

Analysis on Export Trade Effect of China and Countries along One Belt and One Road

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Abstract—In view of China export trade effect on countries along the “One Belt and One Road”, it used extended gravity model to analyze the question. In order to meet research objectives, it adds variables such as population, GDP per capita, market openness, and dummy variables on the basis of gravity model. The conclusions are as follows: (1) The trade effect between china and OBOR countries is obvious, and the trade complementariness are strong; (2) the result proves economic size multiplication, population scale multiplication, market openness, per capita GDP difference boot the effect, but distance between China and OBOR countries and whether the OBOR countries join the EU are negative influences; (3) Most of the OBOR countries are insufficient trade with China, which should be speeded up cooperation to improve the trade effect.

Keywords—*The One Belt and One Road; Gravity Model; Trade Effect; Trade Potential*

I. INTRODUCTION

The proposal of the “One Belt and One Road” initiative is consistent with the current internal and external environment including the slow development of the world economy, the transformation and upgrading of the domestic economy, and the resolution of excess capacity. The United States has returned to the Asia-Pacific region and imposed maritime containment on China, and has unilaterally launched a series of "trade wars". This has increased China's export pressure. The "One Belt and One Road" Initiative is conducive to solving these problems. Gao Hucheng, minister of Commerce, believes that "economic and trade cooperation is the foundation and precursor of OBOR cooperation, it is necessary to be carried on. Therefore, how does China's trade competitiveness for exporting countries along the route and trade effects worth studying, and the answers to these questions have important theoretical and practical significance for enriching the connotation of the One Belt and One Road and promoting the construction of the One Belt and One Road Initiative.

At present, there are many research literatures on the “One Belt and One Road”, which are mainly divided into two categories. One is the qualitative analysis of word-level analysis, such as theoretical concepts, policy implications and so on. It is believed that the “One Belt and One Road” initiative is a time for compliance with the background of the times and is conducive to multi-benefit strategies (Long

Kaifeng, 2015), will have profound impact on the political economy of China and the world (CemNalbantoglu, 2017). Zhang Yujie believed that the construction of the “One Belt and One Road” can break the barrier of the eastern sea route; and further optimize the external environment for China's peaceful development and create a broad strategic space for the rise of the country and national renewal (Du Debin, 2015). The other category is an empirical study of trade between China and the OBOR countries. Wang Haiyun (2014) analyzed that both China and the countries along the route are complementary in resources, capital, and technology. Long Haiwen (2016) found that China and Central and Eastern Europe are mainly characterized by low competition and high complementarities through the trade index analysis of various commodities. Mumtaz Hussain (2017) found that China and the countries along the route have great trade potential, and it will become a reality with the improvement of infrastructure. There are also scholars who have studied the trade influencing factors between China and the countries along the route and found that the economic scale and common border of the trading partner countries have a positive effect on the trade. The distance between the two countries (Kang Xiaoling, Zhang Ying, 2016) and the population product is negative role (Zhang Yujia, 2017).

Through literature review, the existing quantitative analysis mainly has the following characteristics: Firstly, the sample range of most of the literature is limited, mostly in parts of Central Asia and ASEAN etc., and the overall perspective is less, Central Asia is main energy source countries of china, ASEAN and China have signed trade agreements earlier and have closer trade relations, so the general applicability of the analysis results in these two regions is weak. Secondly, more literature is an industry study of energy cooperation between China and countries along the route. Thirdly, the existing quantitative analysis focuses on measuring trade potential, trade costs, trade competitiveness, and less analysis of the trade effects. The research on trade effects at home and abroad has been relatively mature. The analysis of trade effects using the extended gravitational model has been widely applied to the analysis of trade effects in China, ASEAN, Chile and other free trade areas. Therefore, this article draws on previous research methods, under the overall perspective of the countries along the route. The extended gravity model was used to empirically analyze the

trade effects of the OBOR Initiative and whether the construction of OBOR promoted China's exports to countries along the route.

II. THE RESEARCH MODEL AND METHOD OF EXPORT TRADE EFFECT OF CHINA TO COUNTRIES ALONG THE LINE

A. Model Introduction

The scholars Tinbergen (1962) and Poyhonen (1963) applied the gravitational model to trade flow studies as early as possible. They believe that the trade flow of one country to another is proportional to the total economic output of the two countries and the distance between the two countries inversely. After a long period of questioning and verification, the gravitational model eventually became an effective tool in the empirical study of trade. In order to better illustrate the issues, scholars added variables such as population, per capita income, whether they belong to an economic organization, whether they share borders or whether they share a common language or culture in later research. In addition, the gravitational model has also been introduced into many research areas, such as immigration, FDI, tourism. This section draws on the experience of predecessors and uses the combination of the extended gravitational model and panel data to analyze the trade effects of China export to countries along the route.

B. Model establishment

The simplified form of gravity model (1) is

$$M_{ij} = KY_i Y_j / D_{ij}$$

In use, the equation is usually converted into a logarithmic linear form (2):

$$\ln M_{ij} = \alpha_0 + \alpha_1 \ln Y_i Y_j + \alpha_3 \ln DIS_{ij} + \varepsilon_{ij}$$

This paper aims at achieving the research objectives better. According to the extended gravity model established by Bergstrand (1989), this paper sets the model (3) as follows:

$$\ln M_{ij} = \alpha_0 + \alpha_1 \ln Y_i Y_j + \alpha_2 \ln P_i P_j + \alpha_3 \ln DIS_{ij} + \alpha_4 TO_i + \alpha_5 \ln ID + \alpha_6 OR + \alpha_7 EU + \alpha_8 FTA + \varepsilon_{ij}$$

M_{ij} stands for China's trade volume to exporting countries; Y_i , Y_j stand for the GDP of China and the trading country; P_i , P_j refer to the total population of China and the trading country respectively; DIS_{ij} refers to the distance between China and the trading country. TO_j refers to the market openness degree of the trading country, which is the ratio of the country's total trade to GDP; ID refers to the GDP per capita gap between China and the trading country. According to the Heckscher-Ohlin Theory (H-O theory), the greater larger the gap in per capita income, the more complementary the trade between the two countries, the easier it will be for trade. OR , EU , and FTA are dummy variables. OR indicates whether it is the country along the One Belt and One Road (OBOR country). The variable is assigned a value of 0 before 2014. The value of a country along the Belt and

Road after 2014 (included) is assigned to 1, and the rest is 0. The EU indicates whether it is an EU member state. The FTA stated whether it has signed a free trade agreement with China.

This article mainly observes the coefficient of the OR . If the coefficient before this variable is significantly positive, it indicates that the construction of OBOR will be conducive to the expansion of China's exports to countries along the route, that is, the trade effect of China's exports to countries along the route is obvious; if the coefficient is significantly negative or insignificant, indicating that the OBOR Initiative has no obvious effect on expanding China's trade with countries along the route.

C. Sample range and data sources

The first consideration is to select the top 50 countries of China's export. The countries that belong to the EU (EU value is 1) are: Bulgaria, Croatia, Hungary, Poland, Romania, Estonia, Latvia, Lithuania, Denmark, Italy, Germany, France, Belgium, Sweden, the United Kingdom, the Netherlands, and Spain; the countries that signed a free trade agreement with China before 2017 (the FTA has a value of 1) are: Korea, ASEAN countries, Singapore, Pakistan, New Zealand, and Sri Lanka is negotiating from 2014. Since the top 50 export countries only include 26 OBOR countries, in order to achieve the purpose of analysis, taking geographical location, resource endowments, and data integrity into consideration, 18 countries, such as Ukraine, Uzbekistan, Yemen, Qatar, Slovakia, Lebanon and Estonia, are added. Taiwan and Hongkong have special relationship with china, which is not universal, so this article will not consider them. In summary, a total of 66 trading partner countries have been selected for this article, of which 44 are OBOR countries, and also include several larger countries representing the free trade zone. In terms of trade volume, exports to the 66 countries accounted for more than 78% of China total exports, and exports to 44 OBOR countries accounted for more than 96% of the total exports of 71 OBOR countries, so the selection of sample countries could be a good analysis of China export situation and China exports to countries along the route and achieving the purpose of this study.

The export data of China to the sample countries comes from the National Bureau of Statistics Website; the GDP and population of each country's data comes from the World Bank database; the distance between the capitals of the two countries comes from the Distance Calculator on www.indo.com; TO is the ratio of total trade to GDP in each country, where total trade data is sourced from the World Bank database; Whether it is OBOR countries based on the list of country profiles released by the China Belt and Road Portal; whether the FTA signed with China is based on the information published on the website of the Ministry of Commerce of the People's Republic of China.

III. ANALYSIS OF EMPIRICAL RESULTS

A. Export trade effect analysis

Eviews 7.2 software was used to analyze panel data of 66 countries for 7 years. Considering that there may be heteroskedasticity, logarithmic processing is applied to the variables of export value, GDP product, total population product, distance, and per capita GDP difference. To avoid the pseudo-regression due to the unit roots, the result shows that there is no unit root by unit root test performed on each sequence. What's more, Variance Inflation Factor (VIF) are all less than 2, which proves that there is no serious multicollinearity.

The LM test rejects the null hypothesis of using the hybrid estimation model. Because the model contains variables that do not change over time, the fixed-effect model does not simulate the third equations well. Therefore, models (2) and (4) are more in line with the analysis requirements of this paper. The variable FTA in Models (1) and (2) is still not significant at the 10% test level, indicating that the influence in this model is weaker, and models (3) and (4) are obtained after FTA rejection. The regression results for each model are as follows:

TABLE I. REGRESSION RESULTS

Variable	FE(1)	RE(2)	FE(3)	RE(4)
α_0	-34.2257***(-7.7864)	7.2237***(5.4817)	-34.2182***(-7.7939)	7.5439***(5.2783)
$\ln Y_i Y_j$	0.0252 (1.1846)	0.0814***(4.0114)	0.0255(1.2029)	0.0727*** (3.5589)
$\ln P_i P_j$	2.9251*** (10.6700)	0.6009*** (15.6217)	2.9247***(10.6311)	0.6116***(14.5956)
$\ln DIS_{ij}$	-	-0.6722*** (-4.9092)	-	-0.7025***(-4.6936)
$\ln ID_{ij}$	0.0733*** (2.6848)	0.1380*** (5.7241)	0.0735*** (2.6970)	0.131***(-5.377)
TO_j	0.5935*** (4.2464)	0.5329*** (4.9005)	0.5912***(-4.2412)	0.5110***(-4.5500)
EU	-0.3356** (-2.1253)	-0.2910** (-2.4401)	-0.3360** (-2.1303)	-0.3128** (-2.5356)
OR	0.0883*** (2.8501)	0.2201*** (8.6954)	0.0891*** (2.8865)	0.2250***(-8.9277)
FTA	0.0322(0.3008)	0.1141 (1.2257)	-	-
R ²	0.99	0.43	0.98	0.41
Fvalue	352.7	43.3	358.4	45.7

Note: ***, **, * indicate respectively it is significant at 1%, 5%, and 10% confidence levels

Comparing the models (3) and (4), it can be found that the regression results of the model (4) are more in line with the economic significance of the gravity model. The sign of each variable coefficient in model (4) is in line with expectations, and all variables except EU are significant at the 1% confidence level. Where EU and distance are hinder factors. The EU's coefficient is significantly negative at 5% confidence level because preferential treatment among EU member states will create trade creation and transfer effects, which reduces imports from China. The coefficient of distance is -0.7025, which indicates that the current total trade volume between China and the OBOR countries is constrained by distance; it also can indicate transportation cost is still one of the main factors affecting the trade volume between China and the OBOR countries. The product of two countries' GDP, the product of population size, the degree of market opening, and the difference in per capita GDP have a positive effect on exports. The greater the total economic output, the greater the

potential supply capacity of China and the potential demand capacity of the OBOR countries; the coefficient of market openness is 0.5110, which has a significant role in promoting the expansion of China's exports. The more openness the market, the more products are imported. The sign of ID is positive, which is in accordance with the H-O theory. The coefficient shows that the trade complementarities between China and OBOR countries is strong and exhibits inter-industry trade. The coefficient of the dummy variable OR is 0.2250, which is significantly positive at the 1% confidence level. It shows that since the construction of OBOR in 2014, China exports to the OBOR countries has increased significantly. The smaller value of this coefficient may be due to implementation time of the policy is short and the effect is limited. It may increase as the construction of OBOR Initiative progresses.

B. Measurement of trade potential

In order to further observe the trade effect between China and OBOR countries, then calculate OBOR trade potentials (TR) according to the model (4). If the actual trade value is greater than the model's estimated analog value, it means that the two countries trade excessively; otherwise, it means that

there is insufficient trade. From another perspective, insufficient trade or excessive trade can also explain the trade effect between the two countries. Excess trade indicates that the trade effect between the two countries is greater, On the contrary, it shows that the trade effect between the two countries is less or not obvious.

TABLE II. TRADE POTENTIALS

CTRY	TR	CTRY	TR	CTRY	TR	CTRY	TR
UKR	0.48	ROU	0.97	KOR	1.92	ARM	0.09
UZB	0.26	MYA	0.62	BAN	0.50	LAO	0.26
YEM	0.40	PHI	1.27	PAK	0.68	MDA	0.04
ISR	2.46	AFG	0.06	PAN	0.04	MGL	0.22
IRQ	1.25	EGY	1.04	CZE	1.33	TJK	0.45
IRI	2.14	UAE	4.31	SVK	0.72	MAD	0.91
BUL	0.62	MAS	3.04	BRU	0.69	MAR	0.61
RUS	1.96	LIB	1.59	SLO	1.23	ETH	0.35
CRO	0.77	BLR	0.37	SIN	4.83	BIH	0.05
HUN	1.43	EST	1.03	SRI	0.88	TKM	0.23
RSA	2.76	VIE	0.32	NZL	2.87	LAT	1.06
IND	0.59	AZE	0.13	CAM	0.49	ALB	0.50
QAT	0.64	GEO	0.48	KSA	2.29	BRN	0.71
INA	1.23	KGZ	1.62	POL	2.17	LTU	0.85
KAZ	1.30	MDV	0.98	THA	2.01	OMA	0.88
TUR	1.35	MKD	0.08	KUW	1.16	BHU	0.01
TLS	0.23	NEP	0.10	JOR	1.10		

Source: Calculated from UN Merchandise Trade Database data and model estimates

Note: Due to the lack of some data for 2016 in Syria, Montenegro and other two countries, it is impossible to calculate the trade potential.

Observing the results of Table II, 27 countries are in state of overtrade. Of these, nine are in West Asia, six Central and Eastern European countries and five ASEAN countries, two African countries, two Central Asian countries and New Zealand, South Korea, and Russia. Singapore has the greatest potential among them, which shows that China has a greater trade effect with it. This is related to the fact that Singapore mainly depends on imported raw materials. From a regional point of view, China and ASEAN five countries (Singapore, Thailand, Malaysia, Philippines and Indonesia) have greater trade potential, followed by the West Asia region and Central and Eastern Europe. The rest of the countries have shown insufficient trade, indicating that there is still much room for development.

IV. CONCLUSION

Under the macroeconomic background of "One Belt and One Road", this article empirically analyzed the trade effects of China exports to the OBOR countries on the exports data of China to OBOR countries from 2010 to 2016. The results show that the construction of the One Belt and One Road has promoted China's trade with countries along the route, trade effects are obvious, and the OBOR Initiative on trade has achieved initial success. In addition, through ID variables, it is found that there are strong complementarities between china and OBOR countries; trade potential shows China and most OBOR countries are in a state of insufficient trade. Therefore, when trading with countries along the route, we should adopt spatial differentiation strategy. Trade relations with over-traded countries should be maintained, followed by active trade cooperation with insufficient trade countries, through signing bilateral or multilateral trade preferential agreements to reduce trade costs and improve trade effects.

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