

Analysis of the Impact of Chinese Foreign Direct Investment on Its Export Scale

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Abstract. Foreign direct investment and foreign trade are two important ways to participate in the international division of labor. In the context of the challenges facing foreign trade and the rapid development of foreign direct investment, the discussion of the impact of foreign direct investment on Chinese foreign trade is conducive to Chinese use of foreign direct investment to improve its foreign trade situation, and has its practical significance. The existing research on this issue has not taken into account the lag and long-term of the export effect of foreign direct investment. Therefore, this paper analyzes the influence mechanism of foreign direct investment on export scale from different investment motivations, selects the data of foreign direct investment from 2003 to 2015, adopts co-integration long-term equilibrium model and distribution lag model to obtain empirical test, and obtains the conclusion that foreign direct investment significantly promote the growth of export scale and the effect of this lag exists. Then, the empirical results are explained and the relevant policy suggestions are put forward according to the status of the industry distribution of Chinese foreign direct investment.

Introduction

In recent years, the degree of integration between China and the world economy has been deepened, and Outward Foreign Direct Investment (hereinafter referred to as OFDI) and foreign trade are two important ways that Chinese participate in the international division of labor. The two make China better to participate in global economic activities and to share the interests of globalization.

On the one hand, Chinese foreign trade are facing new challenges while achieving certain achievements. Chinese import and export of goods trade increased from US \$ 620.8 billion in 2002 to US \$ 395.3 billion in 2015. However, since the 2008 financial crisis, Chinese foreign trade is facing the world market demand, trade protectionism rise and other issues, Chinese import and export growth rate slowed down, even in 2015 Chinese imports and exports were negative growth.

On the other hand, since 2003, China OFDI has entered a stage of rapid development. Its scale is of rapid growth and the investment area gradually diversifies. Chinese OFDI traffic grew at an average annual rate of 35.9% between 2002 and 2015, and as of 2015, it has covered all sectors of the national economy.

Whether it is based on the traditional trade theory, or based on the theory of multinational corporations, OFDI on a country's foreign trade, especially export trade will have a certain impact. In China, the questions whether OFDI has played its role in the scale of exports, what the extent of its effect is and how to play the effect have become worthy of discussion.

This paper aims to discuss the impact of OFDI on the scale of exports and its deep-seated reasons from the aspects of qualitative analysis of impact mechanism and quantitative test, and put forward relevant policy suggestions to help China to formulate and implement OFDI strategy better. It is of practical significance to use OFDI to improve the current situation of Chinese foreign trade and achieve the purpose of export growth. The main contribution is to consider the effect of OFDI on the basis of the effect of considering the lag.

The Literature Review

There are three representative views on the relationship between OFDI and the scale of exports: alternative theory, complementarity theory and contingency theory.

Mundell (1957) first proposed an alternative relationship between the two, Vernon (1966) product cycle theory, Buckley, Casson (1981) internalization theory and Brainard (1997) adjacent / centralized trade-off theory support this conclusion. The Chang (2006) and other scholars of the empirical results show that there is an alternative relationship between the two.

Contrary to alternative theory, Kojima (1978) suggests that there is a complementary relationship between the two in its theory of marginal industry. Helpman (1984) and Helpman, Krugman (1985) also illustrate that OFDI will ultimately promote home exports from the point of view of increasing returns to scale and differentiation of products. Makki (2004), Frotagne, Pajot (2002) and other empirical results show that the two are significantly positive correlation.

In addition, some scholars believe that OFDI is an alternative or to promote the export depends on the degree of internationalization of investment, OFDI motives and types, etc., there is a contingency relationship between the two. Svenson (2004) empirical test found that the three-digit SITC classification product data show that the two are substituting effects and the two-digit SITC classification industry data show that the two are complementary.

In the research perspective, Zhang Yingwu (2007) and so on from the overall scale of the study, obtained a significant positive correlation between the two conclusions. (2006) and other countries in the framework of trade gravity model, sub-host countries to study, found OFDI export scale effect in different countries or regions of different degrees. Zhang Chunping (2012) studied the difference in the export scale effect of OFDI under different investment motivations. (2009) and other large and short-term export scale effect of China OFDI were tested.

In the existing research, scholars have conducted theoretical proof and empirical analysis on the export effect of OFDI on multi-angle and multi-angle methods. However, the existing research less concerned about the lag and long-term nature of OFDI export effect. It is not yet studied how to use the distribution lag model to study how the export effect of OFDI plays a role over time. This paper attempts to further improve the problem on the basis of the existing research.

The Impact Mechanism Analysis

Based on the different investment motivations, OFDI is divided into market-oriented, production-oriented, resource-oriented and technology-oriented, respectively. The influence of OFDI on export scale is analyzed respectively.

Market-oriented OFDI is divided into two cases:

First, multinational companies through the establishment of business services overseas branch structure for information collection, product promotion and after-sales service and other activities to maintain and expand market share, the motherland's export scale have a positive effect.

Second, multinational companies to avoid the host country or third party trade barriers in the host country to invest and build factories, on the one hand, the investment through local production, local enterprises imitation and indirect export to third parties, to meet the host and third party countries on the other hand, the local production can drive the initial construction machinery and equipment and continuous operation of raw materials, semi-finished products such as the export of intermediate products. In addition, the production of raw materials, semi-finished products and other intermediate products.

The impact of production-oriented OFDI on the scale of exports In addition to the above reduction of the export of the final product, but may be driven by the export of machinery and intermediate products, etc., due to the production-oriented OFDI goal is to reduce costs, overseas branches from the global Industry chain point of view to consider the cost of the means of production, more likely to lower from the means of production of third-country imports, and replace the original from the home country's imports, resulting in reduced home country exports.

Resource-oriented OFDI from two aspects affect the export scale, one is to carry out the

resources in the host country, will drive the host country on the host country's collection equipment and other ancillary equipment and other products exports, the second is the motherland through the reverse import of natural resources, Reduce the cost of access to natural resources, enhance the export competitiveness of processed products or manufactured goods, and promote the export of home countries.

Technology-oriented OFDI can reduce the R & D cost of the home country and enhance the technical level of the home country through joint research and development, thus enhancing the competitiveness of the country's export products in the international market and promoting the export of the mother country.

From the above mechanism analysis, it can be seen that OFDI may expand the scale of export trade may also inhibit the scale of export trade, its impact on the export scale is uncertain, and therefore need further empirical test.

Empirical Analysis

Research Design. First, build the basic model of OFDI impact on export scale. As shown in equation (1).

$$EX = F(C, OFDI, X_i) \quad (1)$$

Which, EX means the scale of exports, with Chinese total exports of goods to the world, the data from the People's Republic of China National Bureau of Statistics. In the selection of control variables, the trade gravity model pointed out that bilateral trade between the two countries is positively related to the total economy, and has a negative correlation with the distance, has been widely verified. Taking into account the geographical distance between China and the rest of the world fixed, into the constant estimates. Therefore, the introduction of bilateral economic aggregate as a control variable, drawing on the practice of other scholars to Chinese GDP and the world's GDP as a measure of the symbol, the data from the World Bank.

Considering the difference between the absolute values and the possible autocorrelation and heteroskedasticity, the model is modified to logarithmic form, as shown in equation (2).

$$LN(EX) = \beta_0 + \beta_1 LN(OFDI) + \beta_2 LN(SUMGDP) + u_t \quad (2)$$

Secondly, consider the hysteresis to establish the distribution lag model.

Based on the assumption that the influence of infinite delay, and the influence degree decays with the time series, the infinite distribution lag model is established and the Koyck method is used to estimate. The infinite distribution hysteresis model is given in (3), and the transformed Koyck model is given in (4).

$$LN(EX_t) = \alpha + \beta_0 LN(OFDI_t) + \beta_1 LN(OFDI_{t-1}) + \beta_2 LN(OFDI_{t-2}) + \dots + u_t \quad (3)$$

$$LN(EX_t) = \alpha(1 - \lambda) + \beta_0 LN(OFDI_t) + \lambda LN(EX_{t-1}) + v_t \quad (4)$$

In which

$$v_t = u_t - \lambda u_{t-1},$$

The second is based on the assumption that the finite hysteresis is limited, and the influence degree can be approximated by the appropriate polynomial, the finite distribution hysteresis model is established and the Polynomial Distribution Lag Model is used to estimate it. The finite distribution hysteresis model is given in (5), and the transformed Almond polynomial distribution lag model is given in (6).

$$LN(EX_t) = \alpha + \beta_0 LN(OFDI_t) + \beta_1 LN(OFDI_{t-1}) + \beta_2 LN(OFDI_{t-2}) + \dots + \beta_k LN(OFDI_{t-k}) + u_t \quad (5)$$

$$LN(EX_t) = \alpha + \alpha_0 z_{0t} + \alpha_1 z_{1t} + \alpha_2 z_{2t} + \dots + \alpha_m z_{mt} + u_t \quad (6)$$

In which

$$z_{jt} = \sum_{i=0}^m i^j LN(OFDI_{t-j}), j = 0, 1, \dots, m;$$

Prior to 2003, China OFDI traffic scale is relatively small, this stage OFDI on the export scale of

the limited impact. Therefore, this paper selected from 2003 to 2015 as a sample of research, and unified statistical caliber, are non-financial industry investment flows, and the use of the US GDP deflation index adjusted for the 2010 constant price.

Empirical Results. The results of stationary test and cointegration test show that there is a cointegration relationship between variables, which can be further analyzed by regression analysis.

First, the regression results of (2) are shown in Table 1, and the constant term is used to estimate the OLS because the constant term is not significant.

Table 1 (2) Estimated results

variable	Estimated results	Removal of constant term estimates
C	2.049265 (0.537913)	--
$LN(OFDI)$	0.238242** (2.561783)	0.190459*** (7.179030)
$LN(SUMGDP)$	0.287013* (2.014920)	0.363495*** (43.85671)
R^2	0.975904	0.975129
Adjusted R^2	0.970549	0.972642
DW	1.586097	1.474097

Note: The explanatory variables are LN (EX); the t statistic in brackets, *, ** and *** respectively indicate that the parameter estimates are significant at the 10%, 5% and 1% significance levels, respectively.

The empirical results show that OFDI is significantly positively correlated with the scale of exports. Chinese OFDI traffic will increase by 0.1% for every 1% increase in Chinese export volume.

Secondly, the Koyck transform model is estimated. As a result of the existence of sequence autocorrelation problems in the Koyck transform model, we use the tool variables as a tool to estimate the Koyck distribution hysteresis model. The results are shown in Table 2.

Table 2 Koyck distribution hysteresis model tool variable method estimation results

variable	Parameter estimate	Related statistics	Estimated results
C	9.464060*** (23.62966)	Adjusted R^2	0.937166
$LN(OFDI_t)$	0.443490*** (11.70234)	DW	1.506713

Note: The explanatory variables are: t, and *, ** and *** respectively indicate that the parameter estimates are significant at the 10%, 5% and 1% significance levels, respectively.

The results show that the coefficient of OFDI flow is significantly positive indicating that in the long run, OFDI for each 1% increase in Chinese export scale will increase by about 0.44%, further validating the OFDI on the export scale to promote the role.

Table 3 Almond polynomial distribution hysteresis model estimation results

variable	Estimated results	variable	Estimated results
C	10.78795 ^{***} (29.59088)	$LN(OFDI_{t-2})$	0.16573 ^{***} (9.421345)
$PDL(01)$	0.055242 ^{***} (9.421345)	Sum of Lags	0.33145 ^{**} (9.421345)
$LN(OFDI_t)$	0.05524 ^{***} (9.421345)	Adjusted R^2	0.906988
$LN(OFDI_{t-1})$	0.11048 ^{***} (9.421345)		

Note: The explanatory variables are in the brackets for the t statistic, *, ** and *** respectively indicate that the parameter estimates are significant at the 10%, 5% and 1% significance levels, respectively.

Again, the polynomial distribution hysteresis model is estimated. The AIC value and the SC value are used to determine the lag length to 2 and the number of polynomials to 1. The regression results show that OFDI has a significant effect on the scale of exports. In the long run, each 1% increase in OFDI will increase the export scale by 0.33%. The results are shown in Table 3.

Since the influence of OFDI on the export scale may not satisfy the above hypothesis, this paper also considers the empirical weighting method with invariant lagged structure. It is also proved that OFDI has a significant positive correlation with the scale of exports for a long time.

Based on the empirical results, it can be concluded that the increase of OFDI scale will promote the increase of export scale, and the effect is lagging behind.

Discussion and Analysis. As shown in Table 4, China OFDI mainly concentrated in the mining industry, manufacturing, wholesale and retail trade and leasing and business services in four industries, the total proportion of more than 70%, the total average ratio of 81.59%, so OFDI The impact of exports mainly from the four industries OFDI.

First of all, Chinese investment in the mining industry in the total investment in the proportion of an average of 23.14%, the investment in the mining industry is mainly to obtain the host country's natural resources, based on the previous analysis, such investment will promote the production of mining equipment and related industries The export of manufactured goods has a positive effect on the increase in the scale of exports.

Second, the manufacturing industry, mainly market-oriented and production-oriented investment, the investment in manufacturing accounted for an average of 10.70%, compared to the other three major industries accounted for less investment, its exports the impact of the scale contributes less.

Again, the leasing and business services industry is the largest share of Chinese OFDI, with an average share of 32.47%. This investment is driven by import and export of services, expanding the scale of the market and promoting the growth of Chinese export scale. Wholesale and retail trade is also for import and export services, and the role of leasing and business services are similar, will promote the expansion of export scale, the average proportion of 15.28%

Table 4 OFDI traffic major industry distribution (%)

Year	Mining Industry	Manufacturing	Wholesale and Retail	Leasing Business Services	Total
2003	48.40	21.80	12.60	9.80	92.60
2004	32.74	13.74	14.55	13.63	74.66
2005	13.66	18.60	18.43	40.30	91.00
2006	48.43	5.14	6.32	25.64	85.53
2007	16.36	8.56	26.59	22.58	74.08
2008	13.91	4.22	15.56	51.88	85.57
2009	27.92	4.69	12.84	42.84	88.28
2010	9.50	7.75	11.18	50.31	78.74
2011	21.06	10.27	15.05	37.32	83.71
2012	17.42	11.15	16.79	34.40	79.76
2013	26.75	7.76	15.80	29.17	79.48
2014	15.44	8.94	17.06	34.36	75.80
2015	9.27	16.46	15.83	29.86	71.42
平均	23.14	10.70	15.28	32.47	81.59

Note: The data are derived from the 2003 China OFDI Statistical Bulletin, which is calculated by the author. The data in the table are expressed as the proportion of the industry's total investment in the non-financial sector.

In general, investments in mining, leasing and business services, wholesale and retail industries have a positive effect on exports, while investment in manufacturing as a production-oriented OFDI is uncertain about exports, but because of its share Compared with the other three categories, so in general, the investment in these four industries in general to promote the export, explained in the regression results, OFDI traffic and the total export there is a significant positive correlation.

Conclusions and Policy Recommendations

The main conclusions of this paper are as follows:

First, OFDI traffic on the export scale has a significant role in promoting,

Second, OFDI on the impact of the size of the export lag effect. Considering its lag effect, the impact on the export scale is even greater.

Third, Chinese OFDI export effect is mainly derived from the mining industry, manufacturing, leasing and business services and wholesale and retail investment, through the expansion of overseas markets, driven machinery and equipment, intermediate exports to promote the overall export growth

Based on the above conclusions, this paper attempts to put forward relevant policy recommendations to further expand the positive effect of OFDI on export scale.

First, through the government to provide guidance, information services, simplify the business OFDI and foreign exchange administrative procedures, the Government to provide tax, finance,

insurance and other policy support and other ways to expand the expansion of OFDI scale, promote export growth and export structure optimization, improve export status.

The second is to adjust the OFDI structure to promote manufacturing-oriented production-oriented OFDI and technology-oriented OFDI.

The third is to coordinate the import and export trade policy, encourage enterprises to drive the export of machinery and equipment and intermediate products and promote the reverse import of resource products and advanced technology.

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