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The Influence of OFDI Investment Motivation on the Upgrading of Home Country's Industrial Structure

-- Based on the Comparison between Developing Countries and Developed Countries

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Abstract

Based on panel data of outward direct investment (OFDI) from 22 developed countries and 40 developing countries from 2004 to 2019, this paper empirically analyzes the different effects of the investment motivations of developed and developing countries on the upgrading of the industrial structure of the home country. The study found that for developed countries, Resource-seeking and Technology-seeking OFDI can significantly promote the optimization and upgrading of my country's industrial structure, and market seeking OFDI can inhibit the upgrading of my country's industrial structure; for developing countries, its Resource-seeking OFDI can also significantly promote my country's industrial structure upgrade; but the effect of market seeking and technology seeking on the industrial structure is not significant. The research provides a reasonable location choice for the promotion of my country's industrial structure under different investment motives.

Keywords

Foreign Direct Investment; Industrial Structure Upgrading; Investment Motivation.

1. Introduction and Literature Review

Since China's reform and opening up, the economy has developed rapidly, and the quality of people's lives and happiness have been increasing. However, the disadvantages brought about by the rapid development have gradually begun to appear. The continuous consumption of resources has begun to be in short supply, and the large-scale industries have begun to overcapacity and lack of technology. Issues such as innovation and development have not been properly resolved. In 2002, China vigorously implemented the development strategy of "going global" and encouraged enterprises to invest abroad. Later, foreign direct investment (OFDI) for the purposes of obtaining resources, transferring production capacity, and learning technology has grown and developed. Through the improvement of some scholars, an OFDI investment motivation system with Resource-seeking, Market-seeking and Technology-seeking has gradually formed. According to statistics from the "Statistical Bulletin of China's Foreign Direct Investment in 2019", since 2016, the growth rate of the world economy and trade in goods has slowed down, and China's OFDI has declined, but the overall economic level has remained stable. In 2019, China's OFDI flow was 136.91 billion U.S. dollars, ranking second in the world, with a stock of 2198.8 billion U.S. dollars, making it the third largest foreign direct investment country in the world, second only to the United States and the Netherlands.

In the middle of the 20th century, multinational companies in developed countries gradually focused on target markets overseas and obtained high profits, which aroused extensive discussions among scholars and gradually formed a series of theories. Hymer (1960) attributed the reason why multinational companies can survive overseas for a long time and compete with

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other enterprises in the host country to their own strong monopoly position, that is, intellectual property advantage and scale economy advantage, and thus put forward the "monopoly advantage theory" [1]. Buckley and Casson (1976) believe that under the assumption of new manufacturer theory and market incompleteness, internalize intermediate products, build an internal exchange system, reduce price changes caused by external market supply and demand, and pursue profit maximization [2]. British scholar Dunning (1977) combined the views of the two and put forward the international production compromise (OIL) theory, which believed that multinational companies must have ownership advantages, internalization advantages and location advantages in order to carry out overseas business [3].

In the 1980s, developing countries also gradually began to make foreign direct investment. American scholar Wells (1983) believes that even if developing countries do not have the technological level of developed countries, they can rely on small-scale production technologies, ethnic characteristic products that are not easy to replicate, and low-cost marketing strategies to enhance their own advantages [4]. In the same year, Lall (1983) proposed on the basis of supporting Wells that developing countries would use the secondary innovation of "learning by doing" to enhance their competitive advantage [5]. Mathews (2006) broke the traditional notion that “outward direct investment must have a competitive advantage” and proposed an “L-L-L” analytical framework. The "latecomers" can obtain external linkages with the "first movers", and cooperate with more high-level multinational companies through leverage, and the absorption of learning can be transformed into their own advantages [6].

Many domestic scholars have also done analysis and empirical research on this type of problem. Wang Qi (2004) comprehensively analyzed the transmission mechanism of foreign direct investment to industrial upgrading [7]. Zhao Wei and Jiang Dong (2010) divided China's OFDI enterprises into policy-oriented state-owned enterprises and benefit-oriented private enterprises to establish a simplified model, using empirical analysis of typical provinces and industrial data to find that OFDI does have a positive effect on the optimization of industrial structure The effect is positively correlated with the scale of OFDI [8]. The researches of Li Fengchun (2012), Yang Jianqing (2013), and Yang Dongxu (2020) have reached similar conclusions [9-11]. The empirical study of Ren Xuemei and Chen Hanlin (2019) found that foreign direct investment is negatively correlated with the change in China's industrial structure, and it has not yet shown an upgrade effect [12]. Li Mengxi et al. (2020) constructed static panel data and found that foreign direct investment mainly relies on trade, technology, capital accumulation, and human capital to promote the upgrading of industrial structure, while constructing a dynamic model found that it has an inhibitory effect on the rate of change of industrial structure adjustment [13]. Wu Xianming and Huang Chuntao (2016), Wu Jianzu and Zheng Qiuxia (2020) confirmed that China's foreign direct investment has a strong and significant motivation to seek resources and markets [14]. Ding Yibing and Fu Lin (2016) found that the reverse technology spillover brought about by technology seeking can significantly promote China's technological progress [15]. Pan Sukun and Yuan Ran (2014) found that although the three types of foreign direct investment motives are lagging behind, they are all reasons for the optimization and upgrading of China's industrial structure [16].

Predecessors’ analysis of investment motives and the industrial structure of the home country mostly used inter-provincial panel data, and the conclusions were inconsistent. The host country of investment was not classified and compared. The analysis of different nature of the country, its investment motives and China’s industrial structure What’s different about the changes. Therefore, based on previous explorations, this article extends the host country sample into two types: developed and developing countries, to analyze the different types of countries that China’s foreign direct investment has, and the different motives of its investment have a bearing on China’s industrial structure. Promote or inhibit, and provide a reference for location selection for future investments with different motives.

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2. Mechanism Analysis and Hypothesis Proposed

2.1. Resource-seeking OFDI Location Choice and Action Route

Due to the stable economic strength of most developed countries, most of the natural resources such as mined minerals are used for self-sufficiency, and basically no export will occur. However, developing countries can rely on the export of natural resources to increase GDP and improve the level of national economic development. , So as to promote the development of military, science and technology, education, health and other aspects. For investment countries, state-owned enterprises are mostly driven by national strategic interests to invest in the host country, while private enterprises often invest in the host country out of seeking certain strategic resources. Therefore, Resource-seeking OFDI is mostly state-owned The enterprise is the main body. These multinational companies are more willing to choose developing countries. First, most developed countries are European countries with a small land area and not many resources and minerals. Many countries in Africa, the Middle East and other places are rich in resources. Without friction between the two sides, imports can be stabilized and there is no need to look for other investments. Target, establish a more stable network of relations between the investing country and the host country. Second, it not only solves the resource needs of investors, but the host country also drives its own economy through exports. Thirdly, the system environment of developing countries is generally poor. Therefore, both parties can sign bilateral investment agreements to make up for the lack of systems in developing countries, improve the quality of the system, and improve the system environment [17]. Developed countries want to compete with investing countries through monopoly advantages, and barriers may appear in the investment process, slowing down the investment process.

The Resource-seeking OFDI promotes the optimization and upgrading of the industrial structure by supplementing the necessary resources of the enterprise while driving the upstream and downstream industries. On the one hand, resource replenishment breaks the limitation of resources, making resource shortage no longer a problem that enterprises need to overcome, and the industry can develop smoothly. On the other hand, the upstream equipment manufacturing industry and downstream industries that use supplementary resources as raw materials have been developed, thereby promoting the optimization and upgrading of the industrial structure.

Hypothesis 1a: The Resource-seeking OFDI for developed countries cannot promote the optimization and upgrading of China's industrial structure (-or not significant).

Hypothesis 1b: Resource-seeking OFDI for developing countries can promote the optimization and upgrading of China's industrial structure (+).

2.2. Market-seeking OFDI Location Choice and Action Route

According to the product life cycle theory, products circulate in the market, the industry begins to form and develop gradually, and the technology begins to mature after showing its scale. However, as technology progresses, new products developed to replace the original products in the market, industrial efficiency declines, profits are reduced, and signs of decline appear. Such industries are called sunset industries, such as China's textile, steel, and cement. Such industries often consume a lot of resources and labor. After a long period of historical development, the sunset industry relies on its huge scale advantages, unable to expand and reduce costs, and its technology is even more difficult to improve. Therefore, it is possible to transfer the sunset industry to developing countries with insufficient scale, and to be undertaken by host country enterprises. At the same time, it also improves the industrial structure of the host country and can also solve the problem of employment in the host country. In developed countries, labor is expensive, and the market products are of high quality and more novel. Sunset products cannot give full play to their advantages in developed countries,

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and the cost of investing countries will also increase. At the same time, the production locations of sunset industries often have environmental pollution problems. The environmental regulatory system in developed countries is perfect, while the regulatory system in developing countries is relatively inadequate. The transfer of sunset industries can also provide favorable conditions for China to improve the environment and build green homes.

The Market-seeking OFDI mainly promotes the optimization and upgrading of the industrial structure from the three perspectives of industrial relevance, industrial competition, and dissolution of production factors. The development of the industry is inseparable from the expansion of scale, and then several industries have gradually formed vertical linkages. Taking the textile industry as an example, textile is processed from silk as raw material into silk thread, and then spun into cloth for specialized production, forming a backward relationship with the sericulture industry. At the same time, it forms a forward connection with clothing production based on fabrics, and a lateral connection with service industries such as cloth or clothing sales and design. Such sunset industries transferred to developing countries can promote the expansion of the domestic forward and backward industries, drive the high-quality development of the lateral service industry, and promote the optimization and upgrading of the industrial structure. The products produced by the transferred industries have a broader market and no longer need to export from the home country, reduce transportation costs, increase profits, and form horizontal competition with the host country's industries, and can even be sold overseas to compete with "third countries." The existing sunset industry of multinational companies can transfer labor resources, return profits from overseas markets, expand the development of other emerging industries, and promote the transformation and upgrading of industrial structure.

Hypothesis 2a: Market-seeking OFDI for developed countries cannot promote the optimization and upgrading of China's industrial structure (-or not significant).

Hypothesis 2b: Market-seeking OFDI for developing countries can promote the optimization and upgrading of China's industrial structure (+).

2.3. Technology-seeking OFDI's Location Choice and Action Route

There are two ways for a country's technology to advance, namely, domestic independent research and development and foreign technology spillover. The quantity and quality of products are also inseparable from technical support. Foreign direct investment for the purpose of obtaining reverse technology spillovers has attracted wide attention from multinational companies. The knowledge capital flow, stock, and R&D investment in developing countries are far from that of developed countries. Investing countries are not efficient in acquiring reverse technology spillovers. Therefore, most of the Technology-seeking OFDI is “anti-gradient” investment. If developed countries want to rely on technology monopoly to obtain a larger market, the exclusivity will be very strong, and the Technology-seeking OFDI will not go smoothly. At present, China's way of entering the market of developed countries is mainly based on greenfield investment (ownership belongs to the investing country), and brownfield investment (cross-border mergers and acquisitions) is not the mainstream.

Technology-seeking OFDI mainly promotes the optimization and upgrading of China's industrial structure through three methods: R&D absorption, industrial clustering, and apportionment effects. Through foreign direct investment, multinational companies send personnel overseas to the host country's scientific research institutions, universities or enterprises to learn and exchange with technical personnel, participate in project work, share experience and information, train technical personnel, and return the knowledge assets learned to the home country. Absorption and reuse will push the technology level of the home country to a higher level. In addition, according to the "external economic theory" proposed by Marshall and the "regional economic dynamics theory" proposed by Isard, it is possible to establish

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overseas economic and trade cooperation parks, such as Silicon Valley in the United States, to agglomerate industries. In the cluster area, the technology spillover of vertical industries will be passed down step by step, and horizontal industries will also be flexible through the enterprise, which will form healthy competition so that technology cannot restrict the overflow and flow, and promote the continuous improvement of the overall technological level of the cluster area. At the same time, it can also cooperate with host country enterprises to share R&D expenses in the way of "more effort, less money" or "I help, you pay", reducing the cost of R&D and learning involved in the home country, and obtaining technological results at a lower cost .

Hypothesis 3a: Technology-seeking OFDI for developed countries can promote the optimization and upgrading of China's industrial structure (+).

Hypothesis 3b: Technology-seeking OFDI for developing countries cannot promote the optimization and upgrading of China's industrial structure (-or not significant).

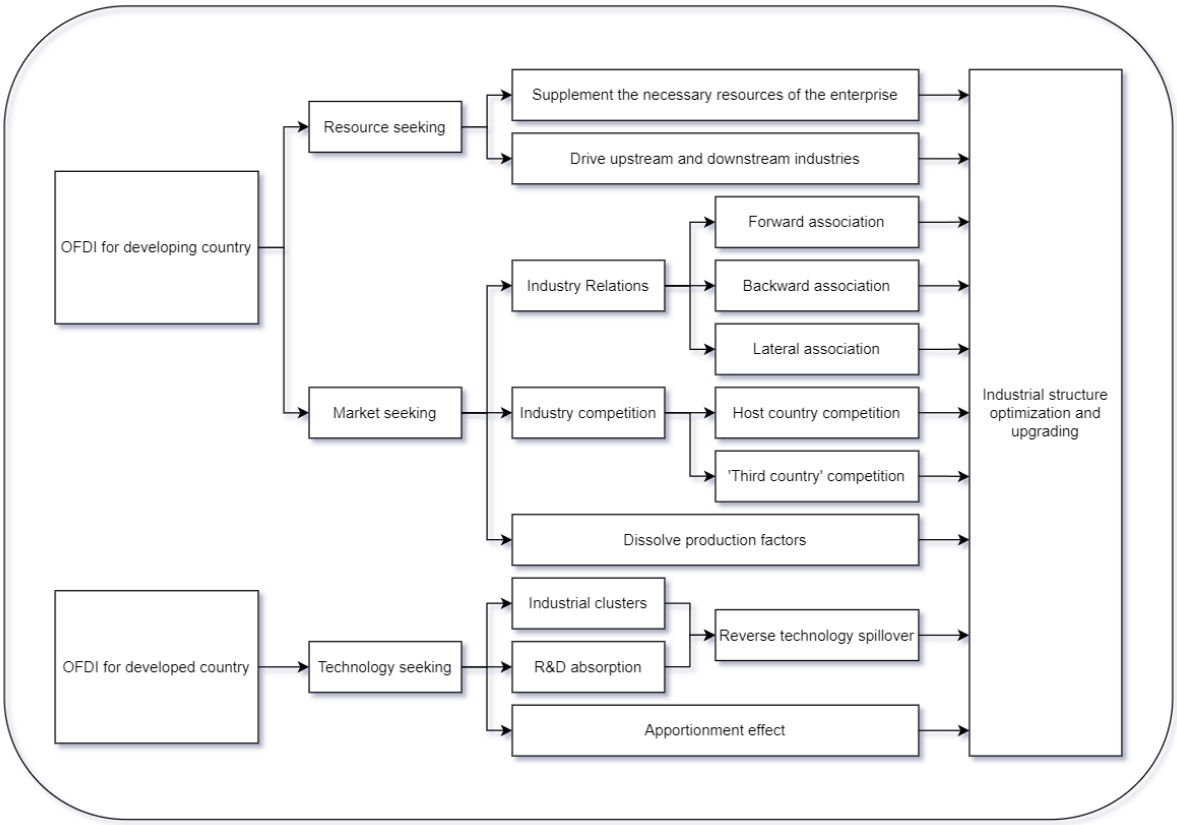

Figure 1. The mechanism diagram of OFDI in different types of countries on the upgrading of industrial structure

3. Model Establishment and Variable Description

3.1. Sample Selection

Since the purpose of foreign direct investment in tax havens such as Hong Kong, Macau, Cayman, Virgin, Luxembourg, and Panama is mainly for tax avoidance, it does not match the research purpose of this article, so it is excluded from the sample. Based on the comprehensive consideration of the scale of China's OFDI and the availability of data, the samples of developed countries include 22 countries including Australia, Austria, Belgium, and Canada; and 40 countries including Bangladesh, Bulgaria, Brazil, and Barbados. The statistics of China's outward direct investment data began in 2003, but some countries' data was missing in the starting year. Therefore, the panel data of China's outward direct investment in different types

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of countries from 2004 to 2019 were selected to construct the upgrading of the industrial structure. Measurement model.

3.2. Model Establishment

In order to empirically test the promotion effect of the three investment motives on the upgrading of industrial structure, this study draws on the standard model of industrial structure analysis, namely, the Channery model. Channery believes that economic growth is an aspect of the transformation of the production structure. Based on this, he established a regression equation with per capita GDP and population as the basic independent variables and industrial structure as the dependent variable. The specific structure of the model is as follows:

$$W = \alpha + \beta_1 \ln AGDP + \beta_2 \ln^2 AGDP + \beta_3 \ln POP + \beta_4 \ln^2 POP + \sum \varepsilon_j T_j + \delta I \quad (1)$$

Among them, W represents a structural variable, $AGDP$ represents a country's per capita GDP, POP represents a country's total national population, T_j represents a dummy variable based on the time trend of a given year, and Irepresents other factors, such as capital investment, import and export trade and so on.

This paper draws on this model and carries out a certain degree of transformation to suit the specific conditions of investment motives in our country. Taking China's industrial structure upgrading index as the explanatory variable, the four fixed terms of China's logarithmic per capita GDP and its square term and China's logarithmic population and its square term are used as control variables. Since these five variables are all time series data, in view of the analysis of the research model, these time series data are tiled in each individual country to form panel data. In addition, the interaction terms of OFDI and three investment motives are introduced into the explanatory variables to represent the three different motives of foreign direct investment. Taking into account the robustness of the model, adding several control variables to the model enables the model to achieve better results. In the entire panel data, since the statistical data time is not long, the dummy variable time T is not investigated, so the revised regression model is expressed as:

$$W_t = \beta_0 + \beta_1 \ln AGDP_t + \beta_2 \ln^2 AGDP_t + \beta_3 \ln POP_t + \beta_4 \ln^2 POP_t + \beta_5 NARE_{it} \times \ln OFDI_{it} + \beta_6 \ln GDP_{it} \times \ln OFDI_{it} + \beta_7 TFP_{it} \times \ln OFDI_{it} + \sum_{j=1}^{5} \alpha_j control_{it} + \varepsilon_{it} \quad (2)$$

Where, i represents the host country, t represents the year, β_0 is a constant term, ε_{it} is a residual term. China's logarithmic per capita GDP $\ln AGDP$ and its square term, China's logarithmic population $\ln POP$ and its square term are money The fixed term of the Nari model; $\ln OFDI_{it}$ is the logarithm of China's foreign direct investment in host country i during t; $NARE_{it}$ is the natural resource endowment of host country i during t; $\ln GDP_{it}$ is the market size of host country i during t; TFP_{it} is the total factor productivity of the host country i during the t period； $control_{it}$ is the control variables added later, including the host country's institutional quality $INSQ$, the host country's economic level $ECOL$, the bilateral investment agreement $BITS$, the host country's trade openness $OPEN$, and the bilateral exchange rate $EXCH$.

3.3. Variable Definition and Measurement and Data Sources

1.Explained variable: industrial structure upgrading index (W). Under equilibrium conditions, one of the characteristics of the upgrading of the industrial structure is the transfer of production factors released by the primary industry to the secondary and tertiary industries. The proportion of the tertiary industry is gradually increasing, and the proportion of the primary industry is getting smaller and smaller. The specific formula is as follows:

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$$W_t = \sum_{i=1}^{3} i \times y_{it} = 1 \times y_{1t} + 2 \times y_{2t} + 3 \times y_{3t} \quad (3)$$

Where, W_t represents my country's industrial structure index during t period, and y_{it} represents the contribution rate of the i-th industry to GDP in my country during t period. We measure my country's industrial structure index by assigning weights of 1, 2, and 3 to the three industries [18]. The closer the indicator is to 3, the higher the level of industrial structure, and vice versa, the lower.

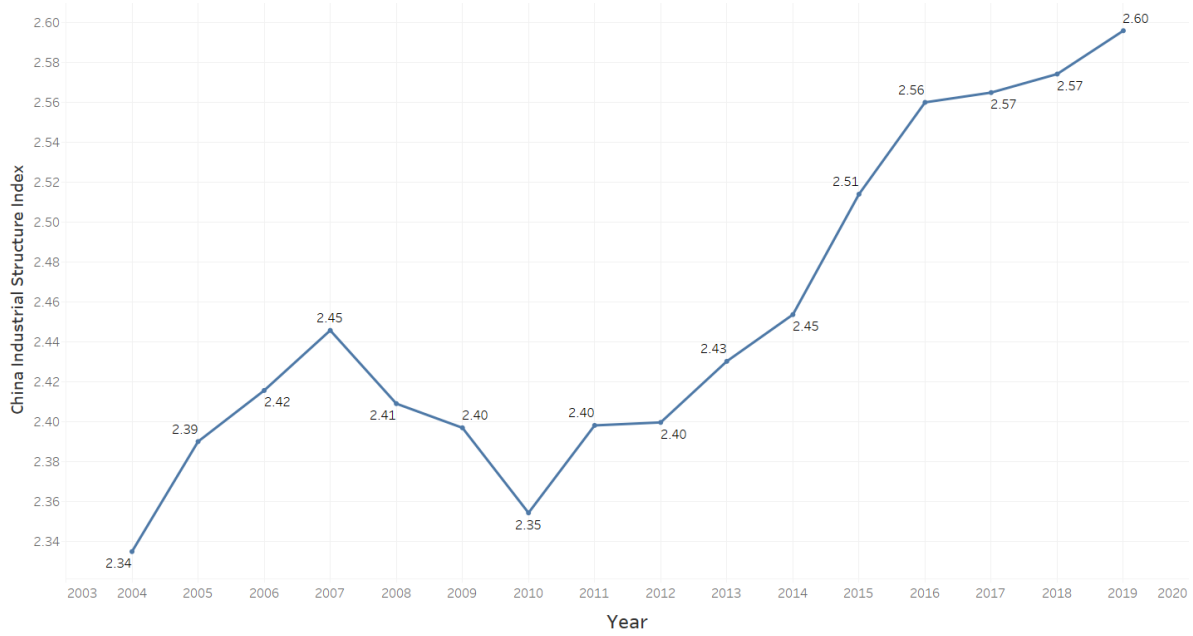

Figure 2. China Industrial Structure Index Trend Chart

2. Explanatory variables: (1) Outward Foreign Direct Investment (OFDI). There are two measurement methods for foreign direct investment: flow and stock, and the stock of OFDI can better reflect the scale of China's OFDI in the host country, so this article chooses to take the logarithm of the stock of OFDI (SOFDI). (2) The host country's natural resource endowment (NARE). Use the total rent of natural resources to measure the endowment of natural resources, specifically the total rent of oil, natural gas, coal, minerals and forests as a percentage of GDP. (3) Host country market size (MARS). Use the log GDP of the host country to measure the market size. Due to the different inflation conditions in various countries, the data is not comparable. Therefore, the base period is set to 2000, and GDP is flattened according to the consumer price index and converted into constant prices in 2000. (4) Total factor productivity (TFP) of the host country. In this paper, the Malmquist index is calculated according to the data envelopment analysis (DEA) and the Cobb-Douglas production function. The output factor is the host country's GDP, and the input factor includes the host country's total capital formation and total labor force. Same as above, convert GDP and total capital formation into constant prices in 2000.

3. Control variables: (1) China's per capita gross domestic product (AGDP). Per capita GDP calculated in constant renminbi. (2) China's total population (POP). Use the total population of China. (3) Host country institutional quality (INSQ). The six indicators of national and regional corruption control, government effectiveness, government stability and anti-violence, degree of legal system, supervision quality, freedom of speech and government responsibility are taken as the arithmetic average. In order to make all the data positive, add all the data +2.5 so that the data is between 0 and 5 (4) Bilateral Investment Agreement (BITS). Some documents use the

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signing year as the starting year of the dummy variable, because it can guide the home country's investment in the host country after signing the agreement. However, it is not appropriate for some investments to be signed and the effective year is too long. Therefore, this article still chooses to take effect. The year is used as the starting year. The start year is 0 before and 1 after; if the effective time is the first six months, the start year is set to 1, and the next six months are set to 0. (5) The economic level of the host country (ECOL). Use the deflated log per capita GDP of the host country to measure. (6) The degree of openness of the host country's market (OPEN). The host country's import value index using 2000 as the base period 1 is used. (7) Bilateral exchange rate (EXCH). The ratio of the average annual exchange rate of the host country's currency to the U.S. dollar and the annual average exchange rate of the renminbi to the U.S. dollar is used.

The data sources and descriptions of all variables are summarized as follows, see Table 1.

Table 1. Variable description and data source

Variable type	Sign	Variable interpretation	Data sources
Explained variable	W	Industrial structure upgrading index	CHINA STATISTICAL YEARBOOK
Explanatory variables	NARE	The host country's natural resource endowment	The World Bank, WDI Database
	MARS	Host country market size	The World Bank, WDI Database
	TFP	Total factor productivity	The World Bank, WDI Database
	OFDI	Outward Foreign Direct Investment	Statistical Bulletin of China's Outward Foreign Direct Investment
Control variable	INSQ	Host country institutional quality	The World Bank, WGI Database
	BITS	Bilateral Investment Agreement	UNCTAD Database
	ECOL	The economic level of the host country	The World Bank, WDI Database
	OPEN	The degree of openness of the host country's market	The World Bank, WDI Database
	EXCH	Bilateral exchange rate	The World Bank, WDI Database
	AGDP	China's per capita gross domestic product	CHINA STATISTICAL YEARBOOK
	POP	China's total population	CHINA STATISTICAL YEARBOOK

3.4. Descriptive Statistics of Variables

Descriptive statistical characteristics are made on the sample data of developed countries, the sample data of developing countries, and the sample data of all countries, and the results are shown in the following Table.

4. Empirical Research

4.1. Related Analysis

Since lnPOP and its square terms and lnAGDP and its square terms are four fixed terms in the Channery model, the influence on the dependent variable must be related, and because the square term in the measurement model will interfere with the test of the variance inflation factor, the correlation These four variables were eliminated from the analysis.

The following table summarizes the correlation matrix of three samples of developed countries, developing countries, and all countries. It is found that there are 1-2 significant correlation coefficients greater than 0.60 in each sample. Further check the variance inflation factor (VIF) of the model, and found that all models do not meet the basic assumption of multicollinearity (MAX(VIF)>10, MEAN(VIF)>1 holds at the same time), indicating that the model does not have serious multicollinearity. Linear. Among the samples of developed countries, the correlation coefficient between China's industrial structure index and the natural resource endowment of the host country and the total factor productivity of the host country is significantly positive,

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while the correlation coefficient with the market size of the host country is not significant. In the sample of developing countries and all countries, China's industrial structure index and the host country's natural resource endowment are both significantly positive, and are not significant with other variables.

Table 2. Descriptive statistics of different samples

Variable	Mean	Std	Min	Max
Does not distinguish between samples				
W	2.414	0.0749	2.287	2.538
LNPOP	21.027	0.026	20.986	21.067
LNAGDP	10.335	0.54	9.31	11.055
Developed country(country=22;year=16;sample=352)				
ECOL	10.267	0.539	8.695	11.301
BITS	0.866	0.341	0	1
INSQ	3.72	0.445	2.656	4.39
OPEN	1.439	0.458	0.776	3.029
EXCH	9.215	34.255	0.0657	186.967
NARE	0.701	1.3	0.000168	8.681
MARS	27.093	1.175	24.898	30.301
TFP	1.008	0.0454	0.806	1.229
SOFDI	10.567	2.782	1.386	15.867
FOFDI	13.018	0.262	11.275	14.557
Developing country (country=40;year=16;sample=640)				
ECOL	7.264	1.295	3.095	10.719
BITS	0.734	0.442	0	1
INSQ	2.155	0.594	0.84	3.751
OPEN	2.727	1.531	0.732	10.437
EXCH	150.77	517.965	0.109	3484.16
NARE	9.239	10.769	0.00117	58.65
MARS	24.389	1.739	20.668	27.885
TFP	0.998	0.115	0.438	2.212
SOFDI	10.235	2.077	2.565	14.23
FOFDI	12.938	0.0909	11.912	13.689
All country (country=62;year=16;sample=992)				
ECOL	8.331	1.803	3.095	11.301
BITS	0.781	0.414	0	1
INSQ	2.71	0.927	0.84	4.39
OPEN	2.27	1.402	0.732	10.437
EXCH	100.541	421.901	0.0657	3484.16
NARE	6.209	9.596	0.000168	58.65
MARS	25.349	2.028	20.668	30.301
TFP	1.002	0.0966	0.438	2.212
SOFDI	10.353	2.355	1.386	15.867
FOFDI	12.966	0.176	11.275	14.557

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Table 3. Correlation matrix of different samples

	W	NARE	MARS	TFP	SOFDI	ECOL	BITS	INSQ	OPEN	EXCH
Developed country[MAX(VIF)=3.86;MEAN(VIF)=1.92]										
W	1									
NARE	0.1178**	1								
MARS	-0.0103	0.1138**	1							
TFP	0.2525***	0.0384	-0.0858	1						
SOFDI	-0.4382***	0.2024***	0.4837***	-0.2109***	1					
ECOL	0.0210	0.0639	0.3793***	0.0001	0.2001***	1				
BITS	-0.0785	-0.0974*	-0.2318***	-0.0344	-0.0346	-0.2025***	1			
INSQ	0.0416	0.2479***	0.1759***	-0.0649	0.2073***	0.7744***	-0.0952*	1		
OPEN	-0.2813***	0.2633***	-0.2633***	-0.0548	0.2730***	-0.3645***	0.2050***	-0.0764	1	
EXCH	-0.0151	-0.1191**	-0.0040	-0.0150	0.1143**	-0.2988***	0.1037*	-0.2682***	0.2431***	1
Developing country[MAX(VIF)=3.55;MEAN(VIF)=1.78]										
W	1									
NARE	0.1731***	1								
MARS	0.0218	0.0137	1							
TFP	-0.0363	0.0509	-0.0095	1						
SOFDI	-0.4264***	0.0459	0.3675***	0.0754*	1					
ECOL	0.0715*	0.2762***	0.4176***	-0.0091	-0.0021	1				
BITS	0.0100	-0.0660*	0.1727***	0.0868**	0.2283***	0.1394***	1			
INSQ	-0.0461	-0.1841***	0.0277	-0.0208	-0.1558***	0.6180***	0.0778**	1		
OPEN	-0.2786***	0.1627***	-0.1272***	0.0064	0.3977***	-0.1419***	0.0322	-0.1608***	1	
EXCH	-0.0481	-0.0226	0.0568	0.0157	0.2031***	-0.1573***	0.0178	-0.0446	0.2187***	1
All country[MAX(VIF)=8.28;MEAN(VIF)=2.85]										
W	1									
NARE	0.1309***	1								
MARS	0.0099	-0.2602***	1							
TFP	0.0142	0.0241	0.0166	1						
SOFDI	-0.4260***	0.0121	0.3393***	0.0130	1					
ECOL	0.0354	-0.1950***	0.6979***	0.0338	0.0779**	1				
BITS	-0.0160	-0.1200***	0.1604***	0.0741**	0.1371***	0.1732***	1			
INSQ	-0.0120	-0.4240***	0.5433***	0.0239	0.0395	0.8673***	0.1446***	1		
OPEN	-0.2288***	0.3199***	-0.3751***	-0.0190	0.2545***	-0.4349***	-0.0235	-0.4323***	1	
EXCH	-0.0385	0.0479	-0.0641**	0.0068	0.1349***	-0.2201***	-0.0071	-0.1562***	0.2620***	1

4.2. Benchmark Regression

Because the characteristics of panel data need to test whether there are individual effects, the traditional F test does not use robust standard errors, which makes the test results inaccurate. Therefore, the least squares dummy variable method (LSDV) is used, and the robust standard error of the cluster with the country as the cluster variable (which can ensure the robustness of autocorrelation and heteroscedasticity at the same time) is used to test whether the intercept term is significant. If the individual dummy variables are combined with F If the test is significant, use the fixed effects model (FE), otherwise use the mixed regression model (OLS). Since all LM tests are not significant, random effects models are not considered. All models comprehensively compare the three tests of F, LM, and Hausman to select a suitable model for regression, and the results of the tests are indicated in the table.

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Table 4. Benchmark regression

Samples	Developed country			Developing country				All country
model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LNPOP	737.161***	731.296***	892.704***	905.272***	904.046***	905.302***	908.209***	917.31***
	(98.875)	(102.268)	(89.544)	(2.380)	(6.729)	(2.210)	(13.520)	(13.908)
LNPOPSQR	-17.679***	-17.541***	-21.372***	-21.675***	-21.646***	-21.675***	-21.745***	-21.961***
	(2.351)	(2.431)	(2.129)	(0.0549)	(0.160)	(0.0537)	(0.323)	(0.332)
LNAGDP	1.087***	1.073***	0.980***	1.161***	1.162***	1.160***	1.156***	1.146***
	(0.111)	(0.0994)	(0.0971)	(0.00178)	(0.00624)	(0.00401)	(0.0127)	(0.0130)
LNAGDPSQR	-0.0429***	-0.0423***	-0.0380***	-0.0471***	-0.0471***	-0.0471***	-0.0469***	-0.0464***
	(0.00551)	(0.00491)	(0.00491)	(0.0000913)	(0.000297)	(0.000195)	(0.000603)	(0.000616)
INSQ	-0.000627	-0.00138	0.00120	-0.000174	-0.000235	-0.000153	-0.000401	-0.000683
	(0.0171)	(0.0171)	(0.0156)	(0.000367)	(0.000530)	(0.000491)	(0.000686)	(0.000506)
ECOL	0.0433***	0.0410***	0.0419***	0.0000971	0.000130	0.0000879	0.000355	0.000495
	(0.0121)	(0.0117)	(0.0109)	(0.000137)	(0.000226)	(0.000183)	(0.000351)	(0.000303)
BITS	0.000366	0.000612	-0.000378	0.000482	0.000476	0.000469	0.000213	0.000182
	(0.00367)	(0.00366)	(0.00440)	(0.000743)	(0.000743)	(0.000785)	(0.000768)	(0.000656)
OPEN	-0.0403***	-0.0387***	-0.0397***	0.00000463	0.0000170	0.00000471	0.0000214	-0.000181
	(0.00996)	(0.00962)	(0.00829)	(0.000163)	(0.000189)	(0.000163)	(0.000192)	(0.000181)
EXCH	0.000493***	0.000534***	0.000470***	0.0000000184	0.0000000211	0.00000000680	0.00000000292	0.000000135
	(0.000124)	(0.000138)	(0.000126)	(0.000000124)	(0.000000120)	(0.000000182)	(0.000000176)	(0.000000150)
NARE*SOFDI			-0.0000231		-0.000000593		-0.00000253	-0.00000282
			(0.0000968)		(0.00000274)		(0.00000351)	(0.00000304)
MARS*SOFDI			-0.000342***			0.000000517	-0.0000179	-0.0000339*
			(0.0000782)			(0.00000550)	(0.0000187)	(0.0000193)
TFP*SOFDI		0.00103	0.00808***				0.000624	0.00110*
		(0.000958)	(0.00196)				(0.000582)	(0.000620)
constant	-7688.566***	-7626.186***	-9325.581***	-9456.537***	-9443.655***	-9456.844***	-9487.380***	-9583.083***
	(1038.945)	(1074.978)	(941.317)	(24.705)	(70.472)	(23.896)	(142.137)	(147.064)
F	4.00**	3.26**	8.78***	0.24	0.20	0.20	0.36	0.87
LM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hausman	17.53***	17.24***	13.26***	14.16***	13.14***	14.20***	13.44***	21.92***
type	FE	FE	FE	OLS	OLS	OLS	OLS	OLS
R-square	0.9272	0.9274	0.9298	0.9226	0.9226	0.9226	0.9227	0.9229

The above table separately explores the influence of the motivation to seek OFDI from developed and developing countries on the upgrading of China's industrial structure, and combines two samples to observe the overall impact of China's OFDI on the industrial structure. For developed countries, only the control variables are included in model (1), and the economic level and exchange rate terms are significantly positive, indicating that the higher the economic level of the developed countries, the higher the exchange rate of the developed countries' currencies against the RMB, and the more the OFDI to developed countries can promote China's industrial structure has been upgraded; and the degree of opening to the outside world is significantly negative, indicating that the more open trade in developed countries, the less conducive to the upgrading of China's industrial structure. Model (2) only examines the impact of technological investment in developed countries on the upgrading of China's industrial structure, and the result is not significant. The analysis may be due to missing variables. Therefore, model (3) incorporates the other two investments into the model. It can be found that technology seeking and industrial structure index are significantly positively correlated ($\beta\_7=0.00808$, $P<0.01$), indicating that China's Technology-seeking OFDI for developed countries can promote China The optimization and upgrading of the industrial structure, and the total factor productivity of the host country remains unchanged, for every 1% increase in China's OFDI, China's industrial structure index will increase by 0.00808; on the contrary, the market seeking and the industrial structure index are significantly negatively correlated ($\beta\_6=-0.000342$, $P<0.01$), indicating that China's Market-seeking OFDI for developed countries has an

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inhibitory effect on the optimization and upgrading of China's industrial structure. With the market size of the host country unchanged, for every 1% increase in China's OFDI, China's industrial structure index will Will drop by 0.000342. The search for resources in developed countries is not significant. As a result, the previous hypotheses 2a and 3a have been verified. For the developing country sample models (4), (5), (6), (7), it can be found that except for the constant term and the fixed term of the Chanary model, the other terms are not significant. The reasons for the insignificance need to be further investigated. . Integrating the two samples of developed and developing countries, it can be shown from Model (8) that technology seeking OFDI can significantly promote the upgrading of China's industrial structure, while market seeking OFDI has a significant inhibitory effect on China's industrial structure.

4.3. Robustness Test

1. Use sub-samples to re-estimate the data. The Black Swan incident that occurred in 2008, the American financial crisis, has more or less affected the economies of various countries around the world. It can be seen from the industrial structure index trend graph that the economic downturn caused by the financial crisis has caused a relatively significant decline in the industrial structure index from 2007 to 2010. Therefore, this paper excludes the years that are more severely affected by the global financial crisis, that is, 2008 and 2009, and uses the remaining years to re-estimate the regression.

Table 5. Subsample robustness test

Sub-samples	Developed country		Developing country			All country
Model	(2)	(3)	(5)	(6)	(7)	(8)
NARE*SOFDI		0.000304**	0.0000443***		0.0000466***	0.0000418***
		(0.000119)	(0.0000134)		(0.0000129)	(0.0000124)
MARS*SOFDI		-0.000350***		0.000000858	-0.0000681	-0.0000613*
		(0.0000799)		(0.00000580)	(0.0000601)	(0.0000355)
TFP*SOFDI	0.00144	0.00847***			0.000805	0.00144**
	(0.00112)	(0.00192)			(0.000624)	(0.000718)
Control variable	Yes	Yes	Yes	Yes	Yes	Yes
F	4.40***	9.29***	4.53***	0.92	4.14***	5.32***
LM	0.00	0.00	0.00	0.00	0.00	0.00
Hausman	29.97***	25.31***	14.70***	9.98***	13.57***	21.03***
type	FE	FE	FE	OLS	FE	FE
R-square	0.9437	0.9465	0.9395	0.9385	0.9397	0.9396

From the overall results in the table, it can be seen that after excluding the years severely affected by the financial crisis, the regression results obtained are better, indicating that the black swan event may be one of the reasons why the benchmark regression of developing countries is not significant. For developed countries' market seeking OFDI and technology seeking OFDI's impact on the industrial structure is basically the same as above. The impact of Resource-seeking OFDI on the optimization and upgrading of industrial structure is significantly positive ($\beta\_5=0.000304$, $P<0.05$), which is different from Hypothesis 1a. It is consistent. This may be because China has a strong Resource-seeking characteristic. As long as it is a resource-rich country, even if there are trade barriers to the OFDI in developed countries, it will break through to ensure the supply of resources to enterprises. For developing countries, compared with the previous article, the Resource-seeking OFDI is significantly positive ($\beta\_5=0.0000466$, $P<0.01$). The other two investment motives are still insignificant, and the Market-seeking OFDI for developing countries can be ignored. And Technology-seeking OFDI's impact on the optimization of China's industrial structure. Hypothesis 1b and 3b have been

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verified, and hypothesis 2b did not meet our expectations. The possible reason is that the transfer of industries did not completely increase the released factors and transfer to the tertiary industry, most of which may sink to the primary industry. Or be forced to restrict, resulting in wastage of human or product resources. Although hypothesis 2b has not been verified, the regression coefficient of Market-seeking OFDI for developed countries is significantly negative. In order to optimize China's industrial structure, developing countries are still the first choice for Market-seeking OFDI. Based on the two samples, the Resource-seeking OFDI and Technology-seeking OFDI can promote the optimization and upgrading of China's industrial structure, while the Market-seeking OFDI will reduce China's industrial structure index on the contrary.

2. Change the measurement method. Change the measurement method of foreign direct investment. The OFDI flow is used to replace the OFDI stock used in the previous article, and the regression test is performed again, which can better reflect the situation of China's OFDI flow in each host country each year. Since the effect of sub-sample regression is better than that of benchmark regression, the data adopts sub-sample data. In addition, the foreign direct investment flow data contains many negative values and cannot be logarithmically. Therefore, adding a positive number to all the data makes all the data positive, but at this time the meaning of the regression coefficient cannot be explained, so only the meaning of the regression sign is explored. The regression results are shown in Table 7. The regression results show that the signs of all significant coefficients are consistent with the previous ones, indicating that the empirical results of this article are robust.

Table 6. Robustness test of substitution variables

Sub-samples	Developed country		Developing country			All country
Model	(2)	(3)	(5)	(6)	(7)	(8)
NARE*FOFDI		0.000151*	0.0000305***		0.0000299***	0.0000300***
		(0.0000740)	(0.00000955)		(0.0000102)	(0.00000968)
MARS*FOFDI		-0.000699***		0.0000133	0.000557	-0.000336***
		(0.000140)		(0.00000991)	(0.000394)	(0.000114)
TFP*FOFDI	0.00566***	0.00751***			0.000767	0.00140**
	(0.00167)	(0.00167)			(0.000484)	(0.000585)
Control variable	Yes	Yes	Yes	Yes	Yes	Yes
F	6.06***	14.72***	3.87***	1.46	6.37***	5.74***
LM	0.00	0.00	0.00	0.00	0.00	0.00
Hausman	26.37***	39.32***	13.57***	11.53***	14.54***	21.03***
type	FE	FE	FE	OLS	FE	FE
R-square	0.9451	0.9476	0.9394	0.9386	0.9398	0.9399

5. Conclusion and Inspiration

There are three investment motivations for China's foreign direct investment, namely, Resource-seeking OFDI, Market-seeking OFDI, and Technology-seeking OFDI. These three motives will more or less affect the optimization and upgrading of China's industrial structure. Through the differentiation of foreign direct investment from different types of countries, the OFDI data of 22 developed countries and 40 developing countries from 2004 to 2019 in China are analyzed, and the panel data model is used to test the impact of investment motivation on the upgrading of China's industrial structure. . Research shows that, first, whether it is for developed or developing countries, Resource-seeking OFDI can significantly promote the optimization and upgrading of China's industrial structure. Second, China’s Market-seeking OFDI in developing countries has no significant effect on the upgrading of China’s industrial

structure, but the Market-seeking OFDI in developed countries has a significant inhibitory effect on China's industrial structure. Therefore, developing countries still It is the first choice of the Market-seeking OFDI in our country. Third, China has a clear motivation for Technology-seeking investment in OFDI in developed countries, and it can significantly promote the upgrading of China's industrial structure.

Nowadays, under the promotion of the "Belt and Road" initiative, more and more Chinese multinational companies have begun to invest overseas. The results of this article provide important enlightenment and empirical basis for the "going out" of multinational companies and relevant government-designated policies. First, it is necessary to speed up the promotion of Chinese enterprises to invest in technology in developed countries. Although many developed countries will set up many barriers in order to maintain their oligarchic status in certain areas or to improve their competitiveness, enterprises still have to work hard to go out, and the reverse spillover of technology is often the development of industries in China. The key to improving the industrial structure. Second, the government should properly resolve the aftermath of industrial transfer. Due to the population base of our country, the transfer of industries will inevitably bring about unemployment or other social problems. Therefore, the government needs to properly solve them. In addition, it can also control industries, improve the welfare of sunset industry workers, and avoid waste of human resources.

This paper analyzes the industrial upgrading effect through the Channery model and supplements the existing related literature. The variables of OFDI investment motivation and industrial structure upgrading that this article focuses on are all national-level macro-factors, and micro-factors such as enterprises are not considered. And it does not incorporate other investment motives into the overall research framework, such as efficiency-seeking OFDI. Future research can consider factors at the enterprise level or industry level, or combine other investment motivations to discuss this issue in more detail.

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