Implement fiscal subsidy to promote enterprises' innovation ability : Evidence from China

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Abstract

Fiscal subsidy is one of the most significant means to promote enterprise innovation in developing countries. It can stimulate the enthusiasm for innovation, but may also crowd out the R&D funds, which is not conducive to the improvement of enterprises' innovation ability. Selecting 4474 industrial enterprises as database which constructs of Chinese industrial enterprises above designated size in 2005-2007, we constructed PSM-DID model, to investigate the effect of the policy of fiscal subsidies. The results show that fiscal subsidy has a significant positive effect on enhancing enterprises innovation performance. In addition, we found that the effect is marginal diminishing. The policy effect is most obvious in high-tech enterprises, followed by non-state-owned enterprises and state-owned enterprises. The influence of current fiscal subsidies on the innovation ability of enterprises is time-varying, and the policy effect will decline with time.

1 Introduction

Technology innovation is one of the most important variables to promote global economic growth today. It can improve countries' economic development level without changing the input of capital and labor. Enterprises are micro subject that cannot be ignored to promote technological progress. More and more enterprises rely on constantly strengthening R&D investment and independent innovation to maximize profits in modern production. The profit-seeking behavior makes the positive externality of innovation come true, and new products

and production processes are widely spread. As the micro carrier of innovation, enterprises do promote economic prosperity and social progress.

As a kind of public goods, the latest research results of enterprises are often imitated by its competitors, which weakens their enthusiasm for research and development and even hinders the economic growth of a country. In order to correct this market failure, most common means of government is to give fiscal subsidies to enterprises. Fiscal subsidy is a way for government to improve the innovation capacity of certain enterprises through financial support of price or income. There are two kinds of fiscal subsidies: direct subsidies and indirect subsidies. Direct way including R&D subsidy, government provide funds directly to enterprises, alleviate the financing pressure of R&D activities. Indirect subsidy includes providing tax breaks such as preferential. This article discusses the direct subsidies form. In 2018, China's R&D expenditure intensity (*the ratio of R&D expenditure to GDP*) reached 2.19%[1], hitting a new high. However, in recent years, the phenomenon of "subsidy fraud" in some enterprises has emerged one after another[1]. The amount of government subsidies is huge, but can subsidies do improve enterprises' innovation? The performance of fiscal subsidies had become a topic discussed by scholars in recent years. Wang Jun[2] worked that our country is in economic and social transformation period, due to information disclosure, the defects of the system construction of 'government failure' phenomenon can't be ignored, the fiscal subsidy is usually companies or government privatization, it is difficult to convert the actual productivity, so whether the government R&D subsidy can improve enterprise innovation has become an important criterion to measure the performance of government subsidies.

As social behavior, innovation activities are affected by various external factors. For example, enterprises under the open market economy system are more likely to realize innovation than those under the closed system[3]. The use of the Differences-in-Differences Model can better solve the exogenous problem, but the selection of the experimental group and the control group may not satisify the common trend hypothesis, so that the estimation results might be biased. Therefore, by adopting the two methods of propensity matching score and double difference, this paper can effectively avoid the influence of non-policy factors on the basis of meeting the common trend hypothesis. In terms of data selection, firstly, since government subsidies have a lag effect on enterprises' innovation output, and different enterprises have different R&D cycles, choosing data with a short time span can avoid the result deviation

[1]Data from the "Statistical Bulletin of National Science and Technology Expenditures in 2018"

caused by hysteresis. Second, the absence of some data in other years and the large number of null values will result in the deviation of the estimated results. Based on the above two reasons, this paper selected the data of 4,474 industrial enterprises from 2005 to 2007 from the database of industrial enterprises above a certain size in China, which can accurately and comprehensively measure the impact of government subsidies on the enterprises's innovation ability, and provide a new perspective for the government to issue financial subsidies and investigate the effect of subsidies.

2 Literature Review

Since Schumpeter's theory[4] of innovation was put forward in the early 20th century, it has been widely discussed and studied by scholars all over the world. Innovation is the internal driving force of economic growth, and external investment has an intervention effect on innovation. Economic growth realized through horizontal innovation and vertical innovation, which is generally accepted in theory of innovation. Later studies by scholars Swan[5] and Solow[6] also show that technological progress and innovation are important forces to promote economic growth. At the end of the 20th century, scholars represented by Romer[7] linked innovation, R&D and economic growth in a general equilibrium framework, and explained how endogenous R&D innovation promoted economic growth. As a public good[8], innovation activity has a strong positive externality. Arrow[9] believes that the lack of innovation will hinder the economic growth of a country. As a means of government intervention in the market, fiscal subsidy policy is widely used by governments of various countries, such as R&D subsidies and tax incentives, in order to improve the innovation capacity of enterprises. However, whether the performance of these subsidy policies is significant or not, and whether government subsidies promote the improvement in enterprises' innovation ability are the core issues debated by various scholars.

The first is about the substitution and complementary effects of public R&D subsidies on private R&D investment. As the direct source of enterprise innovation fund, R&D investment is the driving force of enterprise innovation and the main index to measure enterprise innovation ability. By selecting the cross-section data of 3,338 companies in Lebanon in 1975, Scott[10] took private R&D investment as the explanatory variable and concluded that there was a positive correlation between government R&D investment and private R&D investment.

Leyden[11] and Link et al[12]. selected cross-sectional data of 120 high-tech companies in the United States in 1985 and 137 in 1990, respectively, and compared different experimental data of each company. They also concluded that government R&D investment promoted the growth of private R&D investment. However, some research results suggest that there is a weak correlation between public R&D investment and enterprise innovation investment. Goolsbee[13] found that the innovation of the government investment is usually used to improve scientific research company employee benefits, R&D subsidy by raising wages in private research and development laboratory, making private R&D excluded, at the same time, he thinks that the study did not eliminate the price of some scholars, the overall economic quantitative estimates are likely to overestimate the influence of government R&D input for private R&D. Wallsten & Scott[14] analyzed the data of small businesses funded by SBIR program in the United States and concluded that public funds almost replaced private R&D investment one-to-one. Higgins & Link[15], through analyzing the sample of 174 manufacturing enterprises in the United States in 1978, also believes that as companies get more government R&D subsidies, the R&D input of private enterprises declines. Meanwhile, government R&D subsidies will affect the allocation of R&D expenditures of private enterprises, replacing existing R&D activities and shifting to new research fields.

The second is about the impact of public R&D subsidies on the innovation ability of enterprises. Klette & Moen[16], by analyzing the panel data of Norwegian high-tech companies from 1982 to 1995, believes that government R&D subsidies have permanently improved the R&D level of enterprises. Neary[17] believed that due to the spillover effect of R&D activities, enterprises' investment in R&D would be reduced, and the government's subsidy policy could provide a certain guarantee for enterprises' continuous innovation. Tassey[18] also believed that enterprise innovation activities will face the problems of market failure and investment, and the spillover effect of knowledge and technology will reduce the benefits of enterprise innovation, so the government's R&D investment is conducive to alleviating this externality problem. Yigitcanlar[19] et al. analyzed 188 enterprises in Brazil from 2016 to 2017 through the multivariate probit model, and believed that enterprises using public subsidies have stronger innovation capacity and are more likely to become enterprises with national competitiveness.

In recent years, domestic scholars have also begun to pay attention to the impact of public subsidy policy on enterprises' innovation ability. On the one hand, on R&D subsidies for private R&D input of extrusion and squeezing effect, Zhu Pingfang & Wei MinXu[20] through the random effects model analysis of Shanghai 1993-2000, 32 after the industry believe that

science and technology funded and tax incentives for an enterprise to increase R&D investment has a significant effect, Zhang Bo[21] also believes government subsidies for private R&D spending has a promoting effect. By analyzing the data of Chinese smes, Zhang Jie et al.[22] believed that in the case of imperfect property rights protection system and widespread financial repression, innovation subsidies have a crowding out effect on the R&D investment of enterprises. On the other hand, for public R&D and innovation ability of enterprises to improve problem, Liu Guoqing et al.[23] through the use of CDM model is analyzed after the 813 listed companies from 2010 to 2012, that the performance of the government subsidies for strategic emerging industry is significant, but at the same time, it points out that the fiscal subsidy for individual enterprise itself output performance effect is not big. The results of the dynamic game model between the government and enterprises established by An Tongliang[24] show that, due to information asymmetry, some enterprises that only plan to conduct secondary innovation can release the signal of original innovation to cheat the government subsidy, and the performance of public investment is not significant. Feng Zongxian[25] believed that there was an insignificant negative correlation between government subsidies and innovation efficiency. Zhou Jianghua et al.[26] believe that financial subsidies can reduce the financial risks of enterprises' independent innovation, and government subsidies have a positive impact on enterprises' innovation capacity. Zhang Yongan et al.[27] also proposed that significant subsidies can guarantee the early stage of enterprise innovation, but the efficiency of government subsidies will decline with the continuous development of enterprise innovation. Wang Yihui[28] further pointed out that the payment of subsidies would lead to a decline in the innovation performance of state-owned enterprises. Yang Yang et al.[29] also believed that the promotion of financial subsidies on the innovation ability of private enterprises was greater than that of state-owned enterprises. In addition, for enterprises of different sizes, Zhang Zhenggang[30] et al. found that financial subsidies have a greater impact on small and micro enterprises and start-ups than large enterprises. On the other hand, An Tongliang et al.[31] pointed out that large companies can carry out more sustainable R&D activities compared with small companies, and the R&D investment intensity of small, medium and large companies has an obvious v-shaped structure, which is of certain enlightening significance for the government to choose the object of public investment. Although Chinese scholars have conducted extensive discussions on the performance of financial subsidies, most of their researches on innovation performance take factors such as R&D input and R&D subsidies as the main explanatory variables, and mostly ignore the influence of non-policy factors affecting the

performance of financial subsidies on the research conclusions. It is generally believed that the market economy system will affect the ease of enterprise innovation, innovation activities under the open economy will be easier than closed environment, the political system affects the efficiency of using fiscal subsidies, complex political process will bring high transaction costs, which will reduce the efficiency of government subsidies, the enterprise itself determines the enterprise resource allocation, property right structure of governance structure, which can also affect the efficiency of using government subsidies, but these factors other than policy is often difficult to measure and measurement, which can lead to model missing some important explanatory variables, the final conclusion will have some errors.

This paper tries to use the Differences-in-Differences Model to group the selected enterprises according to whether they are subsidized by the government or not, and observe the changes in their innovation ability before and after the occurrence of the policy, which can better solve the policy externality problem. At the same time, it analyzes the impact of innovation incentive policies on enterprises' innovation ability from an empirical perspective, and examines the relationship between financial subsidies and enterprises' innovation ability, whether this relationship promotes the improvement of enterprises' innovation ability, and the influence of ownership, industry and other factors on the effect of subsidy policies.

3 Theoretical Framework and Research Hypothesis

3.1 Direct impact of financial subsidies on enterprise innovation performance

Through the analysis of previous literature, most of the research conclusions, both at home and abroad, show that government subsidies can positively promote the innovation activities of enterprises[32, 33] and promote the improvement of enterprise innovation performance. These research conclusions also to some extent promote the government to increase the intensity of technology subsidies to enterprises, which is also the premise conclusion of further research on the role of financial subsidies in enterprise innovation activities. Therefore, this paper proposes:

Hypothesis 1: financial subsidies can promote the improvement of enterprises' innovation ability.

For government subsidies and the relationship between the enterprise innovation performance, there are three points to note: (1) the government subsidies to the enterprise to provide technology is mainly divided into two kinds: one kind is direct subsidies, namely through fiscal budget in the form of direct funding to the enterprise, change enterprise innovation activities face financing constraints, the other is indirect subsidies, through tax incentives, government procurement policy support funded enterprises. The fiscal subsidy studied in this paper is based on the government's direct subsidy to enterprises. (2) in this paper, the innovation process is regarded as non-inheritable. The probability of an enterprise to realize innovation is only related to the current fiscal subsidy and R&D investment level, and has nothing to do with the past R&D experience. In other words, the R&D activities in this period are not affected by the R&D activities in the last period. At the same time, it is assumed that the current fiscal subsidy has nothing to do with the R&D investment of enterprises.(3) in this paper, the realization of enterprise innovation is regarded as a process from the beginning of enterprise R&D to the disappearance of enterprise innovation dividend, rather than the process from the beginning of R&D to the end of output patent. For the study of financial subsidies to the enterprise innovation performance of dynamic effect, we will be in the market enterprises are classified into: leading enterprises (*take the lead in innovation*), to follow (*follow leading enterprises to innovate*) and other enterprises (*not follow leading enterprise innovation*), leading the innovation of the enterprise and to follow in unit time represented as a probability function

$$I_{leader} = \ln\left(AS_{leader}^{\alpha}R_{leader}^{1-\alpha}\right) = \ln A + \alpha \ln S_{leader} + (1-\alpha)\ln R_{leader} \tag{3.1}$$

$$I_{follow} = \ln\left(AS_{follow}^{\alpha}R_{follow}^{1-\alpha}\right) = \ln A + \alpha \ln S_{follow} + (1-\alpha)\ln R_{follow} \tag{3.2}$$

Where, I_{leader} and I_{follow} represents the probability of leading and following an enterprise to achieve an innovation in unit time, S_{leader} and S_{follow} represents the fiscal subsidy the enterprise receives, R_{leader} and R_{follow} represents the enterprise's own R&D investment, A are greater than the parameters. And you can see that for both I_{leader} and I_{follow}

$$\frac{\partial I_*}{\partial S_*} = -\frac{a}{S_*^2} < 0 \tag{3.3}$$

In other words, the effect of financial subsidies on the promotion of enterprise innovation probability is marginal and decreasing. The more financial subsidies an enterprise receives, the weaker the promotion effect of one new unit of financial subsidies on innovation performance will be. According to Zhang Yuan's[34] analysis on the correlation between the subsidies

received by enterprises and the characteristics of enterprises, enterprises with different ownership, experience and regions will receive different amounts of financial subsidies. Therefore, according to the corollary of formula (3.3), this paper believes that the differences in ownership, experience and geographical location of enterprises will affect the policy effect of financial subsidies on enterprise innovation performance.

In real economic activities, when considering the ownership differences, the characteristics of enterprises with different ownership should be taken into account. Compared with non-state owned enterprises, the operating efficiency of state owned enterprises is lower, and there are many problems in the internal management system. As an internal activity of an enterprise, R&D activities are inevitably influenced by many factors such as the operation of the enterprise, internal system and management. Wang Yebin[35] found in his research that government investment can significantly promote the innovation activities of high-tech industry, but the impact of government investment on technological innovation is different due to the ownership structure of the industry. The higher the proportion of state-owned economy, the less the impact of government investment on technological innovation. In addition, as a country with an emerging economic system in transition, the construction of the relevant system is not perfect, and the government still holds the right to allocate important resources. Therefore, rent-seeking activities are easy to take place, while state-owned enterprises are more closely connected with the government, more likely to engage in rent-seeking activities and obtain more financial subsidies. According to formula (3.3), the policy effect of fiscal subsidies in state-owned enterprises is weaker than that of non-state-owned enterprises.

When considering industry difference, due to the high-tech industry cycle short, innovative features such as frequent activity, compared to the high-tech industry, high-tech industry enterprises in obtaining fiscal subsidies will be more "potential competitors" face, a single enterprise can get subsidies amount less, according to the law of diminishing marginal in type (3.3), the fiscal subsidy in the high-tech industry policy can play a stronger effect. In addition, compared with non-high-tech industries, in high-tech industries where innovation activities are more frequent, capital, as an important guarantee for research and development, has a higher degree of resource scarcity. Therefore, unit financial subsidies can play a more effective role in promoting enterprises' innovation. Thus, this paper proposes:

Hypothesis 1a: in non-state-owned enterprises, financial subsidies play a stronger role in promoting innovation performance.

Hypothesis 1b: in the high-tech industry, financial subsidies play a stronger role in promot-

ing the innovation performance of enterprises.

3.2 The dynamic impact of financial subsidies on enterprise innovation performance

Suppose that the output function of the initial leading enterprise and the following enterprise is

$$Y = F(I_{newprod}, G_{main}) \tag{3.4}$$

Where $I_{newprod}$ is the enterprise's innovation output income, G_{main} is the enterprise's non-innovation output income. It is assumed that the marginal cost of leading enterprises is equal to 1 before the technology diffusion, and the marginal cost of following enterprises to purchase patents from leading enterprises for production is set as MC_1, which is also in line with the facts of industrial evolution. After the diffusion of technology, the secondary innovation of the follower can reduce the patent transfer cost of the leading enterprise, so the marginal cost of following the enterprise falls to MC_2, but still exists

$$1 < MC_2 < MC_1 \tag{3.5}$$

Therefore, enterprise innovation can be roughly divided into two stages according to the degree of technology diffusion. In the first stage, the leading enterprise takes the lead in innovation, while the degree of technology diffusion cannot make the following enterprises imitate. The leading enterprise has the absolute pricing power of the market, while the following enterprise cannot obtain excess profits. The leading enterprise can fix the market price as MC_1 and its profit R_{leader} is

$$R_{leader} = (MC_1 - 1)\frac{aC}{MC_1} \tag{3.6}$$

a is the market share of leading enterprise, and $0 < a < 1$, c is consumer spending, leading enterprise will set market price as MC_1, the reason is that the market expansion hysteresis factors such as cost, consumer cognition, leading enterprises may not fully occupy the market, rather than spend a lot of fixed cost unknown markets, leading enterprises will choose to collect royalties model (*similar to the franchise store*). The reason why the following enterprises will accept this pricing is that the patent right of the leading enterprises is not indefinite. After purchasing the patent right of the leading enterprises, the following enterprises can conduct secondary innovation through imitation.

In the second stage, technology diffusion has reached a point where the marginal cost will be 1 through imitation and secondary innovation. To simplify the analysis, assume that 50% of consumers in the market prefer to lead the original products of the enterprise, and 50% of consumers prefer to follow the secondary innovative products of the enterprise[2]. Therefore, leading enterprises and following enterprises can take advantage of this market characteristic to realize oligopoly. On the premise of the same market share, the optimal pricing is MC_2, and the profit level R of both is

$$R = (MC_2 - 1)\frac{aC}{2MC_2} \tag{3.7}$$

Based on the above analysis, Based on the above analysis, this paper uses r to represent a constant interest rate level, $t1$ represents the length of time between the leading company's first innovation and the completion of the follow-up company's second innovation (*the first stage*), $t2$ represents the following The length of time that the leading enterprise jointly controls the market (*the second stage*), the innovation value V_{leader} of the leading enterprise in the first stage is

$$V_1 = \int_0^{t1} e^{-rt} I_{follow} R_{follow} dt = \frac{I_{follow} R_{follow}}{r}(1 - e^{-rt_1}) \tag{3.8}$$

The meaning of formula (3.8) is the expected discount of the profits obtained by the leading enterprise at the initial stage of technology diffusion.

In the second stage, the innovation value of leading enterprise is

$$V_2 = V_{follow} = \int_{t1}^{t2} e^{-rt} I_{leader} R_{leader} dt = \frac{I_{leader} R_{leader}}{r}(e^{-rt_1} - e^{-rt_2}) \tag{3.9}$$

Comparing equations (3.8) and (3.9), we can find that for leading companies, $V1 > V2$, that is, in different stages of research and development, their innovation value is also different. In the first stage, the leading enterprise controls the market price by taking the lead in innovative research and development, and profits by selling the right to use the patent. In the second stage, with the completion of imitation and secondary innovation of the following enterprises, the leading enterprises no longer have the absolute advantage of market pricing, but choose to conspire with the following enterprises to form an oligopoly. At this stage, the innovation

[2]There are many reasons for the difference in consumer preferences. For example, some consumers have high brand loyalty to leading companies, they are dependent on the products of old brands, and are unwilling to try to follow the second innovative products of the company. There are also some consumers who are more cautious and unwilling to try new products rashly, and will not buy until they fully understand the characteristics of the products, that is, these consumers tend to buy second-innovative products.

dividends of the leading enterprises gradually disappear. In the third stage, that is, the stage of complete technology diffusion, neither the leading enterprises nor the following enterprises have pricing advantages, and the innovation dividends completely disappear in this stage. For the government, in different stages of financial subsidies to enterprises, the subsidy effect will be different.

In the actual R&D activities of enterprises, the initial stage of R&D may be slow due to lack of funds. At this time, the government grants fiscal subsidies to enterprises, which can effectively promote the R&D process of enterprises. Therefore, the effect of financial subsidies on the improvement of enterprise innovation performance is more effective and obvious. However, with the deepening of enterprise R&D, the market dividends brought by the R&D activities have been fully demonstrated. Therefore, the impact of fiscal subsidies on enterprise innovation performance will be weakened at this time, and the dynamic effect of policies will be on the decline. In addition, the dynamic diminishing marginal effect of policy effect also exists in similar public policy researches. Wang Laifu et al.[36] studied the dynamic impact of monetary policy on housing prices and found that interest rate changes had a strong impact on real estate prices in the short term, but in the long term, the effect of such policy would gradually weaken and eventually return to the origin. Therefore, this paper proposes:

Hypothesis 2: the influence of current fiscal subsidies on enterprise innovation performance will be weakened with the passage of time.

4 Model Construction and Index Selection

4.1 Model Building

In fiscal subsidies eventually converted into enterprise innovation in the process of productivity, economic system, enterprise experience and corporate ownership and other external factors will affect the government subsidy policy effect, for eliminating the influence of the policy factors, this paper adopts double difference model, constructed by government subsidies "group" and other "control" by government subsidies, not by controlling other factors, subsidies than before and the difference between the group and the control group, to examine the effects of government subsidies. The specific setting and derivation of the measurement model in this paper are as follows:

$$Y_{it} = \beta_0 + \delta_1 treated_{it} + \delta_2 time_{it} + \delta_3 did_{it} + \chi'_{it}\lambda_1 + \varepsilon_{it} \tag{4.1}$$

i represents different enterprises. t represents different periods, and Y_{it} is measured by the ratio between the output value of innovative products and the total output value of enterprises. The variable "subsidy group ($treated_{it}$)" reflects whether the enterprise concerned is subsidized by the government. $treated_{it}$=1 represents the enterprise that is subsidized by the government, while $treated_{it}$=0 represents the enterprise that is not subsidized by the government. The variable "subsidy time ($time_{it}$)" reflects the process of subsidy. $time_{it}$=1 indicates that the enterprise has been subsidized; otherwise, $time_{it}$=0. To examine the effects of government subsidies, set the interaction "government subsidy policy (did_{it})", which is "subsidies group ($treated_{it}$)" and "subsidies time ($time_{it}$)" cross terms. to measure the impact of government subsidies on the innovation capability of the enterprise, when "subsidy group" and "subsidy time" take 1 at the same time, did_{it}=1, otherwise, did_{it}=0. In this way, the sample was divided into four groups: the subsidy group before subsidy ($treated_{it}$=1, $time_{it}$=0), the subsidy group after subsidy ($treated_{it}$=1, $time_{it}$=1), the control group before subsidy ($treated_{it}$=0, $time_{it}$=0), and the control group after subsidy ($treated_{it}$=0, $time_{it}$=1).

Thus, the DID model (4.2) is obtained:

$$Y_{it} = \beta_0 + \delta_1 treated_{it} + \delta_2 time_{it} + \delta_3 did_{it} + \beta_1 \chi'_{it} + \varepsilon_{it} \tag{4.2}$$

Among them, δ_1 controls the difference between the subsidy group and the control group, and δ_2 controls the impact of time on the direct management group and the control group are the coefficients reflecting the reform effect. For the control group, namely, $treated_{it}$=0, it can be obtained from the DID model (4.2). The innovation ability of the control group before and after the government subsidy is denoted as

$$Y_{it} = \begin{cases} \beta_0, & \text{when } treated = 0 (\text{before subsidy}) \\ \beta_0 + \delta_2, & \text{when } treated = 1 (\text{after subsidy}) \end{cases} \tag{4.3}$$

Therefore, during the period before and after the subsidy, the innovation capacity of the control group changed to $delta_2$. For the subsidy group, that is, $treated_{it}$=1, which can be obtained from the DID model (4.2). The changes in the innovation capacity before and after the government subsidy are recorded as

$$Y_{it} = \begin{cases} \beta_0 + \delta_1, & treated = 0 \\ \beta_0 + \delta_1 + \delta_2 + \delta_3, & treated = 1 \end{cases} \tag{4.4}$$

Therefore, during the period before and after the subsidy, the change in the innovation capacity of the subsidy group is $\delta_2 + \delta_3$, and the net effect of the subsidy is $\delta_2 + \delta_3 - \delta_2 = \delta_3$,

that is, the coefficient δ_3 of the interaction term did_{it}.If the fiscal subsidy has a positive effect on the change of enterprise's innovation ability, then the symbol δ_3 should be significantly positive, otherwise δ_3 is negative.

4.2 Index Selection

In terms of index selection of the model, The set of control variables (χ'_{it}) mainly includes the logarithm value of the proportion of the enterprise's R&D investment ($ln\_ratio\_RD_{it}$), which is defined as the logarithm value of the ratio of the enterprise's R&D investment to the total revenue of the enterprise, and controls the influence of the enterprise's R&D investment on the innovation activities. The ratio of high-tech talents in enterprises ($ln\_ratio\_tech_{it}$) is defined as the relative value of the ratio of the number of employees at or above the undergraduate level to the total number of employees in the company to control the influence of high-tech talents on innovation activities. Enterprise experience (ln_age_{it}), defined as the reference value of the effective establishment time of the enterprise in the sample period, controls the influence of the development stage of the enterprise on the innovation activities; Enterprise scale ($ln\_revenue_{it}$) is defined as the value of the annual revenue of the enterprise, and the influence of the characteristics of enterprise scale on innovation performance is controlled. Enterprise ownership ($holding_{it}$) is divided according to the holding status of different enterprises in the database of industrial enterprises above a certain scale of China's national bureau of statistics. The enterprises are divided into state ownership enterprises ($holding_{it}$=1) and non-state ownership enterprises ($holding_{it}$=0) to control the difference in innovation activities brought by enterprise ownership. For the industry ($industry_{it}$) in which the enterprise is located, the first two industry codes in the database of Chinese industrial enterprises are extracted, and the enterprises are divided into scientific and technological enterprises ($industry_{it}$=1) and non-scientific enterprises ($industry_{it}$=0), so as to control the differences in innovation activities caused by different industries. The region ($location_{it}$) of the enterprise and the regional opening index ($open\_index_{it}$) are obtained by combining the regional code in the database of Chinese industrial enterprises with the data in the study of China's regional opening index. Generally speaking, the amount of investment in R&D ($ln\_ratio\_RD_{it}$) is an important factor affecting the innovation ability of an enterprise. The more funds invested in R&D in the enterprise's operating income, the higher the output value of the enterprise's new products will be, and the more the enterprise managers attach importance to enterprise innovation. Senior

technical personnel ($ln\_ratio\_tech_{it}$) is the power source of enterprise innovation, the number of senior talents to a certain extent determines the level of enterprise innovation ability. Enterprise experience (ln_age_{it}) can measure an enterprise's familiarity with the market. The more experienced an enterprise is, the more it can grasp the market trend and make better use of fiscal subsidies. For enterprises of different ownership ($holding_{it}$), previous studies[37] have found that ownership differences have a significant impact on the innovation ability of enterprises. For enterprises in different industries ($industry_{it}$), due to the differences in technological innovation capabilities and development stages, there are bound to be significant differences in innovation activities, leading to significant differences in the degree of difficulty and output of innovation among enterprises in different industries. The degree of regional openness ($open\_index_{it}$) measures the regional differences from economic, political and cultural aspects, which has an important impact on the innovation output of enterprises.

The data selected by the empirical research institute in this paper are all from the panel data of enterprises above a certain size from 2005 to 2007 in the database of Chinese industrial enterprises. The sample interval selection for 2005-2007, on the one hand is due to the rest of the year development index data is lack, on the other hand, the influence of the government financial subsidies to the enterprise innovation ability tend to have stronger lag effect, and complete an innovative projects often need to put in a long time, so as to avoid lag effect caused by the result of the model errors, more effective to study the performance of fiscal subsidies, this paper chose the sample interval in 2005-2007.All the original data included 4,474 enterprises above designated size, with a total of 13,422 observation values. After eliminating the sample data of leverage value, specific value and core variable with missing value or negative value in the original data, the balanced panel data is sorted out for empirical analysis. In this paper, the measurement software stata15.0 was used for data processing, and the statistical characteristics of relevant variables are described in table 4.1.

Table 4.1: Statistical description of variables

Variable name	Variable meaning	Mean	Sd	Min	Max
ln_ratio_new	Log value of new product specific gravity	-1.5903	1.5256	-12.1315	7.1452
ln_ratio_subs	Subsidy ratio log value	-5.7812	2.0514	-14.5750	0.2328
ln_Lratio_subs	The subsidy proportion to the value of a lag	-5.7870	2.0743	-14.5750	-0.6570
ln_L2ratio_subs	The second phase lag of subsidy ratio log	-5.7881	2.0851	-14.5750	-1.3429
ln_ratio_RD	Log value of R&D investment	-5.3180	1.9627	-13.0188	-0.9768
ln_open_index	Log value of region open index	3.3726	0.6801	1.2238	4.4391
ln_ratio_tech	The logarithm of the proportion of high-tech personnel	-3.1158	1.2569	-7.3945	0.7397
ln_revenue	Enterprise revenue log value	10.8968	1.3851	1.3863	19.7812
ln_age	Enterprise age log	1.9983	0.8061	0	4.2905
holding	The holding of the enterprise	4.6397	2.8659	1	9
industry	The industry code of the enterprise	2935.0640	928.9262	610	4620
location	The area code for the enterprise	3477449.8	100823	110000	650000

5 Regression Results and Analysis

5.1 Preliminary test of the impact of government subsidies on the innovation capacity

5.1.1 Full sample regression results

As a government policy to stimulate enterprises to innovate, fiscal subsidy policy is highly targeted and not a natural experiment. Therefore, this paper first uses OLS method to estimate the impact of fiscal subsidies on enterprise innovation output. The regression results are shown in table 5.1.

In table 5.1, columns (1), (2) and (3) are estimated results without other control variables,

Table 5.1: Full sample regression results

Explained variable	*ln_ratio_new*				
Explanatory variables	(1)	(2)	(3)	(4)	(5)
ln_ratio_subs	0.0139*	0.0411***	0.0332**	0.0370**	0.0305***
	(2.15)	(3.33)	(2.42)	(2.42)	(2.84)
ln_Lratio_subs		0.0104	0.0102*	0.0346	0.0021
		(0.86)	(2.12)	(1.33)	(1.45)
ln_L2ratio_subs			−0.0362*	−0.0410*	
			(-2.02)	(-2.07)	
ln_ratio_RD				0.1324***	0.1004***
				(7.14)	(8.95)
ln_age				−0.7219*	−0.0434
				(-1.73)	(-1.55)
ln_ratio_tech				0.0474*	0.0715***
				(2.22)	(3.44)
ln_revenue				0.0306	0.0066
				(1.48)	(1.39)
ln_open_index				0.1961***	0.1375***
				(2.22)	(3.45)
_cons	−1.4673***	−1.3590***	−1.2517***	−1.2739***	−1.0227***
N	13422	5767	2735	2311	2311
R^2	0.0003	0.0020	0.0046	0.0726	0.0713

Notes: (1) All tests in this paper are performed under the software Stata15.0; (2) *ln_Lratio_subs* and *ln_L2ratio_subs* are the estimated values of *ln_ratio_subs* with a lag of 1 and 2 years respectively; (3)T value in brackets; (4) "***, **, *" means that the coefficient is significant at the level of 1%, 5% and 10%, respectively.

while columns (4) are estimated results with other control variables. It can be found that no matter whether the control variable is added or not, the effect of fiscal subsidies on enterprise innovation output is significantly positive at least at the level of 10%, indicating that fiscal

subsidies can effectively stimulate enterprise innovation, supporting hypothesis 1. At the same time, this paper in order to determine the efficiency of the fiscal subsidy policy and gradually add subsidies lags in the equation, the results show that the fiscal subsidy policy can in the implementation of the first and second years to promote enterprise innovation, but the effect is weakened gradually, with the passage of time in the third year of policy implementation, fiscal subsidy policy effect disappears, the preliminary support hypothesis 2. After adding other control variables, the results show that government subsidies can significantly promote the growth of enterprise innovation output. The regression results of the control variables show that in addition to the age of enterprises, R&D investment, scientific and technological talents, enterprise scale and regional openness can all promote the growth of enterprises' innovation output, but the promotion effect of enterprise scale on innovation output is not significant. In order to obtain more robust regression results, this paper, after Hausman test, chooses to establish a fixed effect model for further regression of the panel. The regression results are shown in column (5). Since the policy effect of subsidies only exists for two years, the amount after the second period of subsidies is not included in the fixed-effect model. In the regression results of the fixed-effect model, the effect of fiscal subsidies on enterprise innovation performance is still significantly positive, and the regression results of the control variables are almost consistent with those in column (4). Only the influence of enterprise age on enterprise innovation output is negative and not significant.

5.1.2 Grouped regression results

In order to further analyze the influence of government subsidies on enterprises' innovation ability under different conditions, verify hypothesis 1a and 1b, and select matching indexes by using the propensity score matching method, this paper further conducts grouped regression analysis of samples and groups them according to the ownership of enterprises and the industries they are in.

According to the enterprise ownership, according to the index of holding status in the database of Chinese industrial enterprises, the state-owned holding enterprises are divided into a group of state-owned ownership, and other types of enterprises are divided into a group of non-state-owned ownership. According to the industry, the industry codes of enterprises in China industrial database are matched with those of high-tech enterprises in industry classification of national economy, and they are divided into two groups: high-tech industry and

other industries. In order to analyze the influence of fiscal subsidies on enterprises' innovation activities in the presence of these two differences, the samples were grouped by ownership and industry. Regression analysis was carried out on the two groups respectively, and the regression results of core variables were finally obtained after testing and adjustment, which were summarized in table 5.2.

As can be seen from table 5.2, the coefficient of government subsidies is negative in the state-owned group and positive in the non-state-owned group when the ownership group is returned. This shows that government subsidies are inversely related to innovation output in both state and non-state owned enterprises, supporting hypothesis 1a. This may be due to the fact that compared with non-state owned enterprises, state-owned enterprises can get government subsidies more easily and in a relatively larger amount. The crowding out effect[38] makes state-owned enterprises reduce their R&D investment, which actually increases the income of state-owned enterprises, thus reducing their innovation motivation and innovation output. State-owned enterprises' own management and system problems may also lead to inefficient use of government subsidies, which cannot be fully invested in the innovation link. Compared with state-owned enterprises, non-state owned enterprises are often not easy to get government subsidies, and the amount of subsidies they get is relatively small. Driven by external factors such as market competition, their innovation drive and innovation performance are stronger than those of state-owned enterprises.

The coefficient symbols of the two groups are basically the same when they are grouped according to the industry in which the enterprise is located. The difference is that the coefficient of high-tech industry group is significantly higher than that of other industry groups, and it is significant at the 1% level. This shows that the incentive effect of fiscal subsidy on innovation performance of high-tech enterprises is stronger than that of other enterprises. In addition to the law of diminishing margins in equation (3.3), this article believes that the proportion of R&D investment (ln_ratio_RD) and the proportion of high-tech talents (ln_ratio_tech) have a significant role in promoting the innovation ability of enterprises, and high-tech companies are often higher than those in other industries in the two key indicators of R&D investment ratio and high-tech talent ratio. It makes its independent innovation ability stronger, the innovation cycle shorter, and the innovation output is easier to observe. Therefore, the fiscal subsidy promotes the innovation output of high-tech enterprises than other industries.

The values of R^2 in the above regressions are all small, indicating that in addition to the control variables added in this article, there are still other factors that affect the innovation

Table 5.2: Group regression results

Explained variable	*ln_ratio_new*			
Explanatory variables	state-owned	non-state	High-tech industry	Other industries
ln_ratio_subs	−0.0375*	0.0246*	0.0846***	0.0569*
	(-2.27)	(2.45)	(3.66)	(2.11)
ln_ratio_RD	0.1414***	0.1440***	0.1377***	0.1463***
	(7.76)	(13.76)	(9.90)	(12.91)
ln_age	-0.0327	-0.0199	−0.1212***	-0.0063
	(-1.03)	(-0.083)	(-4.71)	(2.24)
ln_open_index	0.0416	0.2103***	0.1364***	0.2195***
	(2.11)	(6.56)	(4.23)	(6.21)
ln_revenue	-0.0290	0.0288*	-0.0152	0.0207
	(-1.43)	(2.22)	(-1.08)	(1.27)
ln_ratio_tech	0.2050***	0.0638***	0.0713***	0.0318***
	(6.07)	(4.39)	(3.45)	(4.64)
_cons	−0.7355***	−1.3163***	−0.9333***	−0.8928***
	(-4.08)	(-6.86)	(-4.21)	(-3.93)
N	6908	4041	4203	5746
R^2	0.0725	0.0598	0.0559	0.0697

Notes: (1) T value in brackets; (2) "***, **, *" means that the coefficient is significant at the level of 1%, 5% and 10%, respectively.

output of enterprises. In this paper, the data is grouped and statistics, and the results show that only 27% of enterprises have received fiscal subsidies. As a policy to encourage enterprises to innovate independently, fiscal subsidies are not random in the selection of policy objects. It is a "quasi-natural experiment", the individual differences of enterprises have a significant impact on whether they can obtain government subsidies. Therefore, in order to avoid the difference in characteristics between enterprises and reduce the error of DID estimation, this article first chooses the propensity score matching method to control the individual characteristics of the enterprise from multiple matching indicators such as enterprise R&D investment

(ln_ratio_RD), age (ln_age), and high-tech talent (ln_ratio_tech). control. Through PSM processing, this paper selects companies with similar characteristics but not government subsidies for each company that has received fiscal subsidies. This article regards the former as the experimental group and the latter as the control group. By comparing the differences in innovation output between the experimental group and the control group after pairing, the effect of government subsidies can be judged. However, the comparison should also take into account that all companies have changed during the policy period due to other external factors (such as the macroeconomic situation), and these factors need to be eliminated during the comparison. Therefore, this paper chooses the double difference model to deal with the influence of external factors on the experimental results, which can better avoid the endogenous problem of fiscal subsidy policy, and eliminate the interference of other factors to effectively estimate the impact of fiscal subsidies on the innovation ability of enterprises. Since it is difficult to obtain enterprise data in the initial year of the implementation of the government subsidy policy, when using the double difference method, this article selects the enterprises whose subsidy income in 2005 was 0 but the subsidy income in 2006 and 2007 were not 0. The year is regarded as 2006 and is estimated by nearest neighbor matching.

5.2 Propensity score matching processing

In this paper, the experimental group of PSM was 779 enterprises that began to receive financial subsidies in 2006, and the control group was 3675 enterprises that did not receive government subsidies from 2005 to 2007. Probit model was used to estimate propensity score, Kernel Matching was used to estimate, and "Common Support" conditions were imposed. The reliability of PSM depends on whether the "conditional independence condition" is met, that is, there is no significant difference between the experimental group and the control group in the observable variables (before receiving government subsidies) after the matching requirement. If there is a significant difference between the two, it means that the selection of observable variables or the selection of matching methods is not appropriate, and the kernel matching estimation is invalid. Therefore, the matching balance test was carried out in this paper, and the results are shown in table 5.3. After compared with before the match, the matching of the experimental group and control group in the proportion of new products to the numerical proportion, research and development to the open, enterprise age on values, regional index of numerical value, high technology talent proportion to the value, enterprise

Table 5.3: Matching balance test results of enterprises

Observable variable	Status	Mean		SD	Standard deviation reduction(%)
		The experimental group	The control group		
ln_ratio_new	Before match	-4.7919	-4.9932	10.4	94.9
	After match	-4.8014	-4.8116	0.5	
ln_ratio_RD	Before match	-1.4237	-1.5053	5.6	93.2
	After match	-1.4338	-1.4282	-0.4	
ln_age	Before match	2.2435	2.1399	11.3	92.2
	After match	2.2373	2.2454	-0.9	
ln_ratio_tech	Before match	3.4026	3.3252	11.7	97.5
	After match	3.3980	3.4000	-0.3	
$ln\_revenue$	Before match	-2.5775	-2.4312	-11.6	93.2
	After match	-2.5486	-2.5094	-3.1	
ln_open_index	Before match	11.8261	11.6091	14.6	93.5
	After match	11.8060	11.7493	3.9	

Notes: (1) All tests in this paper are performed under the software Stata15.0; (2) ln_Lratio_subs and $ln\_L2ratio\_subs$ are the estimated values of ln_ratio_subs with a lag of 1 and 2 years respectively; (3)T value in brackets; (4) "***, **, *" means that the coefficient is significant at the level of 1%, 5% and 10%, respectively.

scale to the numerical aspects of difference, a big drop in every match variable the absolute value of standard deviation were significantly less than 10 [3]. Therefore, it can be considered that the observable variables selected in this paper are suitable and the matching method is appropriate, and the kernel matching estimation is reliable. At this point, the experimental group and the control group had basically the same characteristics in 2005, and the probability of receiving financial subsidies in 2006 was similar, so they could be compared with each other.

[3]Rosenbaum and Donald[39] pointed out that when the absolute value of the standard deviation of the matching variable is greater than 20, the matching effect is considered bad.

5.3 Double difference test

5.3.1 average treatment effect

On the basis of PSM processing, this paper conducts DID test on equation (4.1). The panel dual difference model is estimated by using the fixed effect method, that is, the time changing factors of variables are eliminated by first-order difference. Since the policy dummy variable (*treated*) has time invariance, *treated* will be automatically deleted when the fixed effect analysis of DID is done, but this does not affect the validity of the estimated results. Table 5.4 lists the DID test results of equation (4.1), in which column (1) is the estimated result without other control variables, and column (2) is the result with other control variables. It is not difficult to see that no matter whether other control variables are added or not, the coefficient of the interaction term *did* is significantly positive, which indicates that government subsidies have an obvious promoting effect on the innovation ability of enterprises.

5.3.2 Dynamic marginal effect

In order to further test the marginal impact of fiscal subsidies on the innovation ability of enterprises, a time dummy variable is added to equation (4.1) in this paper, as shown in equation (5.1):

$$\begin{aligned} Y_{it} =& \alpha_0 + \alpha_1 treated_{it} + \alpha_2 time2006_{it} + \alpha_3 time2007_{it} + \alpha_4 treated_{it} \times time2006_{it} \\ &+ \alpha_5 treated_{it} \times time2007_{it} + \beta \chi'_{it} + \varepsilon_{it} \end{aligned} \tag{5.1}$$

Where, $time_{it}2006$ and $time_{it}2007$ correspond to the time dummy variables of 2006 and 2007 respectively. It can be seen that in 2006, the innovation ability of the experimental group ($treated = 1$) and the control group ($treated = 0$) was $\alpha_0 + \alpha_1 + \alpha_2 + \alpha_4$ and $\alpha_0 + \alpha_2$, respectively. Therefore, the innovation ability difference between the experimental group and the control group in 2006 was $\alpha_1 + \alpha_4$. Similarly, the difference in innovation ability between the experimental group and the control group in 2007 was $\alpha_1 + \alpha_5$. Obviously, all three have a common coefficient α_1. Therefore, when investigating the dynamic marginal effect of financial subsidies on the innovation capacity of enterprises, this paper is concerned the coefficient sum α_4 and α_5 of the interaction terms $treated_{it} \times time2006_{it}$ and $treated_{it} \times time2007_{it}$.

Table 5.5 shows the regression results of equation (5.2). Before adding control variables, the coefficients of $treated_{it} \times time2006_{it}$ and $treated_{it} \times time2007_{it}$ were all significantly positive, indicating that the innovation ability of enterprises increased significantly after the implemen-

Table 5.4: The average treatment effect of financial subsidies on the innovation ability of enterprises

Variables	The logarithm of the output value of new products(ln_ratio_new)	
	(1)	(2)
did	0.0587**	0.1321**
	(2.33)	(2.04)
$time$	0.0319	0.0622
	(1.54)	(1.70)
$ln\_ratio\_RD_{it}$	0.0587**	0.1321**
	(2.33)	(2.04)
ln_age		-0.0761
		(-1.22)
$ln\_revenue$		0.0200
		(1.53)
ln_ratio_tech		0.1315***
		(2.94)
$\_cons$	-1.7538***	-1.0571**
	(-7.05)	(-2.48)
N	6133	3767

Notes: (1)T value in brackets; (2) "***, **, *" means that the coefficient is significant at the level of 1%, 5% and 10%, respectively.

tation of the government subsidy policy, and its marginal effect showed a decreasing trend. After adding control variables, the coefficient of $treated_{it} \times time2006_{it}$ and $treated_{it} \times time2007_{it}$ is still significantly positive, and the marginal effect also shows a decreasing trend. The coefficient of each control variable is significant, which is almost consistent with the previous estimated results. At the same time, the results in table 5.5 are consistent with the estimation of the timeliness of subsidy policies in table 5.1. In the first year, the subsidy has the strongest effect on the innovation output of enterprises, and shows a decreasing trend over time.

6 Conclusions and Suggestions

6.1 Research conclusions

This paper uses the PSM-DID model and the panel data of 4,744 industrial enterprises in China from 2005 to 2007 to analyze the changes in the innovation capabilities of enterprises before and after the financial subsidy event. The results show that:

First, with regard to the debate on whether fiscal subsidies are effective, empirical results show that government subsidies have a significant positive effect on enterprise innovation performance. This shows that the government subsidy policy has a significant supporting role in independent innovation of enterprises, can help enterprises to get rid of certain resource constraints, reduce the risk of independent innovation of enterprises, and improve innovation performance. At the same time, the estimation results show that the impact of government subsidies on the innovation capability of enterprises is time-sensitive, and its incentive effect is strongest in the first year of policy effect, and decreases with time, and the policy effect of subsidies disappears in the third year.

Second, according to the law of diminishing margins, there are significant differences in the policy effects of fiscal subsidies for enterprises of different ownership and industries. The empirical results show that the incentive effect of fiscal subsidies on non-state-owned enterprises is stronger than that of state-owned enterprises, and the incentive effect on enterprises in high-tech industries is stronger than that in other industries.

Third, with regard to other factors affecting enterprise innovation performance, the estimated results of control variables show that the proportion of enterprise R&D investment, the proportion of high-tech talents, and the degree of openness in the region have a positive relationship with enterprise innovation performance, while enterprise age has a positive relationship with innovation performance. Negative relationship.

Table 5.5: Dynamic marginal effect of fiscal subsidy on innovation ability of enterprises

Variables	The logarithm of the output value of new products(ln_ratio_new)	
	(1)	(2)
$time2006_{it}$	0.0259	0.0878***
	(1.42)	(2.99)
$time2007_{it}$	0.1108***	0.0416
	(5.92)	(1.35)
$treated_{it} \times time2006_{it}$	0.1790***	0.1417*
	(4.02)	(2.31)
$treated_{it} \times time2007_{it}$	0.1188***	0.0639***
	(5.91)	(3.41)
$treated_{it}$	0.0265	0.3365***
	(0.85)	(8.85)
$ln\_ratio\_RD_{it}$		0.0782***
		(10.03)
ln_age		−0.1168***
		(-5.73)
$ln\_revenue$		−0.2102***
		(-16.03)
ln_ratio_tech		0.1044***
		(6.50)
$\_cons$	1.4896***	1.6521***
	(6.39)	(11.49)
N	6083	3612

Notes: (1)T value in brackets; (2) "***, **, *" means that the coefficient is significant at the level of 1%, 5% and 10%, respectively.

6.2 Policy recommendations

6.2.1 The government shall appropriately increase the input of fiscal subsidies and give full play to the incentive effect of fiscal subsidies

Generally speaking, the behavior of obtaining financial subsidies has obvious competitive characteristics. The enterprises that can obtain government subsidies are often emerging enterprises with strong innovation ability and in the embryonic or growing stage. Most of these enterprises lack R&D funds. Limited by factors such as enterprise scale and credit, financing channels are relatively narrow. After receiving government subsidies, these companies can have more scientific research funds for R&D investment and release their innovation potential. For companies whose technology in the market has matured, obtaining financial subsidies is a recognition of their innovation capabilities. On the one hand, they will continue to raise funds in the capital market and obtain more development funds. On the other hand, the government's financial Subsidies can also encourage these companies to carry out some non-profit R&D activities and create more social benefits. Therefore, the government can appropriately increase subsidies, provide more companies with innovation capital guarantees, give play to the incentive effect of financial subsidies, and promote enterprises to carry out independent innovation.

6.2.2 Allocate the fiscal subsidies reasonably and treat different types of enterprises fairly

Fiscal subsidies are an important measure for the country to implement the innovation-driven development strategy and build an innovative country. It is an important way for enterprises, especially small and medium-sized enterprises in the market, to obtain financing for innovation, and it is also an incentive method to promote innovation enthusiasm and self-confidence of enterprises. When the government allocates the share of financial subsidies, it should choose corresponding subsidy policies for different types of enterprises to improve the efficiency of subsidies. For enterprises of different scales, although some small and medium-sized enterprises have high innovation efficiency, they are often unable to convert high-efficiency innovation into high-efficiency output value due to their own financial capabilities and R&D capabilities, and are subject to the externalities of scientific research activities. So that the ability and possibility of transforming scientific research results into actual profits are low.

Therefore, the government's fiscal subsidies for such enterprises should be more fair and targeted, and focus on supporting the innovation activities of small and medium-sized enterprises, especially technology-based enterprises. It provides necessary financial support to improve the self-confidence of innovation entities. For enterprises of different ownerships, the government's financial subsidy funds should also be distributed fairly. While supporting the innovation activities of state-owned enterprises, it actively guides the innovation activities of non-state-owned enterprises, expands the channels of R&D financing, cultivates innovation awareness, and facilitates the development of their innovation activities.

6.2.3 Improve the market mechanism and strengthen the supervision of financial subsidies

The ultimate goal of enterprise innovation is to obtain economic benefits. Therefore, the government should improve the transformation channels of scientific and technological achievements, promote the rapid transfer of outstanding scientific research results to the application field, and give full play to the social benefits of innovation. At the same time, improve the property rights protection of enterprises, strengthen market supervision and governance, improve relevant laws and regulations, and prevent external problems from hindering the pace of innovation of enterprises. As for the phenomenon of "fraud compensation" in the market, the government should strengthen the approval and supervision before and after subsidies to improve the efficiency of the use of financial subsidy funds, thereby promoting the improvement of enterprise innovation capabilities.

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