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Abstract

The report of the 19th national congress pointed out that under the strategic background of regional coordinated development, we should make full use of the factor agglomeration advantages of scientific and technological innovation resources to study the spatial spillover effect of financial agglomeration on the development of real economy, so as to provide strong support for regional industrial layout and coordinated economic development. Firstly, this paper analyzes the current situation of China's financial development from the aspects of scale, market structure and stability, and analyzes the current situation of China's scientific and technological innovation from the aspects of scale, investment and regional differences; Then, it analyzes the impact mechanism of financial development, scientific and technological innovation and their interaction on industrial agglomeration; Finally, it puts forward countermeasures and suggestions on how to promote financial development and scientific and technological innovation to the development of industrial agglomeration.

Keywords

Financial Development; Scientific and Technological Innovation; Industrial Agglomeration; Influence Mechanism.

1. Introduction

Building an economic circle with high-quality development of finance, science and technology and industry is not only the focus of regional economic research, but also the focus of the current government’s work. General secretary Xi Jinping pointed out in the nineteen major reports of the Communist Party of China that under the background of regional coordinated development strategy, we should make full use of the advantages of technological innovation resources to gather spatial advantages, and study the spatial spillover effects of financial agglomeration on the development of real economy, so as to provide strong support for the regional industrial layout and the coordinated development of economy.

The research on industrial agglomeration originated in the late 19th century. Marshall began to pay attention to the economic phenomenon of industrial agglomeration in 1890 and put forward two important concepts of "internal economy" and "external economy" [1]. After that, scholars have made a lot of research on the impact of industrial agglomeration on economic and social development and the relationship between financial development, scientific and technological innovation and industrial agglomeration. Firstly, the impact of industrial agglomeration on economic and social development. Hu Haoran and Nie Yanfeng (2018) believe that under the promotion of scientific and technological innovation, the continuous emergence of agglomeration effect will promote the optimization of industrial structure, and the comprehensive effect is expanding year by year [2]. Zhao Qingxia et al. (2019) found by studying the data of the Yangtze River Delta and the Pearl River Delta that both manufacturing
agglomeration and producer service agglomeration can promote the improvement of regional innovation ability, so as to promote the innovative development of economy [3]. Secondly, the relationship between financial development and industrial agglomeration. The research of Si Lijuan and Zhang Limin (2019) based on the panel data of China’s provincial capital cities shows that the expansion of financial output and the optimization of industrial structure have a positive spatial spillover effect on economic development, and the proportion of financial added value to economic development has a positive spatial spillover effect [4]. Zhang Peng and Yu Wei (2019) believe that there is a mutual promotion effect between financial agglomeration and urban development efficiency, and regional financial agglomeration is driven by the process of urbanization and the upgrading of industrial structure [5]. Thirdly, the impact of scientific and technological innovation on industrial agglomeration. Cai Yurong and Wang Huiling (2018) believe that scientific and technological innovation can promote the orderly transfer of industries and has a significant effect on the labor productivity of industrial agglomeration [6]. Jiao Siman (2019) empirically analyzed the impact of technological innovation on regional industries based on the data of the Yangtze River economic belt and the Beijing Tianjin Hebei economic circle, and found that technological innovation has a positive promoting effect on the secondary industry and the tertiary industry, especially on the development of the tertiary industry [7]. Finally, the impact of industrial agglomeration on scientific and technological innovation. Du Shuang et al. (2019) empirically analyzed the impact of industrial agglomeration on regional innovation by using the panel data of the Yangtze River Delta and the Beijing Tianjin Hebei economic circle, and found that the manufacturing agglomeration and market concentration of the two economic circles have improved the regional innovation ability to a certain extent under certain institutional conditions and innovation environment [8]. Hao Yongjing and Cheng Sining (2020) believe that both industrial agglomeration and technological innovation can promote economic growth, and technological innovation plays a greater role. The role of regional collaborative agglomeration depends more on the improvement of technological innovation ability [9].

In conclusion, a large number of empirical studies have shown that financial development and scientific and technological innovation have an impact on industrial agglomeration. Therefore, this paper will consider the impact of financial development and scientific and technological innovation on industrial agglomeration at the same time, focus on the interaction between them and the impact mechanism of interaction on industrial agglomeration, and put forward practical suggestions for the government and enterprises from the aspects of correctly guiding financial enterprises and encouraging high-tech industries according to the results of basic theoretical analysis.

2. Current Situation of China's Financial Development and Scientific and Technological Innovation

2.1. Current Situation of Financial Development

2.1.1. Financial Scale

In terms of the absolute scale of the financial industry, the added value of China’s financial industry has been rising steadily in recent ten years, and the annual compound growth rate of the absolute scale of financial assets has exceeded 16%. On the other hand, the proportion of the added value of China’s financial industry in GDP also shows an upward trend as a whole. In 2020, the added value of China's financial industry accounted for 8.27% of the total GDP, surpassing the peak of 8.17% in 2015. Among them, the rapid growth from 2011 to 2015 is related to the European debt crisis and the continuously strengthened quantitative easing policy of the United States; From 2015 to 2018, China strengthened financial supervision with the main goal of "risk prevention and deleveraging", resulting in a downward trend in the
proportion of the added value of the financial industry in GDP year by year; Since 2019, China's macro policy has changed from "deleveraging" to "stabilizing leverage", and increased investment in the field of making up for weaknesses. The proportion of added value of the financial industry in GDP has also increased steadily.

**Figure 1.** Proportion of added value of China's financial industry in GDP from 2011 to 2020

### 2.1.2. Financial Market Structure

At present, a major feature of China's financial system is that banks are dominant, and the degree of securitization in the financial market is relatively low, that is, the proportion of direct financing market has been low, resulting in that most enterprises cannot directly finance from the capital market. Since 2002, the proportion of direct financing in China has shown a fluctuating trend of first rising and then falling. From 2002 to 2015, China's bond market expanded steadily, and the proportion of direct financing gradually increased. After the fluctuations in 2017, affected by the rise of bond financing and the decline of equity financing, the proportion of direct financing in China has gradually stabilized. At present, compared with developed countries, China's financial market structure still has huge development space. However, with the continuous rise of China's high-tech industry, the efficient connection between scientific and technological innovation and capital market will help to improve the proportion of direct financing, so as to optimize the financial market structure.

**Figure 2.** Structure of China’s direct financing from 2002 to 2019

### 2.1.3. Financial Stability

Financial stability is an important index to measure the quality of financial development. A large number of studies show that the proportion of debt scale in GDP of each economic sector can measure the accumulation of financial risks from a macro perspective, and controlling the leverage ratio of the financial sector is the key to maintaining financial stability. The leverage
ratio of China’s financial sector has been rising, and the rising speed is higher than that of real economy and other sectors. The main reason for this phenomenon is the rapid expansion of shadow banks, which is essentially the consequence of a large number of regulatory arbitrage behaviors of financial institutions. However, with the strengthening of financial supervision and the promotion of “deleveraging”, China’s policy has shifted to “stable leverage” and counter cyclical regulation. Certain achievements have been made in risk prevention and financial stability is also being strengthened.

2.1.4. Financial Efficiency
Improving financial efficiency is one of the important objectives of financial development. However, because financial efficiency is difficult to be accurately measured, loan interest rate, deposit and loan spread and social financing scale increment are often used as indicators to measure financial efficiency. China’s loan interest rate is higher than that of many developed countries, mainly because China is still in the stage of rapid economic development, the financial system is not perfect, and the deposit and loan interest margin has been at a high level and stable for a long time. It is difficult to reduce financing costs and improve financial efficiency through deposit and loan interest margin. Therefore, at present, the overall operating cost of China’s financial system is still high, and there is great room to improve financial efficiency.

2.2. Current Situation of Scientific and Technological Innovation
High tech industry is the leading industry of manufacturing industry and an important position of scientific and technological innovation. Therefore, this paper analyzes the current situation of China’s scientific and technological innovation by analyzing the development status of high-tech industry.

2.2.1. Overall Industrial Scale Expansion
In recent years, the number of high-tech enterprises in China has continued to increase significantly, from 31900 in 2010 to 275000 in 2020. The main business income of high-tech enterprises also showed a trend of continuous increase, from 12.95 trillion yuan in 2010 to 45.10 trillion yuan in 2019. However, due to the impact of Sino US trade war and other factors, the number of Chinese high-tech enterprises and the growth rate of operating income have slowed down in recent three years. In particular, the industry whose core technology is mastered by European and American developed countries is facing new transformation needs and urgently needs to improve high-quality self innovation ability.

2.2.2. Increasing Investment in Innovation
Innovation can provide continuous power for high-tech industry, and research and Development Experimental investment is the material basis of innovation. As can be seen from Figure 3, the expenditure on research and development investment and the number of personnel in China have increased steadily in the past decade. The high investment in research and development can meet the large demand for capital of high-tech enterprises, promote the transformation of innovation achievements into productivity, and form a positive cycle of sustainable innovation.

2.2.3. Prominent Industrial Regional Imbalance
With the rapid development of high-tech industry, it is also facing obvious industrial regional imbalance, which is mainly reflected in the following two aspects. First, the development of the eastern and western regions is unbalanced. According to national statistics, there were 1874 large high-tech enterprises in China in 2020, of which the number in the eastern region accounted for 70%, and the proportion of main business income reached 74%, far exceeding that in the central region, the western region and the northeast region. Secondly, the imbalance between state-owned enterprises and non-state-owned enterprises. Due to the differences in systems and their own technical strength, the innovation level of state-owned enterprises
depends more on the scale of scientific and technological teams, while other ownership enterprises rely more on the investment of scientific research funds.

Figure 3. Investment amount and number of personnel in China’s research and development from 2011 to 2020


A large number of empirical studies have shown that financial development and scientific and technological innovation can have a positive impact on industrial agglomeration. Therefore, combined with empirical research, this paper analyzes the impact mechanism of financial development, scientific and technological innovation and their interaction on industrial agglomeration.

3.1. Impact of Financial Development on Industrial Agglomeration

Existing empirical studies have found that financial development can have a positive impact on industrial agglomeration. The impact mechanism is that China’s current virtual economy such as real estate and sports economy is more active, and finance serves the virtual economy more under the role of profit seeking. To some extent, the development of virtual economy can promote the development of real economy and have a positive impact on industrial gathering. However, the development level of virtual economy represented by real estate is strongly related to geographical factors. Therefore, the positive impact of financial development on industrial agglomeration is largely affected by geographical factors. At the same time, the impact of financial development on industrial agglomeration is not fully played in the short term, and will have a more significant impact in the long term.

3.2. Impact of Scientific and Technological Innovation on Industrial Agglomeration

Scientific and technological innovation can have a positive impact on industrial agglomeration, and has a more significant effect than financial development. This is mainly because China attaches importance to scientific and technological innovation, establishes the development goal of "developing high technology and realizing industrialization", implements the innovation coordinated development strategy in various developed economic circles, helps the coordinated development of industry and science and technology, and makes the extension of industrial chain and scientific and technological innovation highly consistent, so as to effectively drive industrial development and promote industrial agglomeration. At the same time, the continuous development of scientific and technological innovation will inevitably lead to the adjustment and redistribution of industrial structure. Therefore, the positive impact of
scientific and technological innovation on industrial agglomeration will gradually appear after a certain period of time.

3.3. The Impact of the Interaction between Financial Development and Scientific and Technological Innovation on Industrial Agglomeration

While analyzing the positive impact of financial development and scientific and technological innovation on industrial agglomeration, combined with the existing empirical research, this paper further considers the impact of the interaction of financial development and scientific and technological innovation on industrial agglomeration. Financial development and scientific and technological innovation can have a positive impact on industrial agglomeration, but their interaction will have a negative impact on industrial agglomeration in a certain period of time [10]. The reason may be that financial development and scientific and technological innovation promote the development of virtual economy, and will cause obvious siphon effect, leading to the continuous transfer of industries to the central cities of major economic circles. With the industrial agglomeration and transfer, the farther away the central city area is and the more backward the economic development is, the lower the industrial agglomeration degree is. However, after long-term development, the virtual economy is difficult to sustain, and the effective integration of scientific and technological innovation and financial development will eventually serve the development of the real economy, which will have a positive impact on the industrial agglomeration of major economic circles.

4. Countermeasures and Suggestions

To sum up, financial development and scientific and technological innovation can have a positive impact on industrial agglomeration under certain conditions, but their interaction will have a negative impact on industrial agglomeration in the short term. In order to strengthen the positive impact of financial development and scientific and technological innovation on industrial agglomeration and promote the impact of the interaction of Finance and science and technology on industrial agglomeration from negative to positive, this paper puts forward the following policy suggestions:

Firstly, deepen the implementation of the strategy of innovative and coordinated development and fully develop the spillover effects of regional cooperation. The government should play the role of cross regional coordination, promote the coordinated development of high-tech industry and financial service industry while following the objective law of economic development, further expand cooperation fields and improve cooperation mechanism, promote the positive impact of high-tech industry and financial service industry on industrial agglomeration, and form comprehensive cooperation, coordinated development regional cooperation pattern of benign competition.

Secondly, fully stimulate scientific and technological innovation and enhance the mutual positive impact effect of scientific and technological innovation and industrial agglomeration. The government should attach great importance to the driving role of scientific and technological innovation, increase investment in technology R & D and talent training of important national supporting industries, promote technological progress and the development of emerging industries, promote the cross regional flow of scientific and technological innovation elements, and enhance the positive impact of regional scientific and technological innovation effect on industrial agglomeration. At the same time, the government should encourage cross industry and cross regional exchanges and cooperation of high-tech industries, and strengthen the technology spillover effect of industrial agglomeration, so as to improve the positive impact of industrial agglomeration on scientific and technological innovation.
Thirdly, correctly guide financial development and scientific and technological innovation with the development of service industry as the goal. There is a close relationship between financial development and scientific and technological innovation. Scientific and technological innovation provides the source power for financial development, and financial development provides support for the transformation of scientific and technological achievements. Therefore, the government needs to promote industrial development as the goal, promote the combination of financial development and scientific and technological innovation, guide financial enterprises to focus their support and investment on the field of scientific and technological innovation, and help the interaction between financial development and scientific and technological innovation better serve industrial development and industrial agglomeration.

Acknowledgments

This work is supported by the project of National College Students' innovation and Entrepreneurship Training Program "Research on the impact of financial development and scientific and technological innovation on Industrial Agglomeration -- An Empirical Analysis Based on Beijing Tianjin Hebei Economic Circle " (Grant No.: 202110378118).

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