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Research on the impact of China's OFDI on the trade competitiveness of countries along the Belt and Road

Zehua Wang

Anhui University of Finance and Economics

ABSTRACT
Based on the panel data of 30 countries along the Belt and Road Initiative (BRI) from 2007 to 2021, this paper innovatively analyzes the impact of China's foreign direct investment on the trade competitiveness of goods, manufacture and service products in these countries by using the fixed effects model. The revealed comparative advantage is selected as the indicator to measure the trade competitiveness of host countries, and it is used as the explained variable. The explanatory variable is the proportion of China's direct investment in the countries along the Belt and Road to the GDP of host countries, and the government efficiency, national export complexity, technology level, trade freedom and economic growth are selected as control variables. The results show that China's OFDI can have a positive impact on the trade competitiveness of countries along the Belt and Road. According to the empirical results, China's OFDI has a significant promotion effect on the trade competitiveness of general goods and service goods in countries along the Belt and Road. Although it has a negative effect on the trade competitiveness of manufacturing products, in the heterogeneity test of time-divided sample regression, the absolute value of its coefficient becomes smaller after the implementation of the Belt and Road policy. This shows that "The Belt and Road" policy improves the matching between OFDI and the host country's manufacturing industry through infrastructure investment, industrial policy coordination and technical cooperation, and reduces the negative impact of export substitution and competitive pressure.

KEYWORDS
trade competitiveness; Revealed comparative advantage; OFDI

1 Background

In terms of investment scale, from 2013 to 2021, Chinese enterprises invested a total of US $853.9 billion in countries along the Belt and Road, accounting for 56.1% of China's total overseas investment; In terms of investment times, Chinese enterprises invested 1, 709 times in countries along the Belt and Road, accounting for 62.1% of China's total foreign investment. Countries along the Belt and Road have become one of the preferred destinations for Chinese enterprises' foreign investment.

The impact of China's overseas investment on the trade competitive advantage of host countries is complex and multi-faceted. On the one hand, Chinese enterprises' investment can improve the production efficiency and export competitiveness of host countries by means of capital input, technology transfer and industrial chain integration. On the other hand, in some cases, Chinese enterprises may also form a competitive relationship with enterprises in the host country, affecting the development of the existing industries in the host country.

Research on the impact of China's OFDI on the trade competitiveness of host countries can not only help us better understand the economic effects of China's OFDI, but also provide policy suggestions for promoting global economic cooperation and development.

2 Economic model and empirical study

2.1 Data sources and sample selection

The data of 30 countries along the Belt and Road from 2007 to 2021 are selected, in which the revealed comparative advantage index (RCA) is taken as the explained variable. The data come from UIBE GVC database. The core explanatory variable pfdi is the ratio of China's OFDI stock to the host country's GDP. The control variables are: export complexity (lnexpy), economic development level (lngdp), technology level (lntech), government efficiency (EFF), trade openness (lnfree). The data are from the World Bank database.

2.2 Model construction

The time span of data samples selected in this paper is 15 years, and the sample countries are 30 in total, which belongs to short panel data. In order to make the conclusions more rigorous and reliable, this paper uses Husman test to determine whether to use fixed effect regression model or random effect model. The original hypothesis of Husman test is that the random effect model is more appropriate. However, the test results show that the P value is less than 0.05, thus

rejecting the null hypothesis.

$$RCA1_{it} = \alpha_0 + \alpha_1 PFID_{it} + \alpha_2 X_{it} + \mu_i + \tau_t + \varepsilon_{it} RCA2_{it} = \alpha_0 + \alpha_1 PFID_{it} + \alpha_2 X_{it} + \mu_i + \tau_t + \varepsilon_{it}$$

$$RCA3_{it} = \alpha_0 + \alpha_1 PFID_{it} + \alpha_2 X_{it} + \mu_i + \tau_t + \varepsilon_{it}$$

In the above formula, represents the trade competitiveness of country or industry i in year t, where RCA1, RCA2 and RCA3 are the trade competitiveness of a manufacture commodity, service commodity and goods respectively; α_0Is a constant term; α_j(j=1,2...) Is the coefficient of the variable; $OFDI_{it}$Represents China's OFDI stock in country i along the Belt and Road in year t; X_{it}Represents the set of control variables. μ_iAre country fixed effects, $.\tau_t$is time fixed effects, and $\varepsilon_{it}$is error terms.

Table 1 Descriptive Statistics Table

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
rca1	450	0.874	0.362	0.0140	1.480
rca2	450	1.091	0.690	0.137	3.954
rca3	450	0.958	0.253	0.0216	1.343
pfdi	450	0.0358	0.0776	0	0.537
eff	450	0.169	0.752	-1.135	2.470
lnexpy	435	2.273	0.0260	2.177	2.364
lngdp	450	8.698	1.110	6.454	11.12
lntech	431	3.509	0.533	0.820	4.596
lnfree	425	4.526	0.576	3.207	6.081

Table 2 Fixed Effects Regression

	(1)	(2)	(3)
	Manufacture	Service	Goods
	RCA1	RCA2	RCA3
pfdi	1.842 * * *	2.501 * * *	1.095 * * *
	(0.302)	(0.475)	(0.225)
lnexpy	0.388	0.658	-0.073
	(0.577)	(0.908)	(0.430)
lngdp	-0.034	0.172 * * *	0.127 * * *
	(0.021)	(0.033)	(0.016)
lntech	0.163 * * *	0.045	0.104 * * *
	(0.039)	(0.061)	(0.029)
eff	0.191 * * *	0.420 * * *	0.239 * * *
	(0.033)	(0.052)	(0.024)
lnfree	0.088 * *	0.104 *	-0.044
	(0.038)	(0.060)	(0.028)
_cons	1.301	1.174	1.972 * *
	(1.306)	(2.057)	(0.973)
Country	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	406	406	406
R^2	0.192	0.176	0.252

*, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively; SE values are in parentheses below the coefficients (the same below).

From the overall effect, China's OFDI has a positive impact on the export competitiveness of service and commodity products of countries along the Belt and Road, but has a negative impact on the export competitiveness of manufacturing products of host countries. The reasons for the negative impact on manufacturing products may be as follows: China's OFDI may intensify the market competition in the countries along the Belt and Road, especially for the local manufacturing enterprises in the host countries.

3 Robustness test

In this paper, the core explanatory variable is replaced by the ratio of China's foreign investment stock in the countries along the Belt and Road to the GDP of the host countries (pfdi) with the flow of China's direct investment in the countries along the Belt and Road (denoted as OFDIL), and the unit is USD 10,000.

Table 3 Replacement of Explanatory Variables

	(1)	(2)	(3)
	Manufacture	Service	Goods
	RCA1	RCA2	RCA3
ofdil	0.671 * * *	0.921 * * *	0.357 * * *
	(0.155)	(0.244)	(0.112)
lnexpy	1.020 *	-0.404	-0.254
	(0.605)	(0.953)	(0.435)
lngdp	-0.032	0.200 * * *	0.116 * * *
	(0.022)	(0.034)	(0.016)
lntech	-0.054	-0.065	0.018
	(0.037)	(0.058)	(0.026)
eff	0.279 * * *	0.317 * * *	0.184 * * *
	(0.034)	(0.054)	(0.025)
lnfree	0.163 * * *	0.004	-0.003
	(0.037)	(0.059)	(0.027)
_cons	-0.252	3.802 *	2.442 * *
	(1.366)	(2.149)	(0.981)
Country	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	390	390	390
R^2	0.167	0.149	0.196

China's OFDIL in the table has all passed the 1% significance level test in the process of explaining RCA1, RCA2 and RCA3, and has a positive impact on the export competitiveness of service and commodity products of countries along the Belt and Road. However, it has a negative impact on the export competitiveness of the host country's manufacturing products, which again verifies the robustness of the regression results.

4 Heterogeneity test

In order to investigate whether there is heterogeneity of China's OFDI on the regions along the Belt and Road before and after the implementation of the Belt and Road policy, this paper divides the sample into two parts: 2007-2012 and 2013-2021, and adopts the method of sub-sample regression to study. Similar to the previous regression estimation results, China's OFDIL in the table has all passed the 1% significance level test in the process of explaining RCA1, RCA2 and

Table 4 Sample Regression from 2007 to 2012

	(1)	(2)	(3)
	Manufacture	Service	Goods
	RCA1	RCA2	RCA3
pfdi	3.576 * * *	6.689 * * *	2.359 * * *
	(0.870)	(1.297)	(0.622)
lnexpy	-1.504	2.068	0.078
	(0.912)	(1.359)	(0.652)
lngdp	0.059 *	0.103 * *	0.096 * * *
	(0.031)	(0.046)	(0.022)
lntech	0.187 * * *	0.087	0.143 * * *
	(0.056)	(0.084)	(0.040)
eff	0.217 * * *	0.444 * * *	0.204 * * *
	(0.050)	(0.074)	(0.036)
lnfree	-0.053	0.312 * * *	-0.057
	(0.061)	(0.091)	(0.044)
_cons	5.735 * * *	-1.830	1.289
	(2.092)	(3.118)	(1.495)
Country	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	162	162	162
R^2	0.280	0.217	0.236

RCA3, and has a positive impact on the export competitiveness of service and commodity products in countries along the Belt and Road.

Table 5 Sample Regression from 2013 to 2021

	(1)	(2)	(3)
	Manufacture	Service	Goods
	RCA1	RCA2	RCA3
Pfdi	1.986 * * *	2.615 * * *	1.056 * * *
	(0.371)	(0.600)	(0.289)
lnexpy	1.693 * *	-0.589	-0.116
	(0.752)	(1.215)	(0.586)
lngdp	-0.026	0.195 * * *	0.139 * * *
	(0.029)	(0.047)	(0.023)
lntech	0.188 * * *	0.104	0.080 *
	(0.055)	(0.089)	(0.043)
eff	0.130 * * *	0.481 * * *	0.294 * * *
	(0.044)	(0.072)	(0.035)
lnfree	-0.072	-0.060	0.069 *
	(0.053)	(0.085)	(0.041)
_cons	-1.677	3.743	2.348 *
	(1.686)	(2.725)	(1.315)
Country	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	244	244	244
R^2	0.180	0.214	0.276

Before the implementation of the "Belt and Road" policy (2007-2012), China's OFDI showed a strong positive impact on the RCA of goods and service products, which may be due to the significant technology spillovers, infrastructure and market access brought by the initial investment. However, after the implementation of the "Belt and Road" policy (2013-2021), the coefficients of China's OFDI on commodity and service products are still positive but have decreased, which may be due to the gradual maturity of the host country economy and the decline of the marginal effect of OFDI. After the implementation of the "Belt and Road" policy, the absolute value of the negative coefficient decreases, which indicates that the inhibitory effect is weakened. In this paper, low-income countries and lower-middle income countries are divided into a group, and upper-middle income countries and high-income countries are divided into a group, which are planned to be grouped for regression analysis.

Table 6 Regression Results for Low- and Lower-Middle-Income Country Samples

	(1)	(2)	(3)
	Manufacture	Service	Goods
	RCA1	RCA2	RCA3
pfdi	2.200 * * *	2.100 * * *	0.917 * * *
	(0.398)	(0.603)	(0.252)
lnexpy	1.668 *	-1.401	0.983 *
	(0.909)	(1.378)	(0.575)
lngdp	-0.051	0.192 * * *	0.210 * * *
	(0.033)	(0.049)	(0.021)
lntech	0.358 * * *	0.107	0.111 * * *
	(0.051)	(0.077)	(0.032)
eff	0.372 * * *	0.227 * * *	0.149 * * *
	(0.057)	(0.087)	(0.036)
lnfree	0.113 * *	-0.110	0.070 * *
	(0.050)	(0.076)	(0.032)
_cons	-0.662	5.777 *	0.243
	(2.023)	(3.066)	(1.280)
Country	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	213	213	213
R^2	0.328	0.159	0.493

Table 7 Regression Results for Middle-High and High-Income Country Samples

	(1)	(2)	(3)
	Manufacture	Service	Goods
	RCA1	RCA2	RCA3
pfdi	1.287 * * *	3.038 * * *	1.017 * * *
	(0.418)	(0.794)	(0.300)
lnexpy	-0.094	2.406 * *	0.946 * *
	(0.626)	(1.189)	(0.449)
lngdp	0.168 * * *	-0.096	0.071 * *
	(0.039)	(0.074)	(0.028)
lntech	0.161 * * *	-0.074	-0.020
	(0.061)	(0.117)	(0.044)
eff	0.082	0.376 * * *	0.122 * * *
	(0.051)	(0.097)	(0.037)
lnfree	0.037	0.016	0.107 *
	(0.078)	(0.147)	(0.056)
_cons	1.947	-3.587	3.320 * * *
	(1.501)	(2.852)	(1.078)
Country	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	193	193	193
R^2	0.170	0.256	0.342

After comparing the two tables, it is found that the absolute value of the coefficient of pfdi in the regression results of middle and high income countries is smaller than that of the control group of low and middle and low income countries. The reason for this phenomenon may be that middle and high income countries have more perfect market mechanism, strong legal framework and higher absorptive capacity of technology, which leads to relatively small negative impact of OFDI. In middle and high income countries, they may limit the negative effect of production transfer through strict regulatory policies, or enhance the competitiveness of local manufacturing through technical cooperation with OFDI enterprises. In addition, the economic diversification of middle and high income countries may reduce the crowding-out effect of OFDI on specific industries, so that their trade competitiveness of manufacturing products is less damaged.

The coefficients of pfdi, the core explanatory variable of service and commodity, are both positive and increase in the middle and high income groups, which may be due to the synergistic effect of technology diffusion and market expansion. In the service industry, OFDI may improve the export capacity of host countries' service products by introducing advanced information technology, financial services or logistics management experience, especially in high-income countries, where institutional and infrastructure support is stronger and absorptive capacity is better. In commodity industries, such as agriculture and minerals, OFDI may enhance the export competitiveness of host countries through resource development, infrastructure construction or market access. Countries with higher income can make more effective use of these resources, so the improvement of RCA is more significant.

5 Conclusions

FDI has a positive impact on the trade competitiveness of countries along the Belt and Road. According to the empirical results, China's OFDI has a significant promotion effect on the trade competitiveness of general goods and service goods in countries along the Belt and Road. Although it has a negative effect on the trade competitiveness of manufacturing products, in the heterogeneity test of time-divided sample regression, the absolute value of its coefficient becomes smaller after the implementation of the Belt and Road policy. This shows that the "Belt and Road" policy improves the matching between OFDI and the host country's manufacturing industry through infrastructure investment, industrial policy coordination and technical cooperation, and alleviates the negative impact of export substitution and competitive pressure.

From the perspective of control variables, the technological level of host countries has a significantly positive effect on the trade competitiveness of manufactured products of high-income countries, but has a negative effect on countries with low income. The reasons are as follows: high-income countries have a better education system and a higher level of human capital, which can effectively use technological progress to enhance the competitiveness of manufacturing industry. Manufacturing industries in high-income countries tend to be more capital-intensive or technology-intensive, and the improvement of technology level directly supports product innovation and export expansion. In contrast, low-

income countries are difficult to absorb technological progress due to low education level and weak infrastructure, and the improvement of technology level will attract capital and labor to service or high-tech industries. The improvement of technology level will attract capital and labor to service or high-tech industries, crowding out the production capacity of traditional manufacturing industries, thus reducing their RCA. The improvement of government efficiency can be reflected in the speed of the government to deal with the registration of start-ups, taxation, the ability to set up laws and regulations conducive to the growth of enterprises, etc. Efficient governments can improve the coordinated development of local enterprises and OFDI by optimizing the business environment, reducing transaction costs and supporting trade activities, so as to improve the country's trade competitiveness.

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