

Study on the Impact of OFDI on the Upgrading of China's Trade Structure

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Abstract

With the advancement of China's reform and opening-up and rapid economic development, bilateral trade between China and various countries has been increasing, and of which of foreign direct investment (OFDI) has been increasing. At present, OfDI in China is divided into shun gradient OFDI and reverse gradient OFDI, the former is resource-seeking OFDI, the latter is technology acquisition OFDI. Both types of OFDI have some influence mechanism on China's commodity trade structure. At present, China is in the stage of industrial transformation and upgrading, so this project focuses on the impact of OFDI reverse spillover effect on the upgrading of trade structure. Based on the panel data of 31 provinces in China from 2002 to 2019, the export of high-tech products from various provinces of China is measured to measure the degree of trade structure upgrading, and the influence of China's OFDI on trade structure is analyzed. The project explores the relationship between the two from theoretical research and empirical analysis, and finally puts forward relevant policy recommendations based on the results of the research.

Keywords

OFDI; Trade Structure; Reverse Technology Spillover Effect.

1. Introduction

Since the reform and opening, especially after the "Belt and Road" and "going out" strategies, China's total export trade has risen rapidly. According to China's Foreign Investment Statistics Bulletin in recent years, global economic growth has fallen to an all-time low since the world financial crisis, with the accompanying effect of a marked decline in global trade in goods and a 33% increase in foreign direct investment flows from foreign companies. Under such a global background, China's economy as a whole is in a stable state, the level of opening up to the outside world has not decreased or increased, and under the active guidance of the relevant departments, the quality of the development of Chinese enterprises has been greatly improved. Data show that China's foreign direct investment flows in 2019 amounted to US\$136.91 billion, down 4.3% YoY, but ranked second in the world, and since 2003, China's foreign investment flows have ranked among the top three in the world for eight consecutive years, occupying an important position in the world economic development. China's outbound investment in the global foreign direct investment influence is increasing, so in this context, the study of how to promote trade structure upgrading through OFDI has become a popular research object. The relationship between outward investment in trade structure was studied earlier in 2007 when Wang Ying and a group of other scholars showed that domestic industrial structure and trade structure are closely related, so it can be concluded that OFDI can affect the changes of China's industrial structure. This project measures the upgrading of trade structure by the proportion of high-tech products and processed trade products to total exports of various provinces in China, and uses of OFDI data from each province to construct a panel model to analyze of OFDI's

role in promoting trade structure upgrading under the mechanism of reverse spillover effect of OFDI. The project is therefore based on the theory of OFDI and trade structure. By constructing the panel model to analyze the relationship between the two under the action of the reverse spillover effect mechanism, and to carry out the empirical research and theoretical analysis of the specification. Reveal the promotion effect of OFDI on trade structure. China is in the stage of industrial transformation and upgrading, refining and issuing targeted conclusions, hoping that China can carry out foreign direct investment, enhance trade structure, speed up economic transformation, so that China in the context of world economic integration has a stronger international competitiveness, and ultimately become a world trade power to provide effective advice and reference.

2. Overview of the Article

2.1. Status of Foreign Research

First of all, the economic effect of OFDI is not only reflected in the scale of trade, but also in the structure of trade. As early as 1966 Vernon's product life cycle theory proposed that the same product in different levels of technology in different countries in the production stage, so the competitive advantage of enterprises is also different, multinational companies will be their marginal industries in the way of foreign investment to overseas developing countries, eliminate excess capacity, optimize the allocation of resources, and thus affect the investment countries' trade structure. Secondly, the marginal industry expansion theory put forward by Japanese economist Kojima Qing in 1978 suggests that international OFDI will shift the relatively disadvantaged industries outwards, thus affecting the import and export trade structure of the investing countries. In addition, Arthur argued in 1990 that international direct investment had accelerated the cross-border flow of factors of production and that industries were re-organized among countries, thus changing the structure of trade. Finally, Rodrik (2006) and Hausmann (2007) based on the level of technology of export commodities, pointing out that countries' technological progress through OFDI and the technological spillovers from commodity trade may in turn contribute positively to the optimization of the country's trade structure.

2.2. Status of Domestic Research

The study on the relationship between outbound investment and trade structure started late. Li Jianping (2007) from the perspective of technological progress analysis, OFDI can transform China's export structure, mainly through two aspects of the role, one is foreign direct investment to stimulate the export of capital goods and services, enhance the added value of products; Dewey Sword (2015) believes that OFDI can promote the self-improvement and renewal of the quality of the host country's products, especially the processing trade type and service export type is the most obvious. Wu Qing (2016) suggested that OFDI could promote the rational allocation of resources and enhance the trade structure. At the same time, OFDI has played an important role in the growth of exports of high-tech value-added products and in the structure of export trade. Le Yi (2017) believes that Chinese enterprises in the OFDI process can make reasonable use of overseas intelligence and research and development capabilities, through reverse technology spillover, to increase the added value of export products and trade structure optimization purposes. Wei Equality (2010) based on panel data empirical research, showing that OFDI can promote the high structure of export commodities. Chen Yuyu (2012) through the establishment of time series regression model, the direct investment of the trade structure effect of empirical research, found that of OFDI stock on the improvement of trade structure has a significant role in promoting, and further from the industry perspective to demonstrate the impact of direct investment on trade structure. Li Xialing et al. (2015) selected the data-building panel model of 25 provinces in China for regression analysis, and pointed out

that OFDI has a significant effect on the improvement of the trade structure of investment countries, and the trade structure effect of OFDI in the eastern region is most obvious. Jia Wei (2015) through the time series data unit root test, cointegration test and other empirical analysis, the OFDI will improve China's export trade structure through reverse technology spillover effect.

2.3. Literature Review

By combing through a large number of previous research results, it is not difficult to find that OFDI not only promotes the scale of bilateral trade, but also provides an opportunity for China's trade structure upgrading. However, when looking for relevant literature, we found that the data on the relationship between trade structure upgrading and OFDI are relatively fragmented, and most foreign studies are based on the theory of industrial structure upgrading, because compared with developing countries, developed countries' outward investment belongs to the gradient of capital export, in order to realize the transformation and upgrading of domestic industrial structure and transfer sunset industry to developing countries. There are more theoretical and empirical studies on the relationship between OFDI and trade structure in China, but most articles directly study the mechanism of the influence of OFDI on trade structure based on trade creation effect and trade substitution effect. Based on this, this project mainly analyzes the impact of OFDI on China's trade structure in the new economic situation, and quantitatively analyzes the upgrading of trade structure from the perspective of OFDI's reverse technology spillover effect, thus improving the nuance and accuracy of the research results.

3. Analysis of Theoretical Mechanisms

Trade structure refers to a country or region in a certain period of time all categories of import and export commodity trade accounted for the proportion of total import and export trade. The improvement of trade structure is related to the economic development and industrial structure of a country or region. This project first analyzes of OFDI's reverse spillover effect from the perspective of domestic economic transformation, and the domestic economy is facing the problem of transformation on the basis of the gradual expansion of domestic and foreign trade scale, which will inevitably develop a number of new industries with export advantages in line with domestic and foreign market demand. The formation of new industries and the elimination of disadvantaged industries will certainly change the structure of foreign trade, because in the context of domestic and foreign trade stability, the renewal rate of new industries is difficult to meet market demand, at this time the reverse spillover effect of foreign investment plays a role, the target countries of foreign direct investment will be reverse feedback back to technology, management and other aspects to help accelerate the formation of new industrial scale, trade structure with the transformation of industrial structure and optimization and upgrading. On the other hand, direct OFDI technology spillover, mainly through the globalization of technology research and development by multinational enterprises. Although the current global high-tech research and development center is concentrated in the United States, Japan, Europe, three major sectors, but with the development of the global economy, multinational companies' technology research and development center gradually transferred to developing countries, including the Importance of China's international competitive position gradually increased. In this context, China can use the research and development spillover of multinational enterprises to introduce advanced technology into the upgrading of trade structure. There are two main ways of this kind of research and development spillover: First, China forms strategic cooperation with the enterprises or research and development institutions of the host country through transnational corporations. In this case, China's technology, capital do not have a greater advantage, so most of the host country to provide capital and technology, and China can only take advantage of

labor costs. This kind of cooperation is not very cutting-edge, rarely becomes a form of cooperation. Second, the use of multinational enterprises directly in the host country to set up research and development institutions, control directly owned by multinational enterprises, with the global market, long-term development of enterprises as the main purpose, directly applied in China's high-level industries, to promote the upgrading of foreign trade structure. In a word, the mechanism of influence on the upgrading of trade structure of OFDI in China is mainly to use of OFDI's reverse technology overflow in which it plays a role, and the spillover of technology will play a role in the development of trade structure to a certain extent.

4. Description of the Model and Variables

4.1. Model Build

Based on the data integrity of the study sample, and taking into account six aspects of impact, including OFDI flow as the core explanatory variable, trade structure as the core explanatory variable, build a dual fixed effect model to examine the impact of OFDI on China's trade structure upgrading:

$$\ln TS_{it} = \beta_1 \ln OFDI_{it} + \beta_2 CIS_{it} + \beta_3 \ln INNO_{it} + \beta_4 \ln POP_{it} + \beta_5 TLP_{it} + \beta_6 CRD_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

Among them, $\ln TS_{it}$ represents the trade structure of the i region t period, $\ln OFDI_{it}$ represents the I region t period of OFDI flow, CIS_{it} for industrial structure, $\ln INNO_{it}$ for innovation capacity, $\ln POP_{it}$ for market size, TLP_{it} for full labor productivity, CRD_{it} for research and development capacity, β is the coefficient of each variable, μ_i representing the fixed effect of the province, λ_t representing the fixed effect of the year, ε_{it} representing the random error term. β_1 for the factors of greatest concern in this paper. If $\beta > 0$, it shows that OFDI is conducive to the upgrading of the trade structure, and vice versa.

4.2. Variable Description

This paper mainly investigates the influence of OFDI on China's trade structure, but the factors affecting trade structure are not limited to OFDI studied in this paper, the article also considers the influence of other development factors on trade structure. Based on the availability of research data, this paper selects the provincial OFDI and trade institutions related panel data for empirical analysis in 2003-2019. The relevant variable fitting description is as follows: (1) OFDI: Select provincial panel data for OFDI flows 2003-2019 as a core explanatory variable. Because of the large number of OFDI and the large differences between regions, the data is processed lying first. (2) Trade Structure (TS): As the core explanatory variable, this paper uses the export value of high-tech products from each province to measure the degree of trade structure upgrading. The higher the volume of exports of high-tech products indicates that the higher the upgrading of the trade structure. (3) Industrial structure (CIS): High-tech industry belongs to the domestic secondary industry, as a control variable between industrial structure and trade structure has a close relationship. (4) Innovation Capability (INNO): Innovation ability as a control variable will affect the upgrading of trade structure to some extent. (5) Total Labor Productivity (TLP): In the process of examining the upgrading of trade institutions, full labor productivity is an important index. By the definition of economics, full labour productivity is calculated by dividing GDP by all employees over the same period. (6) Market size (POP): The number of units in which market size can absorb a product or service within a certain period of time, which plays a vital role in the upgrading of trade structure. This article will measure the size of the market by the population of each region. (7) Research and development capability

(CRD): As the main force of trade institution upgrading, the research and development ability of various regions is one of the important factors affecting high-tech industry, and having high research and development ability will promote the development of high-tech products and expand the competitiveness of the international market, thus enhancing the trade structure.

5. Empirical Analysis

5.1. Statistical Description of Variables

The characteristics of each variable in the regression model are summarized as follows, in which the industrial structure index, the labor productivity index of the whole staff is the ratio, and the other is the natural number.

Table 1. Variables statistically describe the results

Variabl	Obs	Mean	Std. Dev.	Min	Max
lnTS	445	23.0890	2.6023	15.7279	28.0936
lnOFDIL	445	21.2219	2.2401	13.1052	25.7934
CIS	445	8.4904	12.8451	0.7317	93.2504
lnINNO	445	9.2130	1.6268	4.3694	13.0775
lnPOP	445	8.1816	0.7464	6.2975	9.4212
TLP	445	13.0306	3.8400	4.9086	28.7084
lnCRD	445	10.8583	1.1880	7.0975	13.5447

5.2. Basic Regression

Based on the research of this paper, of OFDI flow is taken as explanatory variable and trade structure as explanatory variable. Because the situation varies from province to province, there may be individual effects that do not change over time, and there may be time effects that do not change with individual differences, so this paper uses a dual fixed effect model for regression. The regression results are shown in Table 2.

As can be seen from the table above, the first and second columns are not added to the control variables, control the individual fixed effect, and the time fixed effect is not controlled and controlled regression results. In the absence of control of the fixed effect of the year, of OFDI flow has an impact coefficient of 0.4478 on China's trade structure, which is significantly positive at the 1% confidence level, which initially shows that OFDI has a significant effect on China's trade structure; But on the whole OFDI has obvious positive effect on the upgrading of China's trade structure. The third and fourth columns are the regression results of controlling the time effect after the control variables are added. After joining the control variable system, the influence coefficient of OFDI on China's trade structure of the fixed effect of the year is 0.1714 and the coefficient of the fixed effect of the control year is 0.1476. Both are significantly positive at a 5% confidence level, and the results further illustrate that OFDI has contributed to the upgrading of China's trade structure. That is, the foreign direct investment of multinational enterprises engaged in high-tech industries has led to the upgrading of trade structure, as well as more advanced technology and product innovation applied to industrial development, and improve trade structure.

5.3. Robustness Test

In order to verify the accuracy of the regression results, this paper further tests the robustness. The test is mainly by modifying the specific parameter variables to repeat the experiment, to see whether the empirical results will change, if the parameters change, the significance and positive and negative changes, then the model regression results are not robust. In this paper, the main choice of replacement estimation method to verify the stability of the model.

Table 2. Basic regression results

	(1)	(2)	(3)	(4)
	lnts	lnts	lnts	lnts
lnofdil	0.4478***	0.1333*	0.1714**	0.1476**
	(0.0612)	(0.0711)	(0.0717)	(0.0707)
cis			-0.0271*	-0.0321**
			(0.0141)	(0.0147)
lninno			0.6729***	0.4771*
			(0.1998)	(0.2703)
lnpop			-3.4713**	-3.4665*
			(1.5983)	(1.8072)
tlp			0.0352	0.0125
			(0.0477)	(0.0586)
crd			0.0049	-0.1439
			(0.3146)	(0.3796)
_cons	13.5849***	18.9314***	41.3707***	44.6790**
	(1.2997)	(1.2970)	(12.9484)	(16.6260)
time effect	no	yes	no	yes
Individual effect	yes	yes	no	yes
N	445	445	445	445
R ²	0.497	0.576	0.607	0.627
F	53.4704	23.0865	17.3597	21.7466

Standard errors in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01

Table 3. GMM estimates

	(1)	(2)	(3)	(4)
	lnts	lnts	lnts	lnts
L.lnts	0.9464***	0.7069***	0.8493***	0.7488***
	(0.0742)	(0.0837)	(0.0363)	(0.0759)
lnofdil	0.1091***	0.1206***		
	(0.0157)	(0.0381)		
lnofdic			0.1337***	0.0880*
			(0.0380)	(0.0453)
cis		-0.0146		0.0235
		(0.0989)		(0.0199)
lninno		0.2104		0.1865
		(0.4611)		(0.1345)
lnpop		-0.2596		0.4585
		(0.5417)		(2.3342)
tlp		0.0962		0.0388
		(0.0932)		(0.0379)
crd		-0.2589		0.0014
		(1.1791)		(0.1794)
_cons	-0.7489	0.0000	0.8444	-2.6321
	(1.6572)	(.)	(0.9846)	(19.5430)
time effect	no	yes	no	yes
Individual effect	yes	yes	no	yes
N	415	415	415	415
AR(2) P-value	0.162	0.167	0.161	0.168
Sargen P-value	0.643	0.656	0.661	0.618

Standard errors in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01

In this paper, the GMM estimation model is used to replace the original estimation model, and of OFDI flow and stock as explanatory variables are empirically analyzed to explore the impact of OFDI on China's high-tech products. GMM estimates that the effectiveness of tool variables and the second-order correlation of residuals are generally required to be tested, and sargen and AR tests are carried out for the above two problems, respectively, and the specific regression test results are shown in Table 3.

As can be seen from Table 3, the core explanatory variables, whether OFDI flow or stock, have no legal change in the significance and positive or negativeness of China's trade structure, and are significant at least 10% of the confidence level; Secondly, from the relevant test, sargen test P value is about 0.6 large, that is, do not reject the original hypothesis, indicating that the tool variables are valid; By comparison, it can be concluded that OFDI has a significant positive effect on the results of the two-way fixed effect estimation model and the GMM estimation model for China's trade structure upgrading. It shows that the relationship between the two has a certain consistency and robustness.

5.4. Heterogeneity Analysis

Table 4. Regional heterogeneity

	(1)	(2)	(3)
	lnts	lnts	lnts
	eastern	Central	westward
lnofdil	0.1445***	0.0233	0.0117
	(0.0499)	(0.0797)	(0.0676)
cis	-0.0074	0.0328	0.6056***
	(0.0092)	(0.0701)	(0.1579)
lninno	0.2139	0.2957	-0.2277
	(0.1691)	(0.2675)	(0.3019)
lnpop	-4.3038***	20.0585***	-1.4858
	(0.8791)	(2.6840)	(2.3037)
tlp	-0.0256	-0.0150	0.0529
	(0.0248)	(0.0459)	(0.0423)
crd	-0.3295	-0.1406	0.1667
	(0.2048)	(0.4933)	(0.4674)
_cons	58.1713***	-1.5e+02***	28.7150
	(7.0653)	(20.8456)	(17.9066)
N	179	150	116
R ²	0.600	0.836	0.830
time effect	yes	yes	yes
Individual effect	yes	yes	yes
F	11.0243	30.5352	21.4637

Standard errors in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01

Because there are different external factors such as economic development level, resource endowment and policy environment in the eastern and western regions of China, the influence of OFDI on trade structure can be judged to be different in different regions. In order to make the analysis more reliable, the total sample is divided into three subsamples according to the criteria of the National Bureau of Statistics for the three regions in the east, central and western regions. Among them, the eastern region includes Beijing, Tianjin, Shanghai and other 12 provinces (municipalities and autonomous regions), the central region includes Anhui, Jiangxi, Henan and other 10 provinces (municipalities and autonomous regions), the western region includes Sichuan, Qinghai, Xinjiang and other 9 provinces (municipalities and autonomous

regions). The regression results for the dual fixed effect models for different regions are shown in Table 4.

As can be seen from Table 4, the impact of OFDI on trade structure is more significant in the eastern region, but not significant in the central and western regions. This may be due to the concentration of more high-tech personnel and research and development bases in the eastern region, transportation and other infrastructure is more perfect, conducive to the transformation of OFDI reverse spillover advantages. The development of high-tech industry has become one of the main pillar industries in the eastern region, with export advantages. For the central and western regions, its industrial structure level is low, innovation capacity is limited, it is difficult to transform of OFDI reverse spillover favorable conditions into the innovation of export commodity trade structure, high-tech industries are difficult to form competitive advantages in the international market, so the impact of OFDI on trade structure in the central and western regions is not obvious.

6. Conclusion

Based on the data of OFDI and high-tech export trade in 31 provinces of China from 2003 to 2019, this paper empirically analyzes the impact of OFDI on China's high-tech exports from a domestic perspective. Under the fixed time effect and provincial effect, OFDI has a significant effect on the upgrading of China's trade structure and the effect in the eastern region is more obvious, because multinational enterprises are the main body of OFDI, the establishment of transnational corporations in the host country is conducive to products entering the international market. In terms of control variables, industrial structure and domestic market scale have a significant inhibitory effect on the upgrading of trade structure, and innovation ability has significantly promoted the upgrading of trade structure, mainly due to the upgrading of domestic industrial structure and market size to compress the export market share of high-tech products; Therefore, this paper thinks that the investment risk should be avoided from the expansion of OFDI model. Through coordinated regional development, improve product quality and innovation capabilities, enhance product advantages. At the same time optimize the industrial structure, improve the level of cooperation and so on to use OFDI to upgrade China's trade structure.

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