

Foreign Direct and Enterprise Dual Innovation

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Abstract

To grasp innovation is to grasp development, and to seek innovation is to seek development. The report of the twentieth CPC National Congress proposes that we should insist on the central position of innovation in the overall situation of China's modernization, and comprehensively shape the development of new dynamics and new advantages. At the same time, it is also proposed that although China continues to promote high-level opening up to the outside world, attracting foreign investment among the world's leading, but the capacity of scientific and technological innovation is still not strong. Based on the dual innovation theory, technology spillover theory and international investment theory, this paper takes Chinese A-share listed companies in 2008-2021 as the research object to empirically test the influence effect of FDI on enterprise dual innovation. This paper helps to enrich the influencing factors of dual innovation and the theory of microeconomic consequences of FDI, and at the same time, it can provide empirical evidence for the government to formulate the policy of attracting investment to promote innovation and for enterprises to improve their dual innovation capacity and break the development constraints.

Keywords

Foreign Direct Investment; Dual Innovation; Exploratory Innovation; Development Innovation.

1. Introduction

General Secretary Xi Jinping pointed out that "Innovation is productivity, enterprises rely on it to be strong, and the country relies on it to flourish." Grasping innovation is grasping development, and seeking innovation is seeking the future. The report of the 20th Party Congress has elevated the strategic significance of scientific and technological innovation to a new height, proposing that we should adhere to the core position of innovation in the overall situation of China's modernization and construction, adhere to the innovation-driven development strategy, and comprehensively shape the development of new dynamics and new advantages. At the same time, China's "14th Five-Year Plan" and the Outline of Vision 2035 also propose to make scientific and technological self-reliance and self-improvement the strategic support for national development, and to accelerate the construction of a strong scientific and technological country. In the context of integrating development and security, the situation of transformation and upgrading of enterprises as the main body of scientific and technological innovation is even more severe and urgent, and innovation is the key for enterprises to implement strategic changes, break through the ceiling of traditional operations and seek new competitive advantages [1]. However, innovation activities are different from other strategic activities of enterprises in that they usually face greater risks because of their long cycle, high capital requirements, and high uncertainty of results. International investment theories and related studies show that Foreign Direct Investment (FDI) plays an important role in the technological progress and innovation activities of the host country's industries through technology transfer and technology spillover effects [2]. Therefore, among the influencing factors of enterprise innovation, foreign direct investment is a more important research

direction. Since 1993, China has been the largest developing country attracting foreign investment for 20 consecutive years, and in 2020, it surpassed the United States for the first time to become the world's top foreign investment inflow country. Has the continuous growth in the scale of foreign investment improved the independent innovation capability of China's local enterprises? This remains a controversial issue. As a developing country, China can capture the innovation effect of international technological spillover, i.e., through the demonstration, imitation and dissemination of knowledge and technology by FDI enterprises, to make up for technological deficiencies and realize innovation breakthroughs. However, some scholars have questioned this, arguing that in the context of global value chains, countries around the world are embedded in globalized production and division of labor according to their comparative advantages. Foreign-funded enterprises are usually large-scale multinational enterprises with strong financial and human capital and advanced technology. However, for the purpose of technical protection, foreign-funded enterprises create technical barriers and do not introduce cutting-edge technologies into the host country, but only introduce relatively advanced technologies to gain huge profits, which leads to the fact that the technologies that host-country enterprises acquire from FDI will always lag behind the cutting-edge technologies of developed countries, which may lead to the host-country enterprises being trapped in the quagmire of low-end lock-in.

For the above disagreement, the reason may be that scholars regard innovation as a homogeneous whole in the research process, without considering the heterogeneity of innovation activities. With the continuous deepening of research, the proposal of dual innovation theory provides a new research direction in the field of innovation. According to the dual innovation theory, the innovation activities of enterprises can be divided into exploratory innovation and developmental innovation, and both of them are different in terms of risk profile, expected returns, benefit orientation, etc. [3]. In the face of fierce market competition, innovation in the general sense can no longer support the implementation of China's innovation-driven development strategy, and the key to break through the innovation dilemma lies in dual innovation. If China wants to realize the successful leap from a manufacturing power to a manufacturing power, it is inevitable to realize the breakthrough of core technology in key areas, and to realize exploratory innovation on the basis of exploitative innovation. Most of the literature focuses on the results of the impact of FDI on the overall innovation performance of firms, and there is not much literature that discusses the different impacts of FDI by distinguishing the heterogeneity of innovation activities. This paper intends to explore in depth the effect of FDI on the dual innovation of Chinese firms.

2. Research Meaning

Based on the background that there are a lot of retreat risks of foreign capital and insufficient innovation motivation of enterprises, this paper takes Chinese listed companies as the research object to empirically study the influence effect of FDI on dual innovation of listed companies, which has strong theoretical significance and practical value.

2.1. Theoretical Significance

Innovation, as the ultimate source of economic growth and an inexhaustible driving force for sustainable economic development, is the strategic support for accelerating the construction of an innovative country and a modernized economic system. How to improve the efficiency of enterprise innovation has always been one of the focus issues for scholars and economists. Based on the micro enterprise perspective, this paper divides enterprise innovation activities into exploratory innovation and exploitative innovation according to the heterogeneity of innovation activities, and systematically analyzes the different impacts of foreign direct investment on the dual innovation of private enterprises, which helps to enrich the literature

on the impact factors of enterprise innovation. In addition, in recent years, with the increase of China's investment attraction and the emphasis on innovation capacity, the research on the relationship between foreign direct investment and domestic innovation capacity has been emphasized by more and more scholars, however, at present, scholars have not reached a unanimous view as to whether foreign direct investment can improve domestic innovation capacity. Based on the micro enterprise dual innovation perspective to explore the impact of foreign direct investment on enterprise dual innovation research is relatively lacking. This paper empirically analyzes the effect of FDI on the dual innovation capacity of Chinese firms, which complements the existing literature on foreign investment-induced innovation.

2.2. Practical Significance

With the deepening of China's reform and opening-up, China is forming a pattern of opening-up to the outside world on a wider scale, in a wider range of fields and at a deeper level. The 20th Party Congress proposes to rationally reduce the negative list of foreign investment access and protect the rights and interests of foreign investment in accordance with the law. This paper studies the effect of foreign direct investment on the dual innovation capacity of enterprises, which may provide insights for Chinese governments at all levels to formulate relevant policies for attracting foreign investment according to different situations, better utilize foreign investment to crack the development constraints, and promote the high-quality development of the economy. In addition, as an external financing channel for enterprises, FDI can provide financial support for enterprises, and sufficient financial support can help enterprises increase their R&D investment, thus promoting the improvement of their innovation capacity. By studying the effect of FDI on the dual innovation capacity of enterprises, it helps to improve the efficiency of enterprises' utilization of foreign investment, and helps enterprises to better promote their own innovation and upgrading through foreign investment.

3. The Innovation of This Article

Compared with existing studies, the research of this paper has the following two differences: first, the research perspective is novel. This paper tries to explore the impact of FDI on the dual innovation of enterprises from the micro enterprise dual perspective, focusing on the effect of FDI on different types of innovation, to provide certain reference for enterprises to clarify the direction of FDI utilization. Second, research content innovation. Existing research provides the basis for the study of this paper, but previous literature focuses more attention on the results of the impact of FDI on enterprise innovation, and there are differences in the research conclusions, this paper distinguishes between the heterogeneity of innovation activities, and analyzes the effect of the impact of FDI on the enterprise binary innovation, which may be an important supplement to the existing literature.

4. Theoretical Analysis and Research Design

4.1. Theoretical Analysis

Foreign direct investment is not just an inflow of funds, but a composite investment containing a package of resources such as capital, technology, systems, management and projects, etc. Foreign-funded enterprises are usually larger multinational enterprises with strong financial strength, human capital and advanced technological conditions. Therefore, foreign direct investment can bring a significant impact on the technological progress of domestic enterprises [4]. According to the dual innovation theory, the innovation activities of enterprises can be categorized into two types: exploratory innovation and exploitative innovation. Among them, exploratory type innovation is more radical, and its essence is to acquire and integrate internal and external heterogeneous knowledge to develop new products. It breaks the traditional

knowledge system and discovers new knowledge, with large capital investment and high investment risk, so it needs sufficient financial support and heterogeneous resources. And FDI can make up for its deficiencies in these aspects. Firstly, FDI brings a large amount of capital inflow directly to enterprises, which enables their innovation activities to obtain sufficient financial support [5], so that exploratory innovation activities can be carried out normally. Secondly, FDI makes a strong relationship between domestic enterprises and foreign enterprises, which reduces the possible risks in exploratory innovation to a certain extent through the union. In addition, foreign direct investment will bring new technology, which will help the acquisition of heterogeneous resources for exploratory innovation. Enterprises accepting foreign direct investment also gain the opportunity to touch new knowledge and technology, increasing the access to knowledge elements, and in pursuit of benefits will inevitably learn this new technical knowledge and enhance the sensitivity to knowledge through the collision of diversified ideas to promote the rapid identification of new knowledge, digestion and absorption to create new products, thus enhancing the ability of exploratory innovation [6]. Finally, the entry of foreign capital changes the original market structure and competitive environment. The entry of foreign-funded enterprises has intensified domestic market competition, and in order to gain a foothold in the fierce market competition and obtain excessive profits, and to avoid being "squeezed out" of the market, domestic enterprises have to increase their investment in research and development (R&D) in new products and new technologies, thus increasing their investment in exploratory innovation.

The essence of utilized innovation is the integration and reorganization of existing internal knowledge and technology to realize the renewal and upgrading of products. First of all, after the entry of foreign-funded enterprises, a supply relationship is formed with domestic enterprises. With the deepening of industrial technological complexity, foreign-funded enterprises need to strengthen exchanges with domestic enterprises, such as providing technical support for domestic enterprises, etc. Domestic enterprises can be prompted through cooperation to accumulate operational channels, master the tacit knowledge needed for business operation and development, reflect on the inadequacy of existing products and services, and adjust and improve technology in a timely manner, thereby realizing exploitative innovation. Secondly, foreign-funded enterprises provide training to the local employees they hire, at which point the dissemination of technological knowledge takes place. Domestic enterprises imitate the new technologies brought by foreign investors, and then realize the integration of original and new technologies through the absorption and transformation of knowledge, thus prompting enterprises to integrate and reorganize their internal knowledge, which is conducive to the learning of developmental innovation. In addition, FDI also brings advanced management experience to enterprises, which helps them to quickly adjust the operation mode and organizational processes, accelerate the absorption efficiency of innovative elements, enhance the operation capacity of existing elements, and improve the ability of developmental innovation [7]. Finally, FDI lifts patent constraints to a certain extent. Foreign-funded enterprises adopt strict technical protection for core technologies, so it is difficult for host country enterprises to obtain such core technology and knowledge spillover, but through establishing joint ventures with foreign-funded enterprises and realizing technology transfer, this problem can be effectively circumvented.

Based on this, this paper puts forward the hypothesis:

H1: FDI has a positive facilitating effect on the exploratory innovation of enterprises.

H2: FDI positively promotes the exploratory innovation of enterprises.

4.2. Research Design

4.2.1. Sample Selection and Data Source

Given that the Ministry of Finance required the implementation of new accounting standards in 2007 and explicitly requested enterprises to disclose R&D-related financial information in their annual reports, this paper selects China's A-share listed companies in Shanghai and Shenzhen from 2008 to 2021 as the research sample, and does the following to the initial data: excludes the listed companies in the financial category; excludes the ST samples; deletes the samples with the missing key variables; in order to alleviate the influence of extreme values on the findings of this paper, shrinks the tails of all the continuous variables at the 1% and 99% deciles, and finally obtains the 26,790 initial sample data, and the variable data are all obtained from the CSMAR database.

4.2.2. Variable Definition and Description

Explained variables: exploratory innovation and developmental innovation. According to Chinese accounting standards, an enterprise's R&D investment can be differentiated into expensed R&D expenditures and capitalized R&D expenditures according to the research stage and the development stage. Compared with the development stage, expenditures in the research stage have higher risks and uncertainties, and thus favor exploratory innovation. Therefore, this paper measures exploratory innovation with firms' expensed R&D investment and developmental innovation with capitalized R&D investment.

Explanatory variables: The proportion of foreign ownership in the total number of shares, that is, the proportion of foreign ownership, is selected as the measurement index of foreign direct investment.

Control variables. In order to avoid the impact of omitted variables on the results of the study, this paper controls the following variables: gearing ratio Lev, return on equity ROE, operating income growth rate Growth, total asset turnover ATO, cash flow ratio Cashflow, enterprise age Age, equity checks and balances Balance, the proportion of independent directors Indep, and the value of Tobin Q TobinQ. In addition, this paper also controls the year and industry. , this paper also controls for year and industry fixed effects.

5. Empirical Results Analysis

5.1. Descriptive Statistical Analysis

Table 1. Descriptive statistical analysis

| Variable | Observed value | Mean value | Standard deviation | Minimum | Median | Maximum |
|----------|----------------|------------|--------------------|---------|--------|---------|
| R | 26790 | 2.882 | 3.755 | 0 | 0 | 9.186 |
| D | 26790 | 1.677 | 3.058 | 0 | 0 | 8.571 |
| FDI | 26790 | 2.345 | 8.362 | 0 | 0 | 47.77 |
| Lev | 26790 | 0.397 | 0.199 | 0.048 | 0.387 | 0.865 |
| ROE | 26790 | 0.0730 | 0.115 | -0.507 | 0.078 | 0.347 |
| Growth | 26790 | 0.175 | 0.337 | -0.467 | 0.124 | 1.923 |
| ATO | 26790 | 0.666 | 0.406 | 0.115 | 0.578 | 2.492 |
| Cashflow | 26790 | 0.049 | 0.065 | -0.134 | 0.048 | 0.235 |
| Age | 26790 | 17.32 | 5.893 | 4 | 17 | 32 |
| Balance | 26790 | 0.373 | 0.286 | 0.012 | 0.298 | 0.999 |
| Indep | 26790 | 0.376 | 0.0530 | 0.333 | 0.364 | 0.571 |
| TobinQ | 26790 | 2.055 | 1.238 | 0.866 | 1.660 | 7.997 |

The results of the descriptive statistical analysis of the main variables in this paper are shown in Table 1. In the sample, there is a certain gap between exploratory innovation (R) and developmental innovation (D), and exploratory innovation requires more funds, so its mean and maximum values are larger than those of developmental innovation. However, the medians of dual innovation are all 0, indicating that more than half of the companies do not invest in R&D. To a certain extent, this indicates that the overall level of innovation of China's A-share listed companies is insufficient, and that the emphasis on innovation needs to be strengthened. Foreign direct investment (FDI) accounts for the largest proportion of 47.77%, the mean value is only 2.345%, and the standard deviation is 8.362, indicating that the attraction of foreign investment varies greatly among different enterprises, and foreign investment is not balanced.

5.2. Benchmark Regression Analysis

Table 2. Benchmark regression analysis

| | (1)R | (2)D | (3)R | (4)D |
|----------------|----------|----------|-----------|-----------|
| FDI | 0.046*** | 0.009*** | 0.043*** | 0.010*** |
| | (0.003) | (0.002) | (0.003) | (0.002) |
| Lev | | | 2.586*** | 2.132*** |
| | | | (0.132) | (0.108) |
| ROE | | | 2.944*** | -0.346* |
| | | | (0.222) | (0.194) |
| Growth | | | -0.652*** | 0.201*** |
| | | | (0.070) | (0.060) |
| ATO | | | 0.164*** | -0.658*** |
| | | | (0.063) | (0.051) |
| Cashflow | | | 1.618*** | -0.648** |
| | | | (0.377) | (0.293) |
| Age | | | 0.057*** | 0.022*** |
| | | | (0.005) | (0.004) |
| Balance | | | -1.143*** | -0.019 |
| | | | (0.078) | (0.065) |
| Indep | | | -1.314*** | 0.086 |
| | | | (0.419) | (0.343) |
| TobinQ | | | -0.116*** | 0.070*** |
| | | | (0.021) | (0.017) |
| cons | 3.071*** | 1.328*** | 2.056*** | 0.481* |
| | (0.278) | (0.223) | (0.333) | (0.270) |
| Year | Yes | Yes | Yes | Yes |
| Industry | Yes | Yes | Yes | Yes |
| N | 26790 | 26790 | 26790 | 26790 |
| R ² | 0.047 | 0.052 | 0.091 | 0.074 |

Note: Standard error in parentheses are the same in all table below.

Table 2 reports the regression results of the impact of FDI on firms' dual innovation. As can be seen from Table 2, the coefficients of FDI on both exploratory and exploitative innovation of enterprises are significantly positive at 1% confidence level before and after adding individual-level control variables, indicating that FDI is significantly and positively associated with dual innovation of enterprises, i.e., the entry of foreign investment is conducive to the increase of R&D investment by enterprises to improve the level of dual innovation, and the hypotheses 1 and 2 of this paper have been verified. Compared with developmental innovation, exploratory

innovation faces greater risks, requires more capital, and results in higher uncertainty, while foreign investment effectively compensates for the difficulties faced by enterprises in exploratory innovation activities, and thus the correlation coefficient between FDI and exploratory innovation is larger, that is, the promotion effect of FDI on exploratory innovation is more significant.

6. Conclusion

The introduction of foreign investment is of great significance to the survival and development of enterprises. This paper empirically analyzes the impact of foreign direct investment on the dual innovation of enterprises by using the sample data of Chinese A-share listed companies in Shanghai and Shenzhen from 2008 to 2021. The research in this paper can provide a theoretical basis for the driving force of enterprises to carry out innovative activities, improve the level of enterprises' attracting investment to innovation, and promote the high-quality development of enterprises. The results of the study found that foreign direct investment can improve the level of enterprise dual innovation, and the promotion effect on exploratory innovation is more significant. Based on the research findings, this paper puts forward the following suggestions:

First, the state should deepen the reform, implement a more proactive opening-up policy, continue to expand the opening up of the industry, improve the support policies, improve the regulatory system, deepen the reform of the industry, optimize the business environment and the market competition mechanism, improve the attractiveness to foreign investment, provide more possibilities for the entry of foreign investment, and establish a perfect regulatory and information disclosure system to regulate the enterprises' use of foreign investment.

Secondly, enterprises' utilization of foreign investment should focus on exploratory innovation. This paper finds that FDI has a more significant role in promoting exploratory innovation, which is needed to build an innovative country. In addition, different enterprises should take different actions according to their own development situation for the specific implementation of attracting foreign capital to innovation, and enterprises in high-tech industry and young enterprises should pay extra attention to the sufficient capital and heterogeneous knowledge brought by foreign capital to enhance the vigor of enterprise innovation and improve the level of enterprise innovation.

Acknowledgments

Project of Research and Innovation Fund of Anhui University of Finance and Economics, "Foreign Direct Investment and Dual Innovation of Enterprises--A Moderated Intermediation Model" (ACYC2022014).

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