

The Impact and Its Countermeasures of FDI on Industrial Technology Upgrading in the Pearl River Delta Region under the Background of Supply-side Reform

Yiwen Sun

School of Economics and Management, Changzhou Institute of Technology, Changzhou 213032, China
846650317@qq.com

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Abstract: With the introduction of "supply-side structural reform" measures, institutional changes and major adjustments in economic structure, growth power structure and growth mode structure, China's economic structure will have a profound impact on the future, and foreign investment will face major structural adjustments. Foreign direct investment (FDI) plays an important role in the upgrading of industrial technology in China. It not only changes the structural state of industrial technology incrementally but also promotes the optimization, adjustment and transformation and upgrading of industrial technology in terms of stock. The direct effect of FDI is significant, and the technology spillover effect is obvious in the Pearl River Delta region. However, limited by the source of FDI, fixed asset investment and the number of employees at the end of the year have no significant effect on productivity and technological progress. To promote industrial technology upgrading in the Pearl River Delta region, we need to improve the investment environment and increase the efforts to attract foreign investment and adjust the industrial layout of FDI. Strengthen regional cooperation and accelerate industrial technology upgrading. Improve personnel's scientific and technological level and increase research and development investment.

1. Introduction

On November 10, 2015, General Secretary Xi Jinping first proposed "supply-side reform" at the meeting of the Central Leading Group on Finance and Economics. The supply-side structural reform is a government action plan put forward under the background of fully considering domestic and international environmental changes. With the introduction of "supply-side structural reform" measures, institutional changes and major adjustments in economic structure, growth power structure and growth mode structure will have a profound impact on China's economic structure in the future, and foreign investment will face a structural adjustment. On October 24, 2018, the world's longest cross-sea bridge, the Hong Kong-Zhuhai-Macao Bridge, was officially opened to traffic. For the first time, the land connection between Zhuhai, Macao and the two sides of Hong Kong was realized. The "one-hour economic circle" of the Hong Kong-Zhuhai-Macao Great Bay Area was formally formed. The completion of the Great Bay Area of Hong Kong, Zhuhai, and Macao has brought new opportunities for foreign direct investment and promoted the economic development of the Pearl River Delta.

Industrial technology upgrading plays an important role in the transformation of economic development mode and the adjustment of economic structure in China. Foreign direct investment is an important means to promote industrial technology upgrading. *China's Regional Innovation Capability Analysis Report 2004-2005* points out that the Pearl River Delta region, the key region to attract foreign direct investment in China, has the top three innovative capabilities in the country, and foreign direct investment has also contributed to the rapid growth of the regional economy to a large extent. This paper focuses on the analysis of the impact of foreign direct investment in industrial

technology upgrading in the Pearl River Delta region and puts forward countermeasures and suggestions to promote industrial technology upgrading in the Pearl River Delta region.

This paper makes an empirical analysis and comparison of the upgrading of the technology industry with FDI. From the perspective of supply-side reform, this paper studies the impact of FDI on the upgrading of the technology industry and its countermeasures, and then explores the experience and improvement space of attracting foreign investment in the Pearl River Delta region since the reform and opening-up. It is of great significance to break the regional restrictions, and how to effectively attract and utilize foreign capital, so that FDI can play an effective role in speeding up the transformation of the reform and adjustment of the Pearl River Delta region.

2. Analysis of FDI in Pearl River Delta

2.1 Basic Development Situation of the Pearl River Delta Region

The concept of "Pearl River Delta Economic Zone" was first proposed by the Guangdong Provincial Government in October 1994. "Pearl River Delta" refers to the Pearl River coastal areas of Guangzhou, Shenzhen, Foshan, Zhuhai, Dongguan, Zhongshan, Huizhou, Jiangmen and Zhaoqing. Land area is 417,000 square kilometers, accounting for 23% of Guangdong Province. In 2009, the permanent population of the Pearl River Delta region was 46.34 million, accounting for 49.8% of the permanent population of Guangdong Province. Generally speaking, the "Great Pearl River Delta" refers to the region composed of Guangdong, Hong Kong and Macao. The "Great Pearl River Delta" covers an area of 181,000 square kilometers, with a total household registration population of 86.79 million and a total GDP of 328.7 billion US dollars in 2003. In terms of economic scale, the "Great Pearl River Delta" is 1.2 times as large as the Yangtze River Delta. Its total economic output exceeds that of Switzerland and Sweden, ranking 17th largest in the world. The Pearl River Delta refers to Guangzhou, Foshan, Shenzhen, Dongguan, Huizhou, Zhongshan, Jiangmen, Zhuhai and Zhaoqing.

2.2 The Situation of Investment Attraction in Eight Major Cities in the Pearl River Delta Region

Since the reform and opening up in 1978, China has always attached great importance to the use of foreign capital to promote economic development. FDI has become an increasingly important source of capital and a key force in local economic development. The Pearl River Delta region has developed rapidly in the past 20 years, taking advantage of its geographical advantages adjacent to Hong Kong and Macao and the institutional and policy advantages brought about by the reform and opening up. However, each city has different characteristics in different stages of FDI, which can be clearly reflected from the scale and industrial distribution of FDI in eight big cities.

2.2.1 FDI Scale

During 1991-1996, due to Deng Xiaoping's South Tour Talks, a new upsurge of foreign investment in Guangdong Province was set off, and a large number of foreign investments made outstanding contributions to the economic growth of Guangdong Province. During this period, the actual utilization of foreign capital in Guangzhou increased sharply from \$405 million in 1991 to \$2.6 billion in 1996, with an average annual growth rate of 36.33%. During 1997, Shenzhen showed a slow increase. China's accession to the WTO in 2001 resulted in the second round of rapid growth of FDI in the Pearl River Delta cities. However, due to the transfer of Taiwanese capital from the Pearl River Delta to the Yangtze River Delta and Beijing, Tianjin and Hebei, Shenzhen's FDI fell by 35.14% in 2004. In 2009, the real FDI of nine cities reached its peak respectively and then decreased slightly in Dongguan and Zhongshan, but the overall growth rate slowed down. Overall, FDI in nine cities is growing in fluctuation. In terms of the overall scale of FDI in 2016, Shenzhen is the largest, followed by Guangzhou, and Zhongshan is the smallest.

2.2.2 Industrial Distribution of FDI

With China's economy entering a new normal, the pressure of industrial transformation and upgrading in the Pearl River Delta region is gradually increasing. At present, the industrial transformation and upgrading in the Pearl River Delta focus on the transition from labor-intensive to capital-intensive. The Eleventh Five-Year Plan proposed that the industries in the Pearl River Delta region should be transformed from primitive labor-intensive to more scientific and efficient high-level industries, and the transformation effect should be strengthened through trade adjustment. Among them, Shenzhen's foreign investment is mainly distributed in the secondary industry, mainly due to the early FDI "three to one" processing and manufacturing. Since 1992, Shenzhen's opening up has entered a new stage of development, focusing on industrial development and upgrading, and the proportion of foreign capital in the tertiary industry has increased slightly.

In 2014, the total contractual foreign investment in Guangdong Province amounted to \$ 43.059 billion, of which the total contractual foreign investment in manufacturing industry amounted to \$ 17.698 billion, accounting for 41.1% of the total contractual foreign investment in that year. The wholesale and retail industries accounted for 11.88%. The contractual foreign investment in the financial industry amounted to \$ 7.668 billion, accounting for 17.8%. The actual amount of foreign capital utilized by manufacturing industry reached \$ 12,953.74 billion, accounting for 48.2% of the total amount of foreign capital utilized in that year. The actual utilization of foreign capital by wholesale and retail businesses was \$3.194 billion, accounting for 11.89% of the total actual utilization of foreign capital in that year. From 2005 to 2014, the industry distribution of FDI in Guangdong Province was mainly concentrated in the manufacturing industry and gradually developed into the financial industry and service industry.

2.2.3 Trends in FDI Investment Forms

The early FDI in China mainly came from Hong Kong. Since the 1990s, the investment of European and American countries has gradually increased, and the signing of CEPA agreement has also made the investment of Hong Kong and Macao in various places continue to grow. The source of FDI utilization in Shenzhen is very uneven. The proportion of investment in Hong Kong and Macao is as high as 74%, and the rest is less than 10%. This is related to the industrial correlation between Shenzhen and Hong Kong and Macao.

3. The Mechanism of FDI Affecting the Industrial Technology Level of Host Countries

Foreign direct investment has a spillover effect on the industrial technology level of host countries. The technology spillover effect is essentially an externality, mainly due to the technology diffusion formed by multinational corporations in host countries. For multinational corporations, technology diffusion will lead to the leakage of core technology, which will endanger their technological superiority seriously. However, for host countries, technology diffusion will bring additional impetus to the upgrading of industrial technology. Therefore, the greater the proportion of foreign direct investment, the more obvious the technology spillover effect, at least the greater the possibility of technology spillover. Specifically, there are two ways of spillover effect of FDI on the industrial technology level of the host country, namely "productivity spillover" and "market channel spillover". [1] The former refers to that the host country obtains advanced technology by introducing foreign direct investment, thereby improving production efficiency; the latter refers to that the host country enterprises sell their products to the international market by introducing foreign direct investment with the help of relatively strong transnational corporations.

The main channels for FDI to influence the technological progress of host countries are as follows: Firstly, imitating the demonstration effect, that is, the host countries' enterprises improve their technological level by learning from the technological innovation, product innovation and technological innovation of transnational corporations. [2] Second, the peer competition effect, that is, in order to cope with the increasing market competition, the host country enterprises should intensify their research and development efforts and accelerate the upgrading of industrial technology. [3] Thirdly, the training effect of human capital investment, i.e., the training of employees in the host

country by multinational corporations, will enhance the stock of human capital in the host country. [4] Fourthly, the industrial linkage effect is that the supply-demand docking between multinational corporations and the upstream and downstream suppliers of the host country "forces" the local enterprises of the host country to upgrade their industrial technology. [5] Among the effects as mentioned above, the imitation demonstration effect and peer competition effect mainly exist within the industry, while the industrial linkage effect arises between industries.

4. The Impact of FDI on Industrial Technology Upgrading in the Pearl River Delta Region

It is generally believed that FDI brings obvious external technology spillover effects to host countries through technology introduction, human capital investment and production management experience imparting. In order to promote the technical level of the host country's enterprises, promote the upgrading of the host country's industrial structure, and ultimately enhance the host country's international competitiveness. Based on this hypothesis, this paper empirically examines the impact of FDI on industrial technology upgrading in the Pearl River Delta region.

4.1 Basic Model

When measuring the technology spillover effect of FDI, we adopt the economic growth model based on the new growth theory, [6] refer to the dynamic spillover model after the extended Feder model, [7] as follows:

1. Suppose a two-factor production function:

$$Y_{it} = F(K, L) = A_{it}K_{it}^{\alpha}L_{it}^{1-\alpha}, (\alpha + \beta = 1) \quad (1)$$

where Y is the output level, A is the total factor productivity, K is the capital input, L is the labor input, α is the elasticity coefficient of capital-output, $(1 - \alpha)$ is the elasticity coefficient of labor output, i and t represent the region and time respectively.

2. Assuming that FDI and domestic research and development expenditure are important factors affecting the total factor productivity of the host country (or a certain region of the host country), not only does FDI have a certain impact on the total factor productivity of host country but also its technology spillover effect has an impact on the technological level of the host country's enterprises. Taking Guangdong Province as an example, A_{it} is the total factor productivity of Guangdong Province's economy. This index is endogenously determined by the proportion of foreign direct investment in Guangdong Province's total investment (reflecting the technology spillover effect of foreign-funded enterprises on local enterprises) and the actual amount of FDI used (reflecting the effect of factor productivity enhancement of foreign-funded enterprises themselves). Therefore, the model of endogenous technological progress is established as follows:

$$A_{it} = B_{it}[1 + \eta \text{Share}_{it}] \text{FDI}_{it}^{\theta} \text{R\&D}_{it}^{\lambda} \quad (2)$$

Where, Share_{it} indicates the technology spillover effect of foreign investment. It is generally believed that the more foreign investment in a certain place, the fiercer competition among enterprises in the region. This paper uses the proportion of the actual amount of foreign capital used in the fixed assets investment of the whole society to measure the degree of intra-industry competition. R\&D_{it} denotes domestic research and development expenditure; FDI_{it} denotes foreign direct investment; θ denotes the elasticity coefficient of relative productivity between foreign capital and domestic capital, which can reflect the direct role of foreign capital enterprises in promoting technological progress; η denotes the elasticity coefficient of foreign direct investment in the proportion of total investment, reflecting the technological spillover effect of foreign capital enterprises to local enterprises. Specifically, when η is positive, it means that FDI has a significant

positive spillover effect on the technological progress of the host country; when η is negative, it means that FDI has a hindrance effect on the technological progress of the host country. λ denotes the effect of domestic research and development expenditure on total factor productivity, and B_{it} denotes the residual value of total factor productivity. It can be seen from the formula (2) that FDI can promote the technological progress of the host country through two ways: one is the indirect promotion of technology spillover ($\eta > 0$) by foreign-funded enterprises, the other is the direct promotion of foreign-funded enterprises by improving their total factor productivity (θ). That is to say, the impact of FDI on the industrial technology level in the Pearl River Delta region is determined by two parameters: η (indirect effect) and θ (direct effect). By substituting formula (2) into formula (1), the following conclusions can be obtained:

$$Y_{it} = \{B_{it}[1 + \eta \text{Share}_{it}] \text{FDI}_{it} \theta \text{R\&D}_{it} \lambda\} K_{it} \alpha L_{it} (1 - \alpha) \quad (3)$$

3. Formula (3) takes natural logarithm and adds random perturbation term, and concludes that:

$$\ln(Y_{it}) = \ln B_{it} + \ln[1 + \eta \text{Share}_{it}] + \theta \ln \text{FDI}_{it} + \lambda \ln \text{R\&D}_{it} + \alpha \ln K_{it} + (1 - \alpha) \ln L_{it} + \mu_{it} \quad (4)$$

Using approximate estimates, since $\log(1 + z) = Z$ when Z is very small, formula (4) can be written as a basic model:

$$\ln(Y_{it}) = \ln B_{it} + \eta \text{Share}_{it} + \theta \ln \text{FDI}_{it} + \lambda \ln \text{R\&D}_{it} + \alpha \ln K_{it} + \beta \ln L_{it} + \mu_{it} \quad (5)$$

where, Y_{it} denotes the gross domestic product (GDP) of area i during the t period; L_{it} denotes the number of employees at the end of the year in area i during the t period; K_{it} denotes the value of fixed assets investment in area i during the t period; FDI_{it} denotes that the actual amount of foreign capital utilized in area i during the t period is converted into the value of RMB denominated at the annual average exchange rate of RMB to US dollar in that year. R\&D_{it} denotes domestic research and development investment in the t period of the i region, and Share_{it} denotes the proportion of the amount of FDI in the t period of the i region (after converting to RMB valuation) in the fixed assets of the whole society.

4.2 Data Selection

In order to analyze the technology spillover effect of FDI in the Pearl River Delta region, the data of GDP, fixed assets investment, number of employees at the end of the year, actual utilization of foreign capital, internal expenditure of research and development funds and the proportion of FDI in fixed assets investment in Guangdong Province from 2002 to 2014 are selected (table 1). There are many statistics on FDI in the Pearl River Delta, but the reliability, availability and comparability of the data are taken into account. In this paper, the statistical data of Guangdong Province are used. The reason is that more than 90% of foreign direct investment in Guangdong Province is invested in the Pearl River Delta region, while the data of the Pearl River Delta is too short to be analyzed. In addition, in order to better distinguish the different impacts of domestic and foreign capital on technological progress, the investment amount of fixed assets used for model fitting is deducted from FDI by the whole society's fixed assets investment.

Table 1. Major Economic Indicators of Guangdong Province, 2002-2014

Year	Gross regional product (¥ 100 million)	Investment in Fixed Assets (¥ 100 million)	Employees at the end of the year (10,000 people)	Actual Utilization Outside (\$10,000)	Internal Expenditure on R&D Expenditure (¥ 100 million)	The proportion of FDI in fixed assets investment
2002	13502.42	3970.69	4134.37	1658946	156.45	0.346
2003	15844.64	5030.57	4395.93	1894081	179.84	0.312
2004	18864.62	6025.53	4681.89	1289900	215.19	0.177
2005	22557.37	7164.11	5022.97	1517358	249.6	0.172
2006	26587.76	8132.37	5177.02	1780780	313.04	0.171
2007	31777.01	9596.95	5341.5	1961771	405.5	0.151
2008	36796.71	11165.06	5471.72	2126657	504.57	0.13
2009	39492.52	13353.15	5688.62	2028688	652.98	0.103
2010	46036.25	16113.19	5870.48	2102646	808.75	0.086
2011	53246.18	16843.83	5960.74	2232847	1045.49	0.08
2012	57147.75	19307.53	5965.95	2410578	1236.15	0.076
2013	62474.79	22828.65	6117.68	2532719	1443.45	0.069
2014	67809.85	25928.09	6183.23	2727751	1605.45	0.065

Data source: Guangdong Statistical Yearbook, 2003-2015.

4.3 Result Analysis

According to the existing theoretical logic, the impact of FDI on the technological level of a region is determined by both indirect and direct effects. According to the empirical results of this paper, the impact of FDI on industrial technology level in the Pearl River Delta region has both positive and negative effects, showing a complex phenomenon of both positive and negative effects. Firstly, FDI's direct technology spillover effect shows a positive promoting effect. Although the proportion of input and output is not coordinated, FDI still directly promotes local technological progress through its own total factor productivity improvement. Secondly, the indirect technology spillover effect of FDI has a negative inhibitory effect, which should be closely related to the source of FDI and other factors. In addition, local research and development expenditure can significantly promote economic growth and technological progress, while fixed-asset investment and the number of employees at the end of the year have no significant effect on productivity and technological progress. The specific results are as follows: First, the parameters of FDI in fixed assets investment are estimated to be significant at the level of 5%. Through T test, the regression coefficient is -2.398287. The results show that FDI has a negative technology spillover effect on the technological progress of domestic enterprises in Guangdong Province, that is, when the productivity of foreign enterprises remains unchanged, FDI cannot promote the technological progress of domestic enterprises, on the contrary, it inhibits the progress of local technology. The reason for this situation is that the source of foreign capital in the Pearl River Delta is mainly from East Asia, especially Hong Kong, Macao and Taiwan, while the capital in Hong Kong, Macao and Taiwan is mostly concentrated in labor-intensive enterprises, which use the rich and cheap labor resources in the Pearl River Delta to assemble products. At the same time, the intermediate capital goods have not been localized. This kind of "big in, big out, two

out" production and marketing structure cannot promote the upgrading of industrial technology level of relevant domestic enterprises, on the contrary, it inhibits the technological progress of SMEs in the industrial chain, so the spillover effect is negative.

Second, the estimated FDI parameter is 0.536861, which passes the T test at 5% significant level. The results show that the productivity of MNCs has a positive effect on the technological level of enterprises in Guangdong Province, so the direct technology spillover effect of FDI is positive. Specifically, for every 1% increase in FDI, the contribution to Guangdong's output level increased by 0.537%. It can be seen that for a long time, Guangdong Province, especially the Pearl River Delta region, has played a certain role in promoting local technological progress by formulating preferential policies to attract foreign investment. Although this positive promotion effect is not great, and some of the technology is relatively low, some of these foreign direct investments bring about the elimination of foreign technology, even in order to reduce the risk of pollution in the home country and enter our country. However, compared with the local technological level, this kind of FDI can still promote local technological progress in a short period of time.

Thirdly, the parameter estimation of research and development is 0.339441, which passes T test at 1% significant level. The results show that research and development expenditure in Guangdong Province can significantly promote economic growth and technological progress. Although the ability of independent innovation is not strong, it has played a significant positive role in improving production efficiency. In recent years, research and development investment in Guangdong Province, especially in the Pearl River Delta region, has increased year by year. Its share of GDP and fixed assets investment has increased from 1.16% and 3.92% in 2002 to 2.37% and 6.19% in 2014, respectively. It has nearly doubled in ten years or so. The increase of research and development input has shown some effect in the output. Although the proportion of research and development in GDP still lags behind that of developed countries such as the United States and Japan, this kind of research and development investment has evidently reflected the positive effect of independent innovation ability on local productivity and technological level. Therefore, it is necessary to continue to increase research and development investment.

Fourthly, the regression results of the two parameters of fixed assets investment and the number of employees at the end of the year show that the estimators have not passed the T test. The results show that the two variables have no significant effect on productivity and technological progress. It is worth noting that fixed-asset investment has no obvious effect on the upgrading of local technology level, which may be related to the type of fixed asset investment because it contains a lot of extensive investment at the cost of consuming resources and environment and blind investment in repetitive construction. This shows that extensive and low-level duplicate investment in fixed assets is not conducive to the upgrading of local technology.

Table 2. Technology Spillover Effect of FDI in Guangdong Province

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.476943	3.312801	-1.049548	0.3288
SHARE	-2.398287	0.862929	-2.779240	0.0273
LNFDI	0.536861	0.160089	3.353507	0.0122
LNR&D	0.339441	0.072050	4.711175	0.0022
LNK	-0.178933	0.144595	-1.237481	0.2558
LNL	0.697520	0.558088	1.249838	0.2515
R-squared	0.999227	Mean dependent var		10.41862
Adjusted R-squared	0.998676	S. D. dependent var		0.536284
S.E. of regression	0.019517	Akaike info criterion		-4.731016
Sum squared resid	0.002666	Schwarz criterion		-4.470270

Log likelihood	36.75160	Hannan-Quinn criter	-4.784611
F-statistic	1810.654	Durbin-Watson stat	1.957270
Prob(F-statistic)	0.000000		

5. Countermeasures and Suggestions on Promoting Industrial Technology Upgrading in the Pearl River Delta Region

5.1 Improving the Investment Environment and Increasing the Attraction of High-tech Foreign Investment

In view of the current development situation in the Pearl River Delta region, the government should speed up the transformation from "management-oriented" to "service-oriented", gradually deregulate, and provide good services for foreign-funded enterprises invested in the Pearl River Delta region. Furthermore, it will provide a free investment and trade environment for foreign investment, attract multinational companies with high technology level to invest in the Pearl River Delta region, and give full play to the technology-driven effect of foreign direct investment. At the same time, we should formulate a sound legal system to provide a good legal environment for investment, streamline the procedures for foreign investment and improve the attractiveness of the investment environment in the Pearl River Delta region. In addition, we should further strengthen the infrastructure construction in the Pearl River Delta region, optimize the logistics conditions within the region and connect with the external regions.

5.2 Adjusting the Industrial Distribution of FDI

First, we will increase investment in the primary industry and encourage foreign investment to flow to agriculture. Developing new agricultural projects with foreign direct investment, cultivating new technologies and making positive contributions to the optimization of the internal structure of the primary industry. Second, increase investment in the tertiary industry. The goal of industrial transfer is to realize the "321" industrial structure. [8] In recent years, the scale of FDI used by service industry in the Pearl River Delta region has gradually expanded, but its share is still small compared with the scale of FDI used by the secondary industry. At the same time, foreign direct investment in the tertiary industry mainly flows into real estate industry and rental service industry. Therefore, we should guide foreign direct investment to strengthen investment in the financial industry, education, health and other service industries in order to balance the internal development of service industry.

5.3 Strengthen Regional Cooperation and Accelerate Industrial Technology Upgrading

In order to accelerate industrial technology upgrading, the Pearl River Delta region should strengthen regional cooperation at the international level. On the one hand, we should make full use of the rich resources and cheap labor of developing countries such as Southeast Asia to encourage enterprises in the region to go out, accelerate industrial transfer and capacity cooperation in Southeast Asian countries, optimize the allocation of resources, manpower and capital, and create space for upgrading their industrial technology. On the other hand, we should make full use of the advantages of geographical proximity to Hong Kong, Macao and Taiwan and economic proximity to developed countries, attract advanced industries, human capital and technological resources of these countries or regions through strengthening regional cooperation, conform to the trend of industrial technology upgrading in the region, and undertake the transfer of advanced industries of developed countries or regions.

5.4 Promoting the Level of Personnel Science and Technology and Increasing Research and Development Investment

On the one hand, we should give full play to the role of existing scientific and technological talents, improve the comprehensive quality of scientific and technological talents, especially their innovative ability and research and development ability by improving training procedures and evaluation

mechanism. At the same time, according to the characteristics and needs of industrial structure in the Pearl River Delta region, research and development personnel and high-tech personnel are introduced to enhance the vitality of industrial development. We will strengthen cooperation with institutions of higher learning and scientific research institutions in or around the region to accelerate the development of high-tech industries further and upgrade their technological levels. On the other hand, we should strengthen research and development investment intensity, expand the financing channels of enterprises, give full play to the positive role of foreign direct investment, and enhance the independent research and development capability of the technology industry. At the same time, enterprises with high energy consumption and low output will be eliminated, and old equipment will be upgraded or optimized by using high and new technologies, so as to enhance the industrial technology level of the region further.

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