. According the empirical research, the increasing shareholding proportion held by senior managers is conducive to perfecting business performance, which are significantly positively correlated with each other. On the basis of the panel data of Chinese non-financial listed enterprises,

Tang Jiyue (2016) set up a multivariate linear regression equation, which shows that executive shareholding is strongly positively correlated with business performance. Zheng Weijun (2016) expresses business performance on the basis of the data in the annual reports of listed enterprises by using the financial indicators of return on assets, return on equity and Tobin's Q. according the empirical analysis, executive compensation was positively correlated with business performance. Selecting 50 listed enterprises in 2005 as reference samples and applying the least square method, Zhang Haiyu (2017) explored the influence of executive compensation on business performance. Based on the empirical analysis, as the senior managers' annual salary increases, the enterprise's potential and growth will increase, and vice versa, the company lacks potential and competitiveness. Therefore, executive compensation is significantly positively correlated with company performance.

Applying listed enterprises as research samples, Li Fang (2017) concluded that listed enterprises can increase company profits by carrying out the equity incentive scheme for senior managers. The equity incentive scheme will play a more obvious role when the enterprise's main shareholder is a local government. Selecting 15 listed enterprises carrying out the system of equity incentive from 2006 to 2008 as research samples, Zhang Zifeng (2017) analyzed the financial data of these companies and believed that while bringing benefits, the system of equity incentive system can also generate incentives.

Yang Chunli (2016) believes that a listed enterprise's board of directors will exert an excellent influence on the incentive of company senior managers during the process of carrying out the system of equity incentive with strong supervision ability. Otherwise, the incentive to the enterprise's senior managers is relatively small.

According the deep research on the formulation of equity incentive schemes by Yiu (2014), at present, most listed enterprises have more or less issues while carrying out the system of equity incentive specifically. For example, the performance variables of monitoring and evaluation are not comprehensive and scientific, there is no announcement list of senior management incentives; the waiting time for exercise is too short; there is no reasonable restraint system to prevent senior managers' self-interest from harming the development of the company. Wei (2014) learned from analysis and research: At present, many listed enterprises in China generally tend to use stock options when giving senior management incentives; they only represent the enterprise's performance by applying financial indexes. What's more, the threshold for setting incentive requirements is very low, and it is easy to carry out. Basically, it does not require much effort, which reduces the effectiveness of the system to a certain extent.

Hypotheses Development

Hypotheses on the association between the equity incentive for senior managers and business performance

(1) As the innovation and improvement of modern enterprise incentive system, the equity incentive for senior managers has an obvious incentive effect, and through carrying out the equity incentive, the following positive effects for enterprises will be brought, and an important role will be played.

a. Reduce agency costs for business owners. Through equity incentive, executive income can connect with the uncertainty of the enterprise's long-term growth, thereby stimulating executive competition and creativity, and reducing agency costs to a minimum. For the shareholders of the enterprise, the cash salary distribution proportion of the senior executive can be reduced, and meanwhile, part of the gains from the appreciation of the enterprise's stock can be transferred to the upper level to achieve the long-term benefits of the principal and the agent. From an economic point of view, the stock option system is one of the ideal systems to resolve the contradiction between the enterprise's owner and the executive "trust agent" and is an effective way to achieve a three-dimensional "win-win".

b. Effectively curb the short-term behavior of senior managers. Many of an executive's decisions will have a long-term impact on the business, such as mergers and acquisitions, restructuring, project integration, investment and new product development. It will take three or five years to reflect the impact and contribution of these decisions to the business in the financial statements. Equity incentive arise from stock appreciation as compensation for senior managers' human capital, closely link executive compensation with operation performance, and encourage senior managers to focus on the long-term sustainable growth of enterprises rather than just short-term financial indicators by taking advantage of the differences. Stock price changes can be used to more effectively overcome the short-term behavior of senior managers' traditional incentives. Stock options have the mechanism of "co-existence and co-prosperity" between the personal future earnings of the senior managers and the enterprise long-term growth, which fundamentally changes the senior managers' management mentality and makes them consciously let the enterprises develop from the long-term perspective, thus protecting the benefits of the shareholders and themselves.

c. Attract and motivate talent while saving corporate cash. the enterprise's open equity structure can continue to attract talent, especially the huge wealth brought by stock options is more attractive to managers. Meanwhile, the stock option system also has the constraining force to the executive Stock options require a waiting period to exercise, and senior managers rarely leave the company before exercising them in order to profit from the options. This is an achievable solution to the brain drain problem. In addition, senior managers are more likely to accept relatively low wages

after purchasing stock options, while focusing their income on future expected returns on stock options. Therefore, in addition to the reduction of the enterprise's cash expenditures, equity incentive can ease the problem of shortage of funds and achieve the dual role of stability and incentives. While attracting talents, equity incentive will also reduce the mobility of personnel and contribute to the enterprise's sustainable growth.

According to the above, the following hypotheses are made below:

H1: Equity incentive for senior managers is positively related to business performance.

H1a: The shareholding proportion of senior managers is positively related to the return on equity.

H1b: The shareholding proportion of senior managers is positively related to earnings per share

Hypothesis on the association between the equity incentive for senior managers and innovation input

The investment decision of an enterprise is a strategic behavior of great significance. In essence, it is an investment behavior with high uncertainty of risk and return. There are operational and financial risks during the development of innovation activities and the expected market benefits of the output of R&D activities. In listed enterprises, the principal-agent mechanism has led to inconsistencies in the research and development investment decisions of the enterprise's managers and owners. In recent years, through the empirical analysis, a lot of domestic and foreign scholars has shown that the equity incentive for senior managers can settle the principal-agent issues during the contract, is an effective measure to reduce agent costs, and exerts a positive influence on corporate research and development and innovation activities. Many scholars agree that equity incentive is positively related to research and development investment., which shows that in technology-led companies, motivating managers can make them more participate in the projects of research and development investment, increase the intensity of innovation input to maintain core competitiveness, and thus promote the sustainable development of enterprises. According to the above, assumptions are made below:

H2: Equity incentive for senior managers is positively related to innovation input

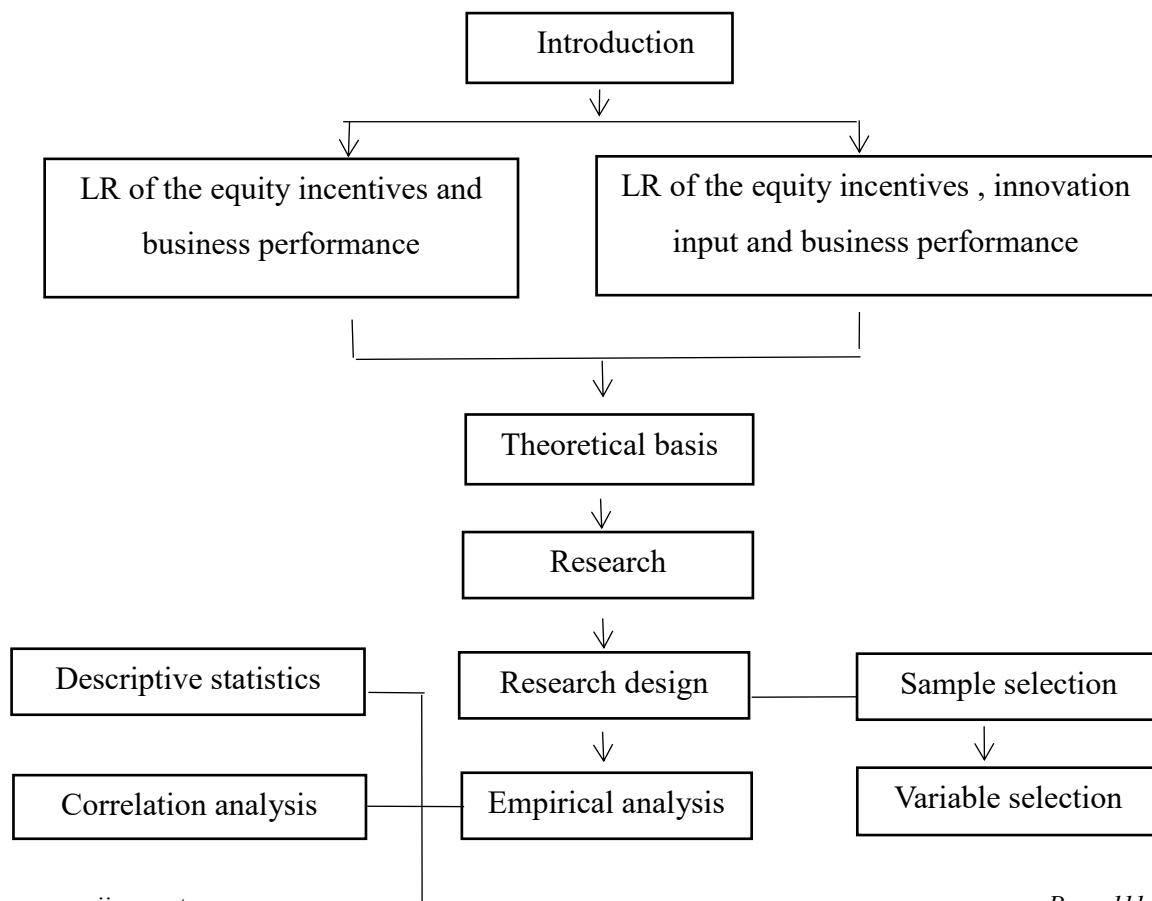
According to the theory of scientific and technological innovation, the economic growth of enterprises mainly depends on innovation. Companies must rely on endogenous innovation behavior to achieve development and good economic benefits.

For a knowledge-based enterprise such as the information technology industry, the role played by R&D and innovation activities is particularly important. The technological advantage generated by innovation activities maximizes the utility of enterprise resources by means of recombination of production factors so as to realize the sustainable growth of enterprise economic benefits. The key for listed enterprises to gain the leading edge in technology is to drive the development of enterprises and increase the intensity of research and development investment by putting innovation activities in a prominent position. Domestic scholars have explored the association between R&D input and business performance from different perspectives. Studies have shown that the two have a positive correlation, which show that the innovation in science and technology has a significant effect on stimulating the economic development of enterprises. Research and development cost is the core resource to ensure the development of innovative activities.

METHODOLOGY

Research Design

Through the empirical research on the association between the equity incentives for senior managers, innovation input and business performance, this article mainly tests the mediation effect of innovation input on the equity incentives for senior managers and business performance. The research design of the full paper is as follows:



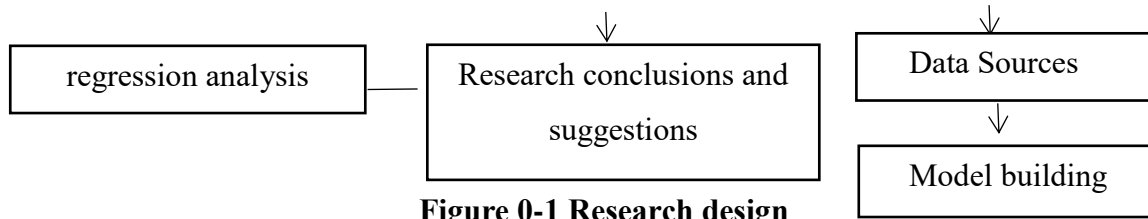


Figure 0-1 Research design

Source: Self-compiled

In the research process, this article mainly adopts the following research methods:

(1) Integration of normative researches with empirical researches

Normative researches: The literature and theoretical researches made by domestic and foreign scholars summarize the association among the equity incentives for senior managers, innovation input and business performance. Empirical researches: By selecting listed enterprises which have carried out equity incentives recently, this paper sets up empirical models, and explores the association among the equity incentives for senior managers, innovation input and business performance and tests whether innovation input play a mediation role in the equity incentives for senior managers and business performance by taking advantages of various statistical analysis methods.

(2) Integration of qualitative analysis with quantitative analysis

According to the research results on the association among equity incentives, innovation input and business performance by domestic and foreign scholars, a qualitative analysis of the principles of equity incentives and the significance of carrying out equity incentives in China is conducted. Based on the current situation of equity incentives among Chinese listed enterprises, a description and statistical analysis were performed. Based on the relevant data such as the level of equity incentive and financial index of listed enterprises, a quantitative analysis of the association among the equity incentive for senior managers, business performance and innovation input is conducted.

(3) Methods of comparative researches

In the first place, this article compares the relevant literature on the association between Chinese and foreign listed enterprises' equity incentives, innovation input and business performance, and summarizes the differences among the viewpoints of Chinese and foreign scholars. On the other hand, through the horizontal comparison of business performance among the listed enterprises which have carried out equity incentive and have not carried out equity incentive, whether the listed enterprises which have carried out equity incentive and have not carried out equity incentive are different significantly is analyzed, and whether equity incentive exerts an influence on the business performance of listed enterprises is discussed.

Analyzed samples

The situation of A-share listed enterprises which have carried out the equity incentive for senior managers at Shanghai and Shenzhen Stock Exchanges

(1) Rapid increase in the quantity of equity incentives

Regarding the total quantity of announcements in the A-share market, the number of listed enterprises which disclosed equity incentive schemes in the A-share market in 2017 showed a rapid growth trend. In 2017, there were 407 listed enterprises which announced equity incentive schemes in China, an increase of 62.15% year-on-year in 2016. On a monthly basis, on average, listed enterprises will launch 34 equity incentive plans each month. Looking at the historical data from 2006 to 2017, the quantity of equity incentive announcements in the A-share market grew at an average annual number of 32 companies, with an average annual growth rate of nearly 30%. The development of equity incentive can be approximately fallen into three phases: the early development phase of the equity incentive was from 2006 to 2010. The annual average number of announcements was limited with only 40 equity incentive schemes announced for listed enterprises. From 2010 to 2014, it was in a period of steady growth, with annual average number of 121 equity incentive schemes announced for listed enterprises, and an annual growth rate of 28.88%. The rapid development phase was from 2014 to 2017 with annual average number of 258 equity incentive schemes announced for listed enterprises, and an annual growth rate of 37.27%.

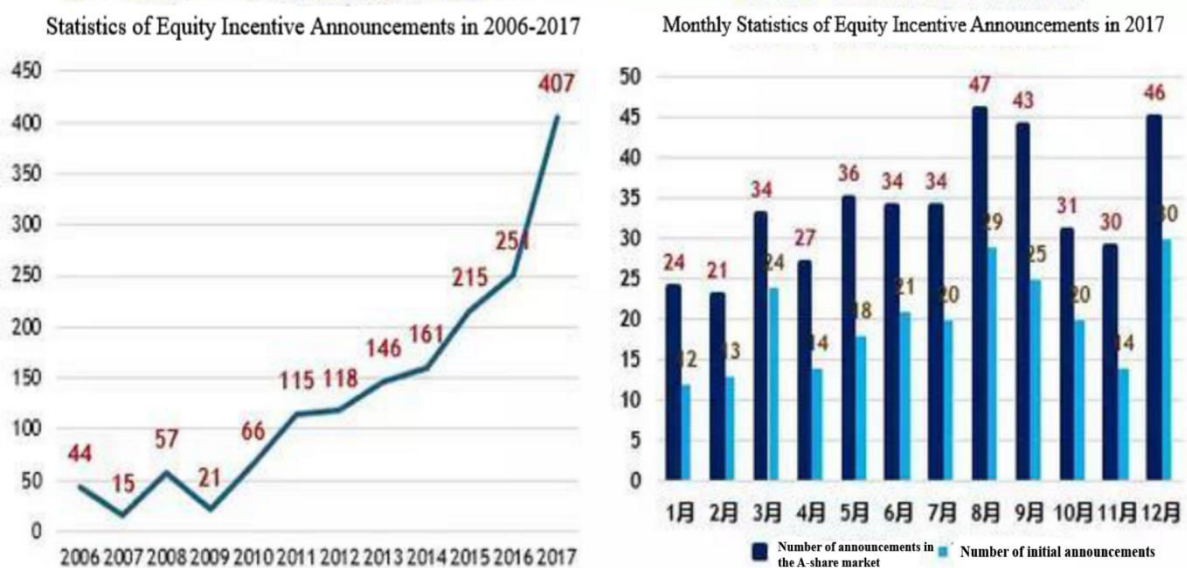


Figure 0-2 Statistics of Equity Incentive Announcements in 2006-2017 and Monthly Statistics in 2017

Source: Realize Consulting's A-share equity incentive statistical analysis report in 2017

Judging from the monthly statistical chart in 2017, the number of announcements in each month of 2017 slightly fluctuated, and the monthly average was around 33 plans. It steadily increased from January to August, reaching a peak of 47 plans in August; it has declined since August, but the fluctuations are not obvious, and the number of announcements in December reached 46. In the aspect of each segment of the capital market, the number and proportion of equity incentive schemes announced by listed enterprises in each segment in 2017 are relatively balanced. Among them, the number of listed enterprises on the main board was the largest in 2017 with 155 equity incentive schemes announced for listed enterprises, occupying 38.08% of the market. Listed enterprises on the Gem announced 139 plans, accounting for 34.15% of the market; listed enterprises on the SME Board announced 113 plans, accounting for 27.76%. At present, Chinese listed enterprises have increasing demand for professionals with scientific and management skills. Listed enterprises in all sectors generally hope to establish long-term effective incentive mechanisms and carry out equity incentive schemes.

(2). Deep comparison of equity incentive markets

As the number of listed enterprises that have carried out standardized equity incentives in each year increases, we have calculated the overall market coverage of listed enterprises that have carried out equity incentives in each year from 2006 to 2017, of which coverage rate on the GEM reached 50.85%, that is, more than half of the listed enterprises on the GEM have carried out equity incentive plans.

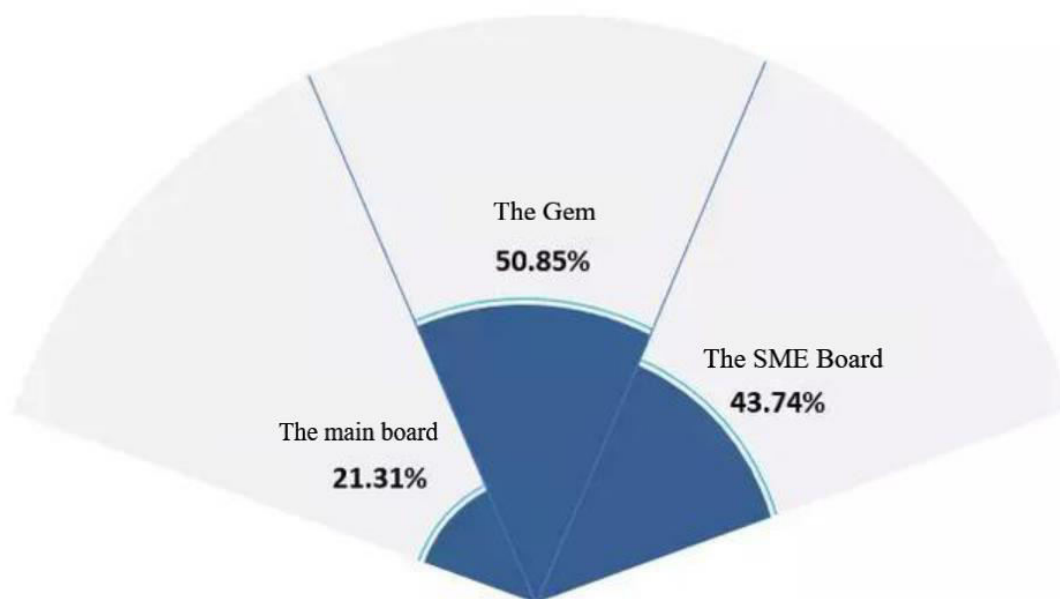


Figure 0-3 Equity incentive coverage of listed enterprises in each sector

Source: Realize Consulting's A-share equity incentive statistical analysis report in 2017

(3). The current situation of equity incentive carried out by listed enterprises under different ownership system

If it is only divided by the dimensions of private listed enterprises and state-owned listed enterprises by December 2017, private listed enterprises announced 380 equity incentive schemes, occupying 93.37%, accounting for almost the entire A-share market; while state-controlled listed enterprises only announced 27, accounting for only 6.63%.

Ownership of listed company		Number of announcements in 2017		Proportion	
The Private enterprise		380		93.37%	
State-owned	Central enterprise owned by the state	27	13	6.63%	3.19%
	Local state-owned enterprises		13		3.19%
	Other state-owned enterprises		1		0.25%
Total		407		100.00%	

In the Rongzheng system, state-owned enterprises are divided into state-owned central enterprises, local state-owned enterprises and other state-owned enterprises. The first two are state-owned listed companies within the SASAC system, and the last are other state-owned listed companies, including state-owned holding enterprises under the ministry of finance, the ministry of education, the publicity department of the CPC central committee and other departments under the state council.

Figure 0-4 Statistics of equity incentives of listed enterprises under different ownership systems

Source: Realize Consulting's A-share equity incentive statistical analysis report in 2017

Overall, equity incentives carried out in Chinese state-owned enterprises are advancing at a faster pace but compared to the autonomy of private enterprises' equity incentive plans, their overall speed is still slower than that of private listed enterprises. Judging from the existing cases, state-owned enterprises promote the equity incentives with two main characteristics compared with private enterprises:

1) High performance requirements: For state-owned enterprises, the listed enterprises that are able to carry out the equity incentive must be listed enterprises whose

performance level is stable above the average level or even the industry leader in the same industry or in the same market. And the performance level evaluation system must be a multi-index, multi-dimensional comprehensive evaluation system with certain rigid requirements. This is a great challenge for the state-owned listed enterprises that are seeking to transform their enterprises or are on the road of transformation with poor performance.

2) There are many approval procedures: Compared with private enterprises that only need to pass the review of shareholders' meeting, state-owned companies encounter more actual supervision and approval procedures during the enforcement of equity incentive, such as state-owned controlling shareholders at all levels, actual controllers, SASAC, provincial and municipal governments and so on.

In addition, since SASAC launched the supporting policy of state equity incentive in 2008, SASAC has not launched a new incentive policy. At the same time, the China Securities Regulatory Commission has revised the "trial" methods for listed enterprises' equity incentive policies in 2006, and announced them on July 13, 2017, and carried out them on August 13, the same year. The existing state-owned enterprise equity incentive policies cannot fully meet the new demands of the current market, and it is expected that the relevant policies will be further improved.

(4) Regional distribution of equity incentive

In the aspect of regional distribution, there are more companies carrying out equity incentive plan in coastal city, East China and South China than companies in Southwest and Northeast China. In 2017, Guangdong province announced the most equity incentive schemes for listed enterprises, with 103 schemes in total, accounting for 25.31%. Zhejiang province followed with 49 plans, accounting for 12.04 percent. Next came Jiangsu province, which announced 48 plans, accounting for 11.79% of the total. Shanghai announced 38 plans, accounting for 9.34%; Beijing announced 36 plans, accounting for 8.85%. Other coastal regions including Shandong and Fujian announced 21 and 19 announcements respectively. Except for Sichuan, Hubei, Anhui, Hunan, Henan, and Jiangxi, the number of announcements in other regions did not exceed five plans, and in some provinces, there was not even a listed enterprise carrying out equity incentive plans in 2017.



Figure 0-5 Regional Distribution of Equity Incentive Market

Source: Realize Consulting's A-share equity incentive statistical analysis report in 2017

(5) Industry Distribution of Equity Incentive

From the perspective of industry distribution, manufacturing companies announced the largest number of equity incentive plans in 2017, reaching 262 plans, with a market share of 64.86%; the information technology service industry was second only to manufacturing, with 62 plans announced, accounting for 15.23% ; Followed by the retail industry and the textile and clothing and apparel industry, each announced 9 plans, accounting for 2.21%. In manufacturing industry, there is the most extensive promotion of equity incentives, on the one hand because there are the largest number of listed enterprises in this industry, and on the other hand the traditional manufacturing industry in China is facing the increasing demand for core talents during the transformation and upgrade of modern industry. Only second to the manufacturing industry, the information technology service industry has become the second largest industry to promote equity incentives. This benefits from the growth of the Internet industry and the popularization of information resources.



Figure 0-6 Statistical chart of the number of equity incentive announcements in various industries in 2017

Source: Realize Consulting's A-share equity incentive statistical analysis report in 2017

From the perspective of various manufacturing market segments, the computer and communications equipment industry announced the largest number of announcements in 2017, reaching 49 plans, accounting for 18.56% of the manufacturing equity incentive market; followed by electrical machinery and equipment manufacturing, which announced 35 Plans, accounting for 13.26%; in addition, the special equipment manufacturing industry also announced 28 plans, accounting for 10.61%. The announcement volume of other sub-sectors was lower than 25 plans.

Sample selection

(1) For the accuracy of the research conclusions, this article selects the A-share listed enterprises at Shanghai and Shenzhen Stock Exchanges from 2014 to 2017 as the data source. In the first place, with high-quality publicly disclosed data of listed enterprises, it is easy to collect and sort out the sample data. On the other hand, because A shares, B shares and H shares have different values, there are also differences in the accounting standards applied during the preparation of financial statements, which may lack comparability. Therefore, only A-share listed enterprises are selected.

(2) The selected sample companies must have accurate announcements or information indicating that they have approved the enforcement of the equity incentive system for senior managers, and the objectives of equity incentive system must conform to the "Measures for the Administration of Equity Incentive Plans of listed enterprises".

(3) The financial industry is a highly regulated industry. The particularity of its capital structure determines that its assets and liabilities are significantly different from those of other types of listed enterprises. Therefore, it has been eliminated. A total of 9 companies have been eliminated in 4 years.

(4) Considering extreme values' adverse influences on the statistical results, ST and PT enterprises with poor performance and listed enterprises that have issued audit opinions such as reservations, refusals, and negative opinions by registered accountants are excluded. At the same time, sample companies with extreme values in operating performance data are excluded, for example, return on equity and net profit growth rate are below -500%.

(5) Some companies have stopped carrying out the equity incentive schemes for some reasons. This article believes that as a long-term incentive system, equity incentive can exert an influence on the business performance for a short term hardly, especially in less than one year. Therefore, it was decided to exclude this type of company.

(6) Excluding listed enterprises with zero shareholding proportion of senior managers, that is, no equity incentives have been carried out for management.

After the above screening, it was determined that the listed enterprises that had announced the equity incentive scheme for the first time in Shanghai-Shenzhen A shares from 2014 to 2017 were selected. Finally, 6 companies were selected in 2014, 16 were selected in 2015, 11 were selected in 2016, and 7 were selected in 2017, there are a total of 40 companies.

All variables are summarized in Table 3.1.

Table 0-1 Variable description table

Type of Variables	Name of Variables	Variable symbol	Variable definitions
Dependent variable	Return on equity	ROE	$\text{Net profit} * 2 / (\text{Net assets at the start of the current year} + \text{net assets at the end of the current year})$
	Earnings per share	EPS	$(\text{Net profit for the period} - \text{preference shares dividends}) / \text{Number of ordinary shares outstanding at the end of the period}$
Independent variable	Executive Shareholding	MSR	$\text{Sum of shares held by senior managers} / \text{total share capital}$
Mediating	innovation	RDF	The proportion of research and

variable	input		development expense in the main business revenue of that year
Control variable	Increase rate of net profits	NPGR	(Net profits during the current period / net profit during the base period) 100% -1
	Company Size	SIZE	Natural logarithm of total assets
	Increase rate of main business revenue	OIGR	(Main business revenue during the current period - Main business revenue during the previous period) / Main business revenue during the previous period * 100%
	Asset-liability proportion	DEBT	(Total Liabilities / Total Assets) * 100%
	Total assets turnover	TAT	Net business revenue/ average total assets * 100%

Source: Self-compiled

Reliability and validity tests

Analysis of reliability

This research used Cronbach's alpha, the most common reliability test coefficient in the Likert scale to further understand the consistency, reliability, and stability of the measurement scale used in this study. For Cronbach's alpha, the larger the coefficient, the better the internal consistency of the tested factors, which indicates that the scale is more reliable and stable. Generally speaking, the Cronbach' alpha of the total scale should be above 0.8, and the Cronbach' alpha of the subscale should be above 0.7. Using SPSS21.0 software to process and analyze the questionnaire, the Cronbach' alpha of the questionnaire used in this research are shown in Table 3.2.

Table 0-2 Reliability analysis of each variable

Measured variable	Measured coefficient	Cronbach a
equity incentives for senior managers	15	0.922
innovation input	18	0.902
business performance	7	0.953
Overall variables	40	0.936

Source: Self-compiled

From Table 3.2, it can be observed that the Cronbach' alpha of the three variables and the overall variables all exceed 0.9, which indicates the excellent reliability of measurement scale.

ANALYSIS

This paper takes the listed enterprises which have announced the enforcement of equity incentive schemes for the first time from 2014 to 2017 in Shanghai and Shenzhen Stock Exchanges as the object of research. In view of the new accounting principles for the accounting treatment of research and development expenses, the listed enterprises that do not conform to the research scope were excluded, thereby guaranteeing the effectiveness of the collected data and the credibility of the research conclusions. In the end, 40 listed enterprises that published equity incentive schemes for the first time and disclosed R&D input data were selected as research samples.

Through more than ten-year development, the system of equity incentives has evolved from corporate luxury to corporate necessities, and listed enterprises increasingly favor equity incentives. Since the “Measures for the Administration of Equity Incentive Plans of listed enterprises (For Trial enforcement)” was carried out in 2006, only a few companies have carried out the equity incentive scheme each year at the beginning and since then the number has been increasing. In May 2016, the “Measures for the Administration of Equity Incentive Plans of listed enterprises” was formally carried out, and the system of equity incentive became popular. 2017 can be described as a year of explosive growth in equity incentives for A-share listed enterprises. The number of equity incentive schemes announced throughout the year reached 448, the highest in years. At the same time, there has been 1,154 companies that have announced the equity incentive scheme by December 31, 2017, among which the number of new added companies in 2017 is 246, accounting for 21.32%, compared with 118 in 2016, an increase of 108%. Of the 246 new added companies in 2017, 85 percent chose restricted stock as an incentive, 9 percent chose options, and 6 percent chose a combination of restricted stock and options.

Research Objective 1 Research on the association between the equity incentives for senior managers and ROE

Descriptive statistics of dependent variables

There are many ways to evaluate the enterprise's business performance at home and abroad. However, in China's empirical research, the financial indicator of return on equity is widely used. This article first analyzes the descriptive statistics of this important indicator. Table 4.1 below shows descriptive statistics on the return on equity of the sample companies from 2014-2017.

Table 0-1 Descriptive statistics of the ROE of the sample companies from 2014 to 2017

	N	Minimum	maximum	Mean	Standard deviation
ROE in 2014 (%)	40	1.02	36.46	14.3610	9.54547
ROE in 2015 (%)	40	1.41	26.81	11.7584	6.53443
ROE in 2016 (%)	40	1.67	25.28	10.5459	8.98830
ROE in 2017 (%)	40	1.29	24.67	10.5238	7.24637
Overall sample ROE (%)	40	2.14	31.58	12.6253	7.12706
Valid N (list status)	40				

Source: Self-compiled according to the financial statements of Eastmoney.com from 2014 to 2017

According to the statistical results in the above table, the average return on equity of the 40 listed enterprises that first announced the equity incentive scheme is greater than 0 from 2014 to 2017, indicating that the sample has a certain profitability, but the profitability alone was not enough to reflect its enforcement.

Descriptive statistics of independent variables

Table 0-2 Descriptive statistics of independent variables

	N	Minimum	maximum	Mean	Standard deviation
Executive Shareholding	40	0.1000	10.0000	4.526610	2.8289739
Valid N (list status)	40				

Source: Self-compiled according to CCER database financial data

On the basis of the descriptive statistics of the independent variables in Table 4.2 above, senior managers' minimum shareholding proportion of 40 listed enterprises carrying out equity incentives is 0.1%, the maximum is 10%, and the average is 4.526%. The overall shareholding is relatively low, which is far from the average shareholding ratio of up to 10% -15% in developed western countries. Therefore, China should further increase equity incentives and increase the shareholding of senior managers.

Descriptive statistics of control variables**Table 0-3 Statistics of control variables**

	N	Minimum	Maximum	Mean	Standard deviation
NPGR (%)	40	-81.74	681.30	48.9564	118.78000
SIZE (ten thousand yuan)	40	10.58	14.26	12.2041	0.04520
OIGR (%)	40	-33.21	124.33	27.9865	28.80546
DEBT (%)	40	14.14	77.41	41.8932	16.56656
TAT (times)	40	0.16	3.19	0.8959	0.64305
Valid N (list status)	40				

Source: Self-compiled according to CCER database financial data

Table 4.3 above shows the descriptive statistics of the five control variables selected in this paper. The average increase rate of net profit is 48.9564%, the average size of the company is 122.041 million yuan, the average increase rate of main business revenue is 27.9865%, and the mean value of asset-liability proportion is 41.8932%, the average turnover rate of total assets was 0.8959 times. Among them, the extreme value difference between the return on equity, the increase rate of main business revenue and the extreme value of the asset-liability proportion is particularly large.

On the basis of the theory of modern capital structure optimization, when the corporate debt does not exceed a certain proportion, the market of the indebted company is higher than that of the companies free from debts or with low debts due to its income tax deduction and leverage benefits. When the company is operating well, it should borrow more to decrease the weighted mean capital cost and increase the enterprise's market value. According to Table 4.3 above, the average asset-liability proportion of 40 sample companies is only 41.8932%, all of which are less than 50%. This phenomenon has a certain gap with the asset-liability proportion of western companies, which is generally above 50% and on an increasing trend year by year.

Correlation analysis**Correlation test of independent variables**

The association among independent variables should be test first before conducting the regression analysis. Its importance lies in eliminating the impact of highly correlated independent variables on the equation of regression and preventing the occurrence of the problem of multicollinearity. Multicollinearity means the distortion

of model estimates in linear regression models due to the existence of precise or highly correlated associations. Among them, high correlation usually means that the association coefficient among independent variables exceeds 0.8, which means that even if independent variables are significantly correlated with each other, as long as the correlation is not strong or low, the selection and setting of independent variables also conforms to the setting principle of statistics.

Use Pearson correlation test to perform correlation analysis on the executive shareholding proportion, net profit growth rate, company size, increase rate of main business revenue, asset-liability proportion and total asset turnover proportion of the 40 sample enterprises that carried out the equity incentive scheme. Table 4.4 below shows the specific analysis process.

Table 0-4 Pearson association coefficient hypothesis testing table between independent variables

		MSR	NPGR	SIZE	OIGR	DEBT	TAT
MSR (%)	Pearson correlation	1	0.024	-0.268	-0.063	-0.321	0.056
	Significance level (two-sided)		0.874	0.084	0.687	0.036	0.717
	N	40	40	40	40	40	40
NPGR (%)	Pearson correlation	0.024	1	0.084	0.196	0.415	-0.017
	Significance level (two-sided)	0.874		0.591	0.211	0.005	0.911
	N	40	40	40	40	40	40
SIZE(ten thousand yuan)	Pearson correlation	-0.268	0.074	1	0.310	0.616	0.203
	Significance level (two-sided)	0.084	0.591		0.044	0.000	0.195

	sided)						
	N	40	40	40	40	40	40
OIGR (%)	Pearson correlation	-0.063	0.196	0.310	1	0.171	-0.071
	Significance level (two-sided)	0.687	0.211	0.044		0.275	0.648
	N	40	40	40	40	40	40
DEBT(%)	Pearson correlation	-0.321	0.415	0.616	1	1	0.648
	Significance level (two-sided)	0.036	0.005	0.000			40
	N	40	40	40	40	40	0.370
TAT(times)	Pearson correlation	0.056	-0.017	0.203	0.171	0.370	0.015
	Significance level (two-sided)	0.717	0.911	0.195	0.275	0.015	40
	140						
	N-0.071	40	40	40	40	40	40

Source: Self-compiled according to CCER database financial data

The data in the table shows that the shareholding proportion of senior managers and the asset-liability proportion pass the two-tailed test at the level of 0.05 ((two-sided)), and the two are significantly negatively correlated. The Pearson correlation coefficient is -0.321. The increase rate of net profits is significantly related to the asset-liability proportion at the level of 0.01(two-sided), and the Pearson association coefficient is 0.416. The size of the company is significantly correlated with the increase rate of the main business revenue at the 0.05 level (two-sided), and the Pearson correlation coefficient is 0.310. The asset-liability proportion is significantly related to the

company size at the level of 0.011 (two-sided), and the Pearson correlation coefficient is 0.616. The total asset turnover proportion is significantly correlated with asset-liability proportion at the level of 0.05 (two-sided), and the Pearson correlation coefficient is 0.370. In addition, other independent variables did not pass the Pearson association coefficient hypothesis testing, so the null hypothesis of the hypothesis testing should be accepted, that is, the correlation coefficient is 0, and the correlation is not significant.

In short, although the above five groups of variables have significant correlation through the two-tailed test at the significance level, it is not difficult to find that the Pearson correlation coefficient value is usually low, and the highest value of 0.616 is also significantly lower than the highly correlated set value. Therefore, the conclusion that the collinearity between the independent variables is not strong and does not cause the problem of multicollinearity is drawn. The setting conforms to the statistical setting principle.

CONCLUSION

This article takes 40 A-share listed enterprises at Shanghai and Shenzhen Stock Exchanges that announced equity incentive schemes for the first time from 2014 to 2017 as a sample, selects the shareholding of senior managers as independent variables, return on equity and earnings per share as dependent variables, and R&D input as intermediate variables. The net profit growth rate, company size, increase rate of main business revenue, asset-liability proportion and turnover rate of total assets were used as control variables. Five hypothetical models were constructed respectively. In virtue of descriptive analysis, this paper makes correlation analysis and regression analysis, SPSS21.0 Statistical analysis software and empirical research on five research objectives. The influence association among the equity incentives for senior managers, innovation input and business performance were analyzed, and the mediation role of innovation input on equity incentives and business performance was tested. The five hypothetical models were verified, and Table 5.1 below shows the summary of the empirical results:

Table 0-1 Overview of hypothesis testing

NO.	Content	Verification result
H1a	Shareholding proportion of senior managers is positively related to ROE	Valid
H1b	Shareholding proportion of senior managers is positively correlated with earnings per share	Valid

H2	The equity incentives for senior managers are positively related to innovation input	Valid
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By studying the impact of stock incentives on the business performance of listed enterprises, it not only helps to enrich the modern enterprise theory, perfect the structure of corporate management, actively drive the reform process of listed enterprises' governance, improve the overall performance, but also enhance the operational efficiency and competitiveness of Chinese enterprises (Ren, 2011; Membondiani, & Zhang, 2013; Wang, 2013; Lu & Dang, 2014; Haji, 2014; Aibassam, Ntim, Opong, & Downs, 2015; Volonte, 2015; Bouheni, Ammi & Levy, 2016; Cummins & Xie, 2016; Tang, 2016; Dai & Song, 2018; Hussain, Rigoni & Orij, 2018; Li, McMurray, Sy, & Xue, 2018). Meanwhile, for Chinese listed enterprises it is of significance to understand the equity incentive scientifically and reasonably, whether to carry out the equity incentive on the basis of their own conditions, and to choose the appropriate equity incentive model to perfect the enterprise's business performance (Tang & Xu, 2012; Rustam, Rashid & Zaman, 2013; Luo, 2014; Zhang, 2014; Wang, 2014; Yang & Song, 2016; Chen, Liu & Qiu, 2017; Chen, 2017).

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