

Research on the Impact of Stock Incentives on Firm Innovation Performance

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Abstract: Innovation is the driving force of economic development. How to take effective incentives to promote innovation is an important issue in theoretical research. Based on the data of China's A-share listed companies from 2008 to 2018 as a sample, this paper analyzes the relationship between equity incentives and corporate innovation performance based on the perspective of R&D incentives. The study found that: equity incentives have a significant positive effect on improving the innovation capabilities of Firms; the positive effects of equity incentives in state-owned enterprises on innovation are more significant than non-state-owned firms; the impact of equity incentives on firm innovation is affected by the organization's internal risk-taking ability, The stronger the corporate risk-bearing ability, the more significant the role of equity incentives in promoting innovation; the intensity of market competition outside the organization also has a significant positive impact on the relationship between equity incentives and corporate innovation; at the same time, the relationship between equity incentives and compensation incentives There is a complementary relationship, and salary incentives will strengthen the positive impact of equity incentives on corporate innovation. The research in this paper enriches the research content of equity incentives, provides theoretical guidance for firms to adopt effective incentives, and improves innovation capabilities and innovation performance. It has important enlightenment significance for promoting the high-quality development of Chinese firms.

Keywords: Equity incentives, Innovative performance, Property rights attributes, Risk-bearing capacity, Market competition, Salary incentives.

1. Introduction

Innovation is an inexhaustible driving force for a country's economic development[1, 2](Solow, 1957; Kogan et al., 2017), is the leading force and an important source of social and economic development. The Outline of the National Innovation-driven Development Strategy issued by The State Council in 2016 clearly points out that the innovation-driven development strategy should be regarded as the national priority strategy, and innovation should be placed in a very important position under the development trend of economic transformation and upgrading. In this context, how to adopt effective incentive means to promote the development of China's innovation and improve the competitiveness and performance of enterprises has become an important issue of common concern from all circles.

As an investment activity with large investment, long cycle and high risk, innovation activities will directly affect the performance level of enterprises in the current period, leading to many managers to reduce innovation investment in order to avoid innovation risks [3, 4] (Johnson, 2007; Aramonte, 2015). To encourage business operators to increase their investment in technological innovation, Jensen and Meckling (1976) [5] It is proposed to implement incentive mechanisms such as equity and option for operators to reduce the agency cost, so as to make the interests between operators and owners consistent, so as to promote the technological innovation of enterprises[6] (Erkens, 2011). Since 2006, the promulgation of the Management Measures for Equity Incentive of Listed Companies (Trial) marks that the equity incentive system has been formally introduced into China, and the relationship between equity incentive and enterprise innovation has attracted the attention of some scholars. The "profit-driven hypothesis" believes that equity incentive is conducive to agreeing on the interests of management and

shareholders, produces the interest convergence effect, pays attention to the long-term development of the company, and attaches importance to innovation investment[5](Jensen and Meckling, 1976); the "trench effect" believes that equity incentive will lead to the increased power of senior executives, resulting in short-term rent-seeking behavior for their own interests, which is not conducive to the development of enterprise innovation[7](Zhang et al., 2008). It can be seen that there is no consensus conclusion on the impact of equity incentive on innovation, which needs further empirical verification.

Based on this paper in 2008-2018 China Shanghai and Shenzhen a-share listed company research found that equity incentive has A significant innovation, equity incentive can motivate the interests of the object and the interests of shareholders, improve the incentive object work enthusiasm, promote the enterprise innovation project, so as to improve the enterprise innovation ability, enhance the market competitiveness of enterprises. Through the analysis of the nature of enterprise property rights, Among the different property properties found, The relationship between equity incentive and enterprise innovation performance varies somewhat, In state-owned enterprises, equity incentive plays a stronger role in promoting enterprise innovation performance; At the same time, the risk bearing ability within the enterprise has a significant positive impact on the relationship between equity incentive and enterprise innovation performance; The relationship between equity incentive and enterprise innovation performance will also be affected by the competition intensity of the external market, The greater the market competition, The more obvious the promotion effect is; Moreover, the effect of equity incentive will be affected by the enterprise compensation incentive, The effect of salary incentive has a complementary effect on equity incentive.

The possible research contributions of this paper are mainly in the following aspects: to study the influence of equity incentive on enterprise innovation from the internal and external influencing factors of the enterprise, which is conducive to deepening the understanding of the relationship between equity incentive and enterprise innovation. This study takes equity incentives for technicians as the entry point, To explore the relationship between equity incentive and enterprise innovation, Change the research object of equity incentive from corporate executives to corporate technical personnel, Enrich the research content of equity incentive; At the same time, this paper found the complementary relationship between equity incentive and compensation incentive, Can provide reference for enterprises to carry out compensation incentive and equity incentive, Promote enterprises to adopt effective incentive means, Promote the development of their own innovation; moreover, To further clarify the relationship between equity incentive and innovation, It plays a key role in enterprise innovation and research and development, It helps enterprises to adjust their equity incentive policies, To provide theoretical guidance for enterprises to formulate reasonable equity incentive, Promote the improvement of enterprise innovation level.

2. Theoretical Analysis and Research Hypothesis

The separation of enterprise ownership and management right, coupled with the uncertainty and risk of innovation activities, lead to the short-sighted behavior of enterprises, which is not conducive to the development of enterprise innovation. With the continuous development of science and technology, the importance of human capital has gradually emerged, which has become the main source of enterprise competitiveness and the driving force of economic growth[8](Offstein et al., 2005). Only through the effective incentive means, fully mobilize the enthusiasm and creativity of employees, the innovation ability of the enterprise can be continuously improved[9](Bouwman and Hulsink, 2004). Equity incentive can give long-term return to the incentive objects, reduce their short-sighted behavior, and pay attention to the long-term development strategy of the enterprise[10] (Barnea, 1981)。 Related studies have also found that equity incentive can integrate the interests of the incentive object with the interests of the company, increase the awareness of the hero, reduce the agency cost, and increase the sense of responsibility and sense of belonging of the incentive object to the enterprise[11](Xu Yue, et al., 2010). As the management of the enterprise grasp the development strategy and direction of the enterprise and influence the formulation and implementation of innovation strategy; technical personnel, as the core human capital of the enterprise, create most of the value of the enterprise and is the fundamental source of the core competitiveness of the enterprise. Giving corresponding equity incentives to senior executives and technicians can make them become a community of interests with shareholders, improve their work enthusiasm, produce higher work efficiency, stimulate them to explore new technologies, and ensure the continuity and innovation of research and development activities[12](Hochberg and Lindsey, 2010). Sigitas, et al. (2018)[13]Research shows that equity incentive can improve the risk bearing ability of managers and encourage managers to conduct innovative activities, so as to improve the long-

term value creation ability of enterprises; Lu Tong and Dang Yin (2014)[14]It is found that equity incentive can achieve personal goals with corporate goals and reduce agency problems such as adverse selection and moral hazard. Therefore, the enterprise core personnel hold the core of the enterprise ability and resources, is the main participants of enterprise innovation activities and executor, through the equity incentives can combine their earnings with the development of the company, fully mobilize incentive object innovation initiative and creativity, make enterprises pay more attention to long-term development, pay attention to the long-term development orientation, also conducive to enterprise absorption and reserve talents, better promote enterprise innovation, improve the enterprise innovation performance. Based on the above analysis, the following research hypotheses are proposed:

Hypothesis 1: Equity incentive plays a positive role in promoting enterprise innovation performance.

Previous studies have shown that due to the special economic background in China, property rights have a significant impact on the technological innovation of enterprises. Whether it is equity incentive or salary incentive, the environment is different, and the relationship with enterprise innovation will also change[15](Liang Tongying, et al., 2015). There are a large number of state-owned enterprises in China, the staff in state-owned enterprises often have administrative level, focus on development stability, often focus on their own work, solve their duties, and less active in innovative activities; meanwhile, all incentive policies have strict restrictions and lack of effective long-term incentives[16](Wu Yanbing, 2012), leading to a small pursuit of innovative activities among employees. However, in private enterprises, due to the fierce competition mechanism, even if the incentive intensity of enterprises is small, employees will actively win development opportunities for themselves, participate in innovation activities, and promote the development of enterprise innovation. Therefore, the impact of incentive on the innovation performance of private enterprises is not significant. Moreover, the compensation control in the state-owned enterprises has less impact on the enterprise personnel[17](Chen Zhigang and Chen Qibo, 2020), when the benefits of an innovation activity are greater than the loss of avoiding innovation, the probability of enterprise personnel carrying out innovation activities will also increase[18](Luan Bin and Yang Jun, 2016), so in the short and medium term, the incentive means in state-owned enterprises cannot effectively achieve the effect of promoting innovation, and strong long-term incentive means must be implemented. Equity incentive can improve the development expectation and motivation of the incentive object, connect the long-term interests of the incentive object with the enterprise, make it form a community of destiny with the enterprise, change the working state of the enterprise, which is conducive to further improving its enthusiasm to participate in innovation, so as to promote enterprise innovation. Therefore, the promotion effect of equity incentive of state-owned enterprises on enterprise innovation performance is more obvious. Based on the above analysis, the following research hypotheses are proposed:

Hypothesis 2: The promotion effect of equity incentive on enterprise innovation performance is more obvious in state-owned enterprises.

Whether it is equity incentive or other incentive methods, the means of incentive for enterprises are to further improve

the innovation ability of enterprises and ensure their own development in the market competition. Market competition is an important external factor that affects the innovation activities of enterprises, which is often regarded as an effective external governance mechanism[19](Zhang Chuancui and Chen Hanwen, 2017). Arrow[20]It is the first to propose that competition will promote innovation, and enterprises will show stronger innovation ability in the competition, which is conducive to promoting the improvement of their own innovation level. The more fierce the market competition, the stronger the crisis consciousness of the enterprise will be, and the more inclined to change, which will pay attention to the innovation and development of the enterprise for the more long-term development of the enterprise, and promote the technological innovation[21](Linitch and D`Aveni). When the degree of market competition is small, the sense of crisis is weak; the greater the intensity of the market competition, the crisis awareness of the enterprise is gradually strengthened, in order to seek more development opportunities in the market and take the lead in the market, they will actively improve their own innovation ability, effectively improve the innovation level of the enterprise through various ways, and increase the incentive to the enterprise personnel. Encouraged by the enterprise, the crisis awareness of the employees will be continuously strengthened. In order to help the enterprise to gain advantages in the fierce market competition and maintain the further development of the enterprise, the enthusiasm of the equity incentive objects to carry out innovation activities will be greatly improved. Therefore, with the increase of the intensity of market competition, employees' awareness of crisis will continue to increase, and enterprises will pay more and more attention to the improvement of their own innovation ability, increase the strength of equity incentive, improve the work enthusiasm of employees, and thus promote the improvement of enterprise innovation performance. Based on the above analysis, the following research hypotheses are proposed:

Hypothesis 3: The promotion effect of equity incentive on enterprise innovation performance is positively affected by the intensity of market competition.

Enterprises will encounter various risks and challenges in the development. Research and development activities have high risk and high return, which need enterprises to have a strong risk bearing ability. Therefore, the risk bearing ability of enterprises is the key to affect their innovation decisions, and can promote the long-term development of enterprises[22](Li and Tang, 2010). The risk bearing ability of enterprises reflects the identification and grasp of new opportunities[23](Barger and Lehn, 2019), the stronger the risk bearing capacity of an enterprise, the higher the tolerance of innovation risk and uncertainty, the stronger the confidence in high-risk innovation projects, and the greater the enthusiasm for innovation and change[24](Simon and Houghton, 2003). Enterprises with high risk bearing capacity will attract more funds and provide more guarantee for their innovation and research and development activities[25](Hilary and Hui, 2009), it will bring employees greater confidence and security, and make them more willing and dare to actively participate in innovative research and development activities[26](Covin and Slevin, 1989). High enterprise risk bearing capacity can provide more guarantee for innovation activities, making enterprise personnel more dare to try high risk and high return innovation projects,

effectively grasp new opportunities, and actively participate in various innovation activities, which is conducive to the improvement of enterprise innovation performance. Based on the above analysis, the following research hypotheses are proposed:

Hypothesis 4: The promotion effect of equity incentive on enterprise innovation performance is positively affected by the enterprise's risk bearing ability.

Championship theory[27](Lazear and Rosen, 1981) argue that the pay gap between different levels of the business helps to encourage employees to work harder to get higher pay. With the promotion of employees' positions and the improvement of work level, employees can get higher salary and rewards, which makes employees work hard continuously, thus promoting the improvement of company performance. Therefore, reasonable salary gap is an effective way to improve the work quality and efficiency of employees[28](Li Wenjing and Zheng Manni, 2016). The higher the salary incentive of the company, on the one hand, can promote the efforts of the employees to get higher compensation, greatly improve the motivation of the employees and facilitate the development of innovation activities; on the other hand, it can mobilize the enthusiasm of senior executives, adopt various effective incentive measures to stimulate the creativity of the employees and promote the development of enterprise innovation. The higher the salary incentive of the company, the higher it can also improve the sense of belonging and dependence of senior executives and employees to the company, pay more attention to the future development of the company, and encourage senior executives and employees to pay attention to the investment of the company's innovation, which will help to promote the improvement of the innovation level of the company and enhance the innovation ability of the company. Therefore, the effect of enterprise equity incentive will be affected by the enterprise compensation incentive, if the enterprise compensation incentive is higher, incentive object work enthusiasm and effort is the stronger, the enterprise will pay more attention to long-term development, attach importance to the equity incentive incentives attempt and implementation, ensure the effect of equity incentive, so as to promote the improvement of enterprise innovation performance. The following research hypotheses are proposed:

Hypothesis 5: Equity incentive and salary incentive show a complementary relationship, that is, the promoting effect of equity incentive on enterprise innovation performance is positively affected by the salary incentive.

3. Study Design

3.1. Sample selection and data processing

Considering the requirements of data and the availability of data, this paper selects China Shanghai-Shenzhen A-share listed companies from 2008 to 2018 as the research object. This paper further excluded the financial industry and the enterprises that were specially handled due to abnormal financial conditions or other operating conditions. At the same time, the samples of ST companies and the samples with missing data of related variables were excluded, and 25,883 observation samples were finally obtained. The patent data and financial data of the enterprises came from CSMAR and CNRDS.

3.2. Variable setting and measurement

(1) Enterprise innovation performance

The number of patents is the most commonly used indicator of technological innovation. In terms of the output of scientific and technological innovation, compared with the number of patent applications, the number of patent granted is more vulnerable to many human factors such as patent agencies, and there is great uncertainty. Therefore, the number of patent applications can reflect the true level of innovation output more than the number of patent granted. Chinese types of patent include: invention, utility model and appearance design. Due to the low technical content of appearance design patents, this paper uses the total number of patent applications (Inno_all) and the number of invention patent applications (Inno_inv) to measure the innovation performance of enterprises[29](Yang Huihui et al., 2020), and that the total number of patent applications is represented by the sum of invention patent applications, utility model patent applications and appearance patent applications[30](Liu Xing and Zhao Jianyu, 2019), add a logarithm to all patent variables, and intercept the data. Considering the timing of innovation output, the innovation output lags behind the first phase.

(2) Equity incentive

Because most of the data about equity incentive mainly focus on executive equity incentive, this paper adopts the core technical personnel equity incentive data to analyze the role of equity incentive for innovation, the core technology staff in this paper mainly refers to those who have professional skills knowledge, master the core business technology backbone, measure liu (2018) (About equity incentive data from the Tai'an database, domestic and foreign for the classification of the enterprise core personnel standard differences, but generally can be divided into three categories: the first category is the core technology staff with professional skills, the second is the core of extensive external relations, the third category is the core management staff with management skills) [31]The measurement method of technical personnel incentive is specifically expressed as: equity incentive = equity granted to core technical business personnel in this year / total amount of incentive granted in this year, expressed in techinct.

(3) Property rights and attributes

In this paper, 0-1 variable is used to measure the property right, with state-owned enterprises labeled 1 and non-state-owned enterprises labeled 0.

(4) Market competition

At present, HHI is mostly used as the competition index variable in the measurement of market competition, which may have some limitations and measurement errors. This paper references Zhang Jie et al. (2014)[32]The lerner index (Lerner's Index) serves as the main index to measure the length of the market competition. The larger the index is, the more fierce the market competition is.

(5) Risk-bearing capacity

Since higher risk taking means that the uncertainty of corporate cash inflows increases, the volatility of corporate profits is widely used to measure the risk bearing capacity of enterprises[33](Yu Minggui et al., 2013), this paper draws on the measurement method of Yu Minggui et al. (2013), and uses the volatility of corporate earnings to measure the risk taking level of risk bearing, which is expressed by Risk. ROAi

is the ratio of the earnings before interest, tax, depreciation and amortization (EBITDA) of the enterprise i in the corresponding year to the total assets at the end of the year. When calculating the fluctuation, the annual ROA of the enterprise is adjusted by the industry average, and then the standard deviation of the industry-adjusted ROA of the enterprise during each observation period is calculated.

(6) Compensation and incentive

Due to the gap between the company compensation incentive is affected by the enterprise size and other factors, this paper draws on Wang Xu and Wang Fei (2019)[34]The salary incentive is measured by selecting the total salary of the top three executives divided by 3.

(7) Control variables

In order to control the influence of other variables on enterprise innovation performance, the economic characteristics of enterprises are selected as the control variables. ① Enterprise size (Fir_size), the size of an enterprise is measured by the logarithm number of enterprise assets. According to the basic production function of the enterprise, the enterprise capital is regarded as the input element, and the patent is regarded as the output. Generally speaking, the larger the scale of the enterprise, the stronger the innovation ability will be[35](Wang Gang et al., 2017); ② enterprise age (Film_age), the year of the enterprise minus the year of the establishment, affects the strategic choice of the enterprise, thus affecting the choice of the enterprise innovation strategy; ③ asset-liability ratio (Leverage). Studies have shown that bank loans measure market investors' confidence in corporate profitability, At the same time, the appropriate debt operation of enterprises can make up for the lack of funds, Use more money to improve technical equipment, Conduct innovative activities, Divide the total liabilities of the enterprise by the assets of the enterprise; ④ Cash flow (cash), Measured by net cash flow from operating activities divided by business assets; ⑤ Corporate Performance (Performance), Measured by corporate profits divided by corporate assets; ⑥ Return on assets (Return_assets), Measured by corporate profits divided by corporate assets; ⑦ Fixed asset ratio (Tangibility), Divide by fixed assets by total assets; Since innovation activities may be clustered due to industry or regional industrial policies, This article also sets up the two virtual variables: year (Year) and industry (Industry).

The definitions and measures of the specific variables are shown in Table 1 below.

4. Empirical Results and Analysis

4.1. Descriptive statistics

Descriptive statistics of the main variables in this paper are shown in Table 2. The average value of enterprise patent applications is 1.283, the maximum value is 5.903, and the minimum value is 0.00; the average value of enterprise invention applications is 0.867, the maximum value is 5.011, and the minimum value is 0.00, indicating that the innovation level between the sample enterprises varies greatly and the overall innovation level is low. At the same time, the standard deviation of the control variables is less than 1.00, indicating that the overall fluctuation range of the control variables is small.

Table 1. Table of related variables definitions

	variable name	abbreviation	computational method
Be explained variable	Total number of patent applications	Inno_all	The number of invention patent applications, the number of new patent applications and appearance patent applications and the log value
	patent of invention	Inno_inv	The log value of the number of invention patent applications
explanatory variable	stock ownership incentive	Techinct	The value of core technical business personnel / the total incentive granted in this year
regulated variable	Property property	Dummy	State-owned enterprises take 1, non-state-owned enterprises take 0
	market competition	Market com	Lerner index
	Risk bearing capacity	Risk	The ROA adjusts the industry average of the ROA for each year, and then calculates the standard deviation of the industry-adjusted ROA of the enterprise in each observed time period.
	Compensation incentive	EC	The total compensation of the top three executives / 3 plus 1 log
controlled variable	scale	Firm_size	Ln (Enterprise Assets + 1)
	enterprise age	Firm_age	Take the logarithm of the number of years that the company is listed in
	asset-liability ratio	Leverage	The total liabilities of the enterprise are divided by the enterprise assets to take the log
	cash flow	Cash	Net cash flow from operating activities is divided by the assets of the enterprise
	Enterprise performance	Performance	Corporate profits are log-taking divided by corporate assets
	ROE	Return_assets	Net profit / total assets are log-taking
	fixed assets ratio	Tangibility	Fixed assets are divided by the total assets to take the log

Table 2. Descriptive statistics

variable	mean	median	standard error	least value	crest value
Inno_all	1.283	0.000	1.568	0.000	5.903
Inno_inv	0.867	0.000	1.232	0.000	5.011
Techinc	0.042	0.000	0.156	0.000	0.693
Firm_size	3.130	3.128	0.140	0.000	3.465
Leverage	0.364	0.363	0.201	-0.223	4.968
Cash	0.036	0.040	0.093	-2.048	4.184
Performance	0.042	0.043	0.136	-3.584	10.063
Return_assets	0.034	0.036	0.133	-4.277	10.063
Firm_age	2.762	2.833	0.408	0.000	4.111
Tangibility	0.188	0.167	0.136	0.000	0.693

4.2. Equity incentive and enterprise innovation

In order to more detailed investigation of the influence of equity incentive on enterprise innovation performance, considering the innovation show lag, this paper through the lag of sample enterprise regression test results shown in table 3 and table 4, in the control year fixed effect and industry on the basis of fixed effect, the explanatory variable equity incentive regression coefficient shows stable consistency. In the (1) main effect model in Table 3 and Table 4, the results show that the regression coefficient of equity incentive on enterprise innovation is significantly positive ($\beta = 0.695$, $p < 0.01$; $\beta = 0.608$, $p < 0.01$). The results show that equity incentive has a significant role in promoting enterprise innovation, that is to say, the company will significantly improve the enthusiasm of incentive objects for technological innovation, encourage enterprises to carry out more innovation projects and activities, and the number of invention applications and patent applications will also increase, thus increasing the innovation level of enterprises,

so hypothesis 1 is verified.

4.3. Regulatory effect of property rights

Equity incentive and enterprise innovation relationship will also be affected by the enterprise property attribute, in order to verify the influence of different property attribute equity incentive on enterprise innovation, this paper adopts virtual variable to express property attribute, state-owned enterprises marked as 1, other non-state-owned enterprises (private and foreign enterprises) marked as 0, and adopts the property attribute and equity incentive interaction to illustrate the influence of equity incentive on enterprise innovation by the enterprise property attribute. The results are shown in Table Table (2) of Table 3 and 4, the effect of equity incentive on the number of invention applications and the fixed effect of the control year was more than 1% ($\beta = 1.011$, $p < 0.01$; $\beta = 0.876$, $p < 0.01$), and the results passed the significance test. The above results show that the influence of equity incentive on enterprise innovation will be significantly regulated by the enterprise property attribute, state-owned enterprises with its

own scale advantage and resource advantage, take the strength of equity incentive, the incentive effect of incentive object will be stronger, the transformation of innovation also faster, by equity incentive innovation performance improvement to more significant, so hypothesis 2.

4.4. The regulatory role of market competition

Equity incentive and enterprise innovation will be affected by the strength of market competition, in order to verify whether the market competition will affect the relationship between equity incentive and enterprise innovation, this paper adopts lerner index to measure the size of the strength of market competition, in order to avoid multiple multicollinearity problem, the lerner index and equity incentive decentralization interaction to illustrate the influence of equity incentive on enterprise innovation is affected by the strength of market competition. The results are shown in Table 3 and Table 4 (3), on the basis of fixed effect of control year and industry fixed effect, the influence of equity incentive and market competition on the number of invention applications and total patent applications was more than 1% significantly positive ($\beta = 2.018$, $p < 0.01$; $\beta = 1.343$, $p < 0.01$), and the results passed the significance test. The above results show that the impact of equity incentive on enterprise innovation will be significantly adjusted by the intensity of market competition. The greater the intensity of market competition, the stronger the sense of crisis of the enterprise and its employees, the more obvious the incentive effect of the enterprise means, and the promoting effect of

enterprise innovation will increase. Hypothesis 3 is therefore verified.

4.5. Regulatory effect of risk bearing capacity

Enterprise risk bearing ability is the key to enterprise innovation research and development, in order to verify whether enterprise risk bearing ability on equity incentive and the relationship between the enterprise innovation, this paper adopts the volatility of corporate earnings to measure the company's risk bearing ability, take equity incentive and risk bearing ability interaction of innovation of equity incentive to the influence of enterprise risk bearing ability. Results are shown in Table (4) of Table 3 and Table 4, on the basis of control year and industry fixed effect, the influence of equity incentive and risk bearing ability on the total amount of patent applications was significantly positive above 1% ($\beta = 3.359$, $p < 0.01$), and the effect of invention patent applications was significantly positive over 5% ($\beta = 4.139$, $p < 0.01$). The results passed the significance test. The above results show that the equity incentive influence of enterprise innovation will be significantly regulated by enterprise risk bearing ability, the greater the enterprise risk bearing ability, the stronger the enterprise risk response ability, the guarantee the greater of the innovation activities, so the incentive object will be more active innovation project, is conducive to the improvement of enterprise innovation performance. Hypothesis 4 is therefore verified.

Table 3. Impact of equity incentive on enterprise innovation:Inno_all

	(1)	(2)	(3)	(4)	(5)
	Inno_all	Inno_all	Inno_all	Inno_all	Inno_all
Techinct	0.695*** (10.10)	0.645*** (9.09)	0.479*** (3.88)	1.049*** (7.83)	0.528*** (7.53)
Firm_size	3.883*** (7.47)	3.715*** (7.07)	3.873*** (7.42)	3.881*** (7.43)	3.689*** (6.34)
Leverage	-0.234*** (-5.00)	0.251*** (-5.52)	-0.217*** (-4.46)	-0.239*** (-4.95)	-0.232*** (-4.41)
Cash	0.753*** (8.48)	0.752*** (8.49)	0.728*** (8.24)	0.767*** (8.62)	0.626*** (7.16)
Performance	-0.090 (-0.19)	-0.069 (-0.15)	-0.143 (-0.27)	-0.048 (-0.10)	-0.215 (-0.36)
Return_assets	0.539 (1.07)	0.526 (1.09)	0.627 (1.14)	0.510 (1.06)	0.654 (1.06)
Firm_age	-0.504*** (-18.74)	0.522*** (-19.21)	-0.505*** (-18.79)	-0.503*** (-18.70)	-0.402*** (-15.53)
Tangibility	-0.373*** (-4.95)	0.411*** (-5.41)	-0.366*** (-4.86)	-0.377*** (-5.01)	-0.295*** (-3.77)
Techinct×Dummy		1.011*** (3.63)			
Techinct×Risk			3.359** (2.09)		
Techinct×Market_com				2.018*** (3.39)	
Techinct×EC					0.215** (2.07)
_cons	10.269*** (-6.43)	9.743*** (-6.04)	10.240*** (-6.39)	10.356*** (-6.46)	12.012*** (-7.60)
year	Yes	Yes	Yes	Yes	Yes
industry	Yes	Yes	Yes	Yes	Yes
adj.R2	0.229	0.231	0.230	0.230	0.242

Note: Sample size is 25883,***, **, *Represents the two-tailed significant statistics at 1%, 5% and 10%, respectively, the numbers in parentheses are standard error, the standard error is adjusted according to the treatment method of heteroscedasticity, and the industry and year effects have been controlled.

Table 4. Influence of equity incentive on enterprise innovation:Inno_inv

	(1)	(2)	(3)	(4)	(5)
	Inno_inv	Inno_inv	Inno_inv	Inno_inv	Inno_inv
Techinct	0.608*** (10.33)	0.587*** (9.74)	0.343*** (3.20)	0.843*** (7.33)	0.434*** (7.48)
Firm_size	3.460*** (7.28)	3.212*** (6.90)	3.452*** (7.24)	3.459*** (7.25)	3.203*** (6.22)
Leverage	-0.084** (-2.24)	-0.110*** (-3.03)	-0.068* (-1.74)	-0.087** (-2.25)	-0.078* (-1.86)
Cash	0.583*** (8.18)	0.582*** (8.20)	0.555*** (7.88)	0.593*** (8.32)	0.458*** (6.53)
Performance	-0.328 (-0.58)	-0.293 (-0.55)	-0.388 (-0.64)	-0.300 (-0.55)	-0.482 (-0.68)
Return_assets	0.678 (1.18)	0.655 (1.21)	0.762 (1.22)	0.658 (1.18)	0.808 (1.12)
Firm_age	-0.310*** (-14.45)	-0.336*** (-15.61)	-0.311*** (-14.53)	-0.309*** (-14.42)	-0.238*** (-11.70)
Tangibility	-0.341*** (-5.69)	-0.405*** (-6.68)	-0.335*** (-5.57)	-0.344*** (-5.74)	-0.262*** (-4.17)
Techinct×Dummy		0.876*** (3.50)			
Techinct×Risk			4.139*** (2.91)		
Techinct×Market_com				1.343*** (2.60)	
Techinct×EC					0.307*** (3.46)
_cons	-12.074*** (-5.82)	-11.636*** (-5.39)	-3.289 (-1.21)	-12.124*** (-5.82)	-11.836*** (-6.42)
year	Yes	Yes	Yes	Yes	Yes
industry	Yes	Yes	Yes	Yes	Yes
adj.R2	0.202	0.203	0.208	0.202	0.209

Note: Sample size is 25883,***, **, *Represents the two-tailed significant statistics at 1%, 5% and 10%, respectively, the numbers in parentheses are standard error, the standard error is adjusted according to the treatment method of heteroscedasticity, and the industry and year effects have been controlled.

4.6. The regulatory effect of salary incentive

Corporate compensation incentives will promote the work enthusiasm of corporate executives and employees, Pay more attention to the development of enterprise innovation, Thus affecting the effect of the equity incentive, In order to verify the impact of compensation incentive on the relationship between equity incentive and enterprise innovation, This paper uses the average of the top three executive compensation to measure corporate compensation incentives, The results are shown in columns (5) of Table 3 and Table 4, On the basis of the fixed effects of the control year and the industry fixed effects, The interaction item of equity incentive and compensation incentive had a significant positive impact on the total number of patent applications by more than 5% ($\beta = 0.215$, $p < 0.05$), The impact on the number of invention patent applications above 1% was significantly positive ($\beta = 0.307$, $p < 0.01$), The results passed the significance test. The above results show that the impact of equity incentive on enterprise innovation will be significantly regulated by the salary incentive. The higher the enterprise salary incentive, the enthusiasm of the incentive objects, and promote senior executives to pay more attention to the development of enterprise innovation, so as to pay attention to the implementation effect of equity incentive and promote the improvement of enterprise innovation performance. Thus hypothesis 5 is verified.

5. Conclusions and Revelation

5.1. Conclusion

This paper takes the perspective of enterprise R & d incentive as the breakthrough point, and empirically tests the positive influence of equity incentive on enterprise innovation. The research found that: (1) equity incentive plays a positive role in promoting enterprise innovation. The implementation of equity incentive is conducive to combining the interests of the stimulated objects with the interests of shareholders, so that they can pay more attention to the long-term development of the enterprise, improve the enthusiasm and initiative of the encouraged objects to innovate, actively carry out innovation activities and technology research and development, and promote the improvement of enterprise innovation performance.(2) The impact of equity incentive on enterprise innovation varies among different enterprises. In state-owned enterprises, equity incentive can fully mobilize the enthusiasm of the incentive object to work, more actively participate in innovation activities, so as to promote the development of innovation.(3) The impact of equity incentive on enterprise innovation is regulated by the intensity of market competition. The greater the intensity of market competition, the more significant the implementation of equity incentive for its innovation ability. The greater the intensity of market competition, the higher the requirements for the innovation ability of enterprises, the stronger the sense

of crisis of enterprises and employees, and the higher the enthusiasm for innovation, which is more conducive to the development of enterprise innovation projects.(4) The risk bearing ability of an enterprise plays a significant positive regulating role between equity incentive and enterprise innovation. The strong risk bearing ability of an enterprise means that employees have more protection in innovation activities and are subject to less conditions. They can fully invest in innovation research and development activities, which plays a significant role in promoting the innovation performance of enterprises.(5) Enterprise salary incentive will significantly and positively affect the promotion effect of equity incentive on enterprise innovation performance. The greater the enterprise salary incentive, the higher the enthusiasm of enterprise personnel will work. In order to achieve a higher salary level, they will work more hard and actively participate in innovation research and development, which is conducive to the improvement of enterprise innovation performance.

5.2. Revelation

First, the implementation of equity incentive measures is conducive to improving the innovation level of the company. When implementing the equity incentive measures, enterprises should pay attention to the characteristics of the incentive object, not only to motivate the senior executives, but also to increase the incentive of technical personnel, and the combination of compensation incentive to enhance the innovation enthusiasm and initiative of the enterprise personnel, so as to improve the innovation level of the enterprise.

Second, the enterprise incentives influenced by different internal and external factors, both external market environment, or the enterprise internal ability, different factors of enterprise innovation incentive measures, lead to the effect of enterprise innovation measures are very different, so the enterprise in the incentives to fully consider the influence of internal and external factors, give full play to the role of the positive factors, ensure the effective implementation of incentive measures.

Third, the development of enterprise innovation without the support of external environment, the government should formulate reasonable incentive policy, create a good institutional environment for the enterprise, actively guide the enterprise innovation behavior, provide resource support for the enterprise innovation activities and policy protection, create a good environment for the enterprise innovation, promote the enterprise innovation achievements, improve the level of enterprise innovation, so as to realize innovation driven development strategy. At the same time, different enterprises have different responses to innovation when they are subject to equity incentive. The government should formulate differentiated innovation incentive measures according to different enterprises to promote the improvement of the innovation level of enterprises.

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