

The Effect of Government Intervention on Self Innovation of Strategic Emerging Enterprises based on the Role of Financial Intermediary

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Abstract

The implementation of government intervention and financial support can solve the problem of insufficient investment in independent innovation of enterprises, improve the ability of independent innovation of strategic emerging industries, and achieve the goal of high-quality economic development. However, due to the inconsistency between the government's macro-control objectives and the interest objectives of financial institutions, government intervention and financial support are uncoordinated. Under this background, this paper studies the impact of government intervention and financial support on the independent innovation of strategic emerging industry enterprises. The results show that: (1) Government intervention can stimulate enterprises to increase investment in independent innovation. (2) Government intervention and financial support affect the allocation of financial resources in enterprise innovation activities. (3) Long term bank loans inhibit enterprises' independent innovation and development, and reduce enterprises' investment in independent innovation.

Keywords

Independent Innovation; Government Intervention; Financial Support; Strategic Emerging Enterprises.

1. Introduction

In a complex and volatile economic environment, uncertainties in China's economic development continue to increase, which urgently requires new drivers of economic growth, easing downward pressure on the economy, and achieving high-quality economic transformation. As the direction of a new round of scientific and technological revolution and industrial transformation, strategic emerging industries have become a key area in fostering new drivers of economic development, achieving economic transformation and gaining new advantages in the future global industrial competition. Strategic emerging industries are pillar industries based on major technological breakthroughs and major development needs, integrating knowledge and technology intensive, high growth potential, and good comprehensive benefits. They play a significant role in leading and demonstrating the overall social and long-term development. Improving the ability of independent innovation is the central link in cultivating and developing strategic emerging industries. The independent innovation activities of strategic emerging industries are characterized by high investment, long cycle, high risk and externality, which often lead to low enthusiasm and insufficient innovation ability of strategic emerging industry enterprises in independent innovation activities. The effective cooperation of government intervention and financial support can promote the independent innovation activities of strategic emerging industry enterprises and

improve their independent innovation capabilities. The government adopts government subsidies, taxes and other policies to intervene in the independent innovation activities of strategic emerging industries, which can increase the funds for independent innovation, reduce the cost of independent innovation, and improve the independent innovation capability of strategic emerging industries. Financial support is to mobilize financial resources in the market, ease the financing constraints of strategic emerging industries, and then increase the investment in independent innovation of strategic emerging industries, so as to realize the supporting role of independent innovation and development of strategic emerging industries. In recent years, China has formulated a series of inclusive and flexible government intervention policies and financial support measures to promote the independent innovation activities of enterprises in strategic emerging industries. Through government intervention and financial support policies, the scale of independent innovation input of strategic emerging industry enterprises in China has been expanding, innovation output has been increasing, and innovation has achieved remarkable results.

While the independent innovation ability of China's strategic emerging industries has been improved, people question the effectiveness of government intervention and financial support for the independent innovation development of strategic emerging industries. Can government intervention and financial support really stimulate the independent innovation input of strategic emerging industries? Can government intervention and financial support really promote the transformation of innovation achievements and improve the level of independent innovation capability of strategic emerging industries? All these issues are controversial. Government intervention and financial support can provide a large amount of support funds for enterprises to fund innovation activities, and mobilize the enthusiasm of enterprises for independent innovation. However, due to the inconsistency between the government's macro-control objectives and the interests of financial institutions, government intervention and financial support cannot be well combined. Government intervention is more inclined to achieve efficient operation of financial funds, while financial institutions are inclined to achieve the goal of maximizing benefits on the premise of ensuring capital security. In the process of supporting strategic emerging independent innovation, it is difficult for the government and financial institutions to achieve coordinated development of government intervention and financial support. In addition, there is greater uncertainty and complexity in the independent innovation activities of strategic emerging industries, which leads to "blind spots" in the process of government intervention and financial support in promoting the development of independent innovation of strategic emerging industries, low efficiency of independent innovation of enterprises, and the results of independent innovation cannot meet people's expectations. Therefore, to clarify the impact of government intervention and financial support on independent innovation of enterprises, it is necessary to conduct more in-depth research and discussion on independent innovation of strategic emerging industries.

2. Sample Selection and Data Source

2.1. Sample Selection

This paper chooses A-share listed companies in Shenzhen and Shanghai as the research object. The selected listed companies belong to the level of independent innovation enterprises in strategic emerging industries. The sample of such listed companies can more comprehensively and systematically reflect the government intervention. The initial sample is Shanghai and Shenzhen A-share listed companies from 2012 to 2018, and the relevant samples are selected according to the following principles: First, according to the latest Guidelines for Industry Classification of Listed Companies (revised in 2012) issued by the CSRC, the listed companies in strategic emerging industries in the wind database are selected, and the initial starting point

of the sample is set as 2012. Second, the selected listed companies are in a growing period, and have certain business capabilities and R&D innovation capabilities, that is, the listed companies have certain economic strength to support enterprises to carry out R&D innovation activities. Third, exclude ST and *ST listed companies, that is, exclude the sample of listed companies that have lost money for two consecutive years or more. Fourth, exclude listed companies with tax rates less than 0 or greater than 1, and use stata 12.0 to winsorize all continuous variables at 1% level to reduce the impact of extreme values on the distribution.

2.2. Data Source

The financial information of listed companies in strategic emerging industries comes from the wind database, the number of patent applications comes from the Guotai'an database and the official website of the State Intellectual Property Office, and the R&D personnel of listed companies come from the Guotai'an database. Some missing patent applications and R&D personnel data are manually searched and supplemented through the annual reports of listed companies. A total of 657 listed companies in strategic emerging industries are selected as the research objects.

3. Index Selection and Model Establishment

3.1. Index Selection

3.1.1. Investment in Independent Innovation

Independent innovation input (R&D). The independent innovation input of the explained variable is the capital input of strategic emerging industry enterprises for research and development, mainly used for basic research, application research and experimental development. Song et al. (2018) and Zhang et al. (2018) regard the scale and intensity of independent innovation investment as an important symbol to measure the scientific and technological strength and core competitiveness of enterprises [1, 2]. This paper takes R&D expenditure as a measure of the scale of enterprises' independent innovation investment.

3.1.2. Government Intervention

Government intervention (G). The explanatory variable is government intervention, and the main means are government subsidies and tax incentives.

(1) Government subsidies. Government subsidies (S). Government subsidies refer to monetary assets or non-monetary assets obtained by enterprises from the government free of charge, mainly including financial discount, research and development subsidies and policy subsidies. According to the latest accounting standards and Yang Yi's practice, the government subsidy index under other income accounting items in the enterprise financial statements is selected as the measurement index [3].

(2) Tax preference. Tax preference is one of the important interventions to accelerate the cultivation and innovative development of strategic emerging industries. It reduces the cost of enterprises' R&D innovation process through R&D expense deduction, value-added tax preference, income tax preference and other ways, and indirectly encourages enterprises to carry out independent innovation activities.

① Research and development expenses plus deduction (EXP). The enterprise R&D expense plus deduction is a tax method and means for the government to intervene in the enterprise R&D innovation activities. The actual amount of R&D expenditure plus a certain proportion is used as the deduction when calculating the tax payable. Since the introduction of the policy of additional deduction of R&D expenses of enterprises in 1996, the proportion of additional deduction of R&D expenses of enterprises has changed. In 2017, according to the decision of the executive meeting of the State Council, the Ministry of Finance, the State Administration of Taxation and the Ministry of Science and Technology jointly issued the Notice on Improving the

Pretax Plus Deduction Ratio of Research and Development Expenses of Small and Medium sized Technological Enterprises (CS [2017] No. 34), which increased the proportion of research and development expenses enjoyed by small and medium-sized technological enterprises from 50% to 75%. For this reason, this paper refers to the research of Han Renyue (2019), and directly multiplies the actual amount of enterprise R&D expenses in 2012-2016 and 2017-2018 by 50% and 75%, respectively, as an indicator to measure the additional deduction of R&D expenses.

② Value added tax concessions (VAT). Value added tax is one of the most important taxes for enterprises, and it is a kind of tax levied on the value-added generated in the process of selling goods and improving services. VAT preferences mainly include VAT refund and exemption, and VAT deduction. Among them, most of the tax refund and exemption are targeted at small and medium-sized enterprises with insufficient profits, while strategic emerging industries have certain enterprise scale and profitability, and most of the listed companies' tax refund and exemption preferential policies are not obvious. In particular, the sales of independent innovation products in strategic emerging industries need a long period of time to enjoy the return and reduction of VAT. Wang Chunyuan (2017) adopted VAT deduction as a VAT preference in the process of R&D innovation, which mainly refers to the VAT deduction of new fixed assets, which mainly includes the new machines, machinery, tools and other equipment, tools and appliances related to production and operation of enterprises in the current year. It is the capital investment of enterprises in R&D innovation projects and an important indicator of government intervention in enterprises' independent innovation [4]. In order to better explain the tax preference for enterprise innovation investment, this paper uses the value-added tax deduction of newly added fixed assets of enterprises in the current year as the measurement index of value-added tax preference, and calculates the value-added tax preference index according to the value-added tax rate of 17% for general taxpayers.

③ Income Tax (EIT). Enterprise income tax is an important tax burden for enterprises, and it is an intervention means that the government can directly regulate enterprise income. As the preferential tax policies involved in income tax are relatively complex, it is difficult to have continuous and unified indicators to explain the income tax preferences. Therefore, this paper refers to the practices of Wang Xu et al. (2017) and Li Xiangju (2019), and directly uses income tax as the reverse indicator of tax preferences to explain the impact of government intervention on independent innovation investment [5, 6].

3.1.3. Financial Support

Financial support (F). Financial capital plays an important role in resource allocation during the development of strategic emerging industries. It is an important capital input for enterprises to achieve independent innovation financing, medium-term resource integration and new product value appreciation. Financial support belongs to the micro enterprise level and will be affected by government intervention. Therefore, financial support is taken as a regulating variable to study the impact of financial support on enterprises' independent innovation investment. The financial support studied in this paper includes bank loans and foreign direct investment.

(1) Bank borrowings. ① Short term bank borrowings (SI). The government clearly mentioned in the special support fund policy for supporting strategic emerging industries that it is necessary to expand financial support means and support enterprises to implement major industrialization projects through bank loans and bond financing. The short-term bank loans of enterprises are an important source of funds for enterprises' investment innovation projects and innovation activities, and one of the key policies of the government to provide financial support for strategic emerging industries. For this reason, this paper selects short-term bank loans as one of the measurement indicators of financial support by referring to the practices of Zhen Liming et al. (2019) and Kan Jingyang et al. (2017) [7, 8]. ② Long term bank borrowings (LI). Long term bank loans are the key source of funds for enterprises to invest in R&D

innovation and maintain production and operation projects. They are mainly used for fixed asset investment loans, renovation loans, science and technology development and new product trial production loans. With reference to Liu Hui's (2014) research indicators, long-term bank loans can be selected as one of the indicators to measure financial support [9].

(2) Foreign direct investment. Foreign Direct Investment (FDI). In the case of capital market development, foreign direct investment will become an important channel for developing countries to imitate, digest and absorb technology and knowledge, and is one of the important capital inputs for independent innovation of enterprises. There are many indicators to measure foreign direct investment. Because this paper studies the impact of government intervention on independent innovation investment, foreign direct investment needs to be related to relevant government policies. Therefore, this paper chooses the funds borrowed from overseas by enterprises within the total amount of project investment approved by relevant government departments as the indicator to measure foreign direct investment.

3.1.4. Control Variables

In order to control the influence of other variables on the empirical results, this paper selects enterprise size (size), enterprise profitability (ep), enterprise age (age), capital structure level (lev) and enterprise ownership type (own) as control variables. Han Xin (2018) and Jia Ming'e (2018) believed that the larger the enterprise scale, the stronger the profitability of the enterprise, and the sufficient funds of the enterprise, the more able to provide sufficient R&D and innovation funds. According to the life cycle theory of strategic emerging industries, the age of enterprises can reflect the development stage of enterprises and judge the investment of enterprises in independent innovation. The level of capital structure can reflect the investment decision-making ability and debt repayment ability of listed companies for a R&D innovation high-risk project. The type of enterprise ownership determines whether the development of enterprises is dominated by enterprises or by the government, which has a great impact on the decision-making behavior of enterprises' independent innovation investment. The actual shareholders of listed companies are mainly divided into four types: state-owned shareholders, individual shareholders, university shareholders and overseas shareholders. For the purpose of studying state-owned enterprise shareholders, the value of state-owned shareholders is 0, and the value of other shareholders is 1.

3.2. Model Establishment

In order to more intuitively and objectively understand the impact of government intervention on enterprises' independent innovation investment, this paper constructs the following function of enterprises' independent innovation investment in strategic emerging industries based on Cobb Douglas production function:

$$R \& D_{i,t} = f(G, F) = a_0 G_{i,t}^{\alpha_m} F_{i,t}^{\beta_n} \quad (1)$$

The formula shows that government intervention and financial support are functions of enterprises' independent innovation investment, R&D represents independent innovation investment, G and F represent government intervention and financial support respectively, α_m and β_n , represent the elasticity coefficient of government intervention and financial support respectively.

In order to eliminate heteroscedasticity in the process of multivariate statistics, natural logarithms are taken for relevant variables, and multiple indicators of government intervention and financial support are included in the model to obtain the function expression of (2):

$$\ln R \& D_{it} = \ln a_0 + \alpha_1 \ln S_{it} + \alpha_2 \ln EXP_{it} + \alpha_3 \ln VAT_{it} + \alpha_4 \ln EIT_{it} + \beta_1 \ln SI_{it} + \beta_2 \ln LI_{it} + \beta_3 \ln FDI_{it} \quad (2)$$

This paper uses panel data of listed companies. Panel models are divided into static and dynamic panel models, and static models are divided into fixed effect and random effect models. Using stata12.0 for F test and Huasman test, the F statistical value is greater than 15, the chi square statistical value of Huasman is 104.54, and the P value is less than 0.01. The original hypothesis is strongly rejected, and the model has individual effects. At the same time, control variables are added. Therefore, the following fixed effect panel model is established:

$$\ln R \& D_{it} = \alpha_0 + \alpha_1 \ln S_{it} + \alpha_2 \ln EXP_{it} + \alpha_3 \ln VAT_{it} + \alpha_4 \ln EIT_{it} + \beta_1 \ln SI_{it} + \beta_2 \ln LI_{it} + \beta_3 \ln FDI_{it} + \sum_{k=1} \lambda_k Contr_{it} + \mu_i + \eta_t + \varepsilon_i \quad (3)$$

Among them, R&D represents independent innovation investment, S, EXP, VAT and EIT represent government subsidies, R&D expense deduction, value-added tax preference and income tax respectively, and SI, LI and FDI represent short-term bank loans, long-term bank loans and foreign direct investment respectively. Contr is a set of control variables, α represents constant terms. $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \beta_1, \beta_2, \beta_3, \lambda_k$ are the coefficients corresponding to each variable. i and t represent the enterprise and year respectively, μ_i is the intercept term of individual heterogeneity, ε_i is the time fixed effect, and η_t is the random disturbance term that changes with individuals and time.

4. Empirical Research Results and Analysis

The fixed effect model is used to analyze the impact of government intervention on enterprises' independent innovation investment. There is a significant positive correlation between government subsidies and enterprises' investment in independent innovation, which passes the significance level of 1%. If the government subsidy increases by 1%, the enterprises' investment in independent innovation will increase by 0.208%. From the perspective of tax preference, there is a significant positive correlation between R&D expense deduction and value-added tax preference and enterprises' independent innovation investment, and both pass the 5% significance level, indicating that both can encourage enterprises to expand the scale of independent innovation investment. Specifically, the R&D expense plus deduction and 1% VAT discount will increase the enterprise's independent innovation investment by 0.0354% and 0.039% respectively. There is a significant negative correlation between income tax and enterprises' independent innovation investment, and it has passed the significance level of 5%. The income tax will increase by 1%, and the enterprise's independent innovation investment will decrease by 0.04%, indicating that the heavier the tax burden, the higher the enterprise's R&D cost. As this paper selects the reverse index of income tax preference, the greater the enterprise income tax preference is, the more able to stimulate enterprises to carry out independent innovation is.

From the perspective of correlation regression coefficient, the regression coefficient of government subsidies and independent innovation investment is far greater than that of tax incentives and independent innovation investment, that is, the effect of government subsidies to stimulate enterprises' independent innovation is more obvious. This is because the government subsidies are not discriminated against by industries and sectors, and are directly used for enterprise R&D, innovation and production. In addition, the independent innovation input of enterprises is increased. At the same time, the cost of enterprise R&D and innovation is reduced, and social investment is guided and increased into enterprise R&D and innovation investment. This is the most direct application of public investment and private investment to enterprise innovation activities. However, tax preferences set restrictions, most of which are aimed at specific industries and specific product sales. For some large enterprises, they prefer R&D and innovation projects with high private returns, directly enjoy government subsidies,

and ignore tax incentives. Therefore, from the perspective of the means of government intervention, government subsidies play a greater role in stimulating the independent innovation development of strategic emerging industries.

Financial support is added to the fixed effect model as a regulating variable, and the model is used to analyze the impact of government intervention and financial support on enterprises' independent innovation investment. After the adjustment variable of financial support is added, the regression coefficient of many indicators of government intervention and enterprises' independent innovation investment is still positive correlation, that is, government intervention has a positive incentive effect on enterprises' independent innovation investment, but the overall regression coefficient of many indicators of government intervention is relatively small. The regression coefficient of government subsidies has changed from 0.208 to 0.1497, the regression coefficient of R&D expenses plus deductions has changed from 0.0354 to 0.0279, the regression coefficient of VAT preferences has changed from 0.039 to 0.0383, and the regression coefficient of income tax has changed from -0.04 to -0.0513.

There is a positive correlation between the short-term loans of enterprise banks and the investment in independent innovation of enterprises, and it has passed the significance level of 1%. The increase of short-term bank loans by 1% will increase enterprises' investment in independent innovation by 0.7427%, indicating that short-term bank loans can encourage enterprises to increase their investment in independent innovation. The regression coefficient between long-term bank loans and independent innovation investment is negative, while the regression coefficient between foreign direct investment and independent innovation investment is positive, indicating that long-term bank loans will hinder independent innovation investment, and foreign direct investment will promote enterprises' independent innovation investment.

From the perspective of control variables, enterprise size, profitability, enterprise age, asset structure, and enterprise ownership type are all positively correlated with enterprise independent innovation investment.

5. Conclusion

Through the empirical study of multiple indicators and capital investment in independent innovation, the following conclusions have been drawn: First, government intervention can stimulate enterprises to increase their investment in independent innovation. Government subsidies promote enterprises' investment in independent innovation by directly increasing enterprises' investment in R&D projects to stimulate enterprises' independent innovation. The incentive effects of R&D expense deduction, value-added tax preference and income tax are realized by reducing the costs incurred in the process of R&D innovation of enterprises, and the incentive effect of government subsidies is more obvious than that of tax preference. Second, government intervention and financial support affect the allocation of financial resources in enterprise innovation activities. Short term bank borrowing is the most common way of enterprise financing, which can promote enterprises to increase their investment in independent innovation, and its effect of encouraging enterprises to invest in independent innovation is far greater than government intervention means such as government subsidies. Therefore, financial support means weaken the government's ability to intervene itself, achieve self-regulation of the enterprise economy, and get rid of the suspicion of excessive government intervention. Third, long-term bank loans inhibit enterprises' independent innovation development and reduce enterprises' investment in independent innovation. This is a research and innovation project with long cycle and high complexity that enterprises are unwilling to host. However, long-term loans such as fixed asset investment loans, renovation loans, science and technology development and new product trial production loans will also cause great

financial risks to enterprises, increase their investment costs, and thus reduce their R&D and innovation investment.

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