

The Impact of Chinese Energy OFDI on Energy Imports Trade

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Abstract: This paper selects the fixed effect and random effect methods. It uses the data of Chinese energy OFDI (outward foreign direct investment) and energy imports to build a static panel, and empirically tests the import trade effect of Chinese energy OFDI. The results show that the impact of Chinese energy OFDI on energy import trade is positive. The specific influencing factors are embodied in the amount of foreign direct investment in energy and the GDP of the host country. For high-income countries, energy investment from China and the distance between the two nations play a significant role in promoting Chinese energy import. For non-high-income countries, energy investment from China and GDP pushes forward an immense influence on energy import. Therefore, in terms of foreign direct investment in energy, China should continue to increase investment; in terms of investment location selection, enterprises in related fields should first consider the GDP of the host country and the distance between nations.

1 INTRODUCTION

The sustainable growth of the national economy and the guarantee of political and military security depend on the stable energy supply. (Liu & Li, 2018) In the past decade, Chinese energy consumption has grown at an average rate of 3.9%, ranking first in energy consumption. However, with the increase of use, the gap between domestic production and imports is becoming more and more significant, the energy dependence on foreign countries is increasing, and the stability of energy supply has been improving in recent years. (Cheng & Yuan, 2015) In terms of external energy dependence, according to China Statistical Yearbook 2018, the ratio of Chinese energy import to primary energy production in 1990 was only 1.26%. But in 2015 and 2016, the rate reached 21.42% and 25.93%, respectively. In 2018, Chinese energy dependence on foreign countries was 21%, up 1% year on year. According to the BP World Statistical Yearbook, Chinese energy dependence will reach 23% in 2035. In such a domestic environment, Chinese enterprises' foreign direct investment in energy has become an important measure to improve the national energy security pattern and open up international markets.

In the past decade, with more and more enterprises "going global", China has achieved

extensive expansion of OFDI stock and scope while profoundly participating in the international energy market. According to the national data of the National Bureau of statistics from 2009 to 2017, the stock of OFDI in Chinese energy production and supply industry and manufacturing industry was only about US \$2.256 billion and the US \$40.58 billion in 2009, respectively, reaching US \$24.99 billion and the US \$157.67 billion in 2017. With the steady growth of Chinese energy OFDI, the promotion of the "one belt and one way" initiative has become a new opportunity for Chinese enterprises to take an in-depth part in the energy market, (Yang & Wang, 2018) and its growth will not change. (Gusarova, 2019) In terms of energy production, Central Asia, West Asia, and North Africa are rich in energy resources. In terms of energy consumption, East Asia and Europe connected by the "one belt and one-way initiative" are important energy consumption areas in the world. Under the international background of a good cooperation situation, the integration of Chinese enterprises into the world energy pattern has become a meaningful way to realize the upgrading of the global value chain and industrial chain.

Combined with various indicators such as bilateral geographic distance, host country's economic level, and energy factors, Chinese energy OFDI investment has diversified in location selection,

mainly including Australia, Brazil, Britain, Canada, Ethiopia, India, Indonesia, Iraq, Kazakhstan, Laos, Malaysia, and other countries. Through the analysis of investment motivation, the location choice of Chinese overseas energy investment has the obvious motivation of resource seeking, and economic development level seeking, the institutional distance between the host country and China harms investment location. (Yang & Wang, 2018) Has OFDI in energy in the past decade promoted Chinese energy import? At the same time, considering the heterogeneity of the host country's development level, does Chinese energy OFDI also have heterogeneity in the impact of bilateral energy trade?

2 LITERATURE REVIEW

There are two kinds of theoretical views on OFDI and trade effect. That is, some scholars think that OFDI and business are naturally complementary, while others believe that complex dynamic interaction is the real connection between them. According to the above point of view, Mundell (1957) thinks that the relationship between investment and export trade takes the form of mutual substitution. Chiappini (2012) tested the data of 11 European countries and concluded that OFDI is complementary to exports. Ouyang, Zhou, and Guan (2019) from the theoretical point of view, taking Chinese enterprises as the analysis object, studies that OFDI has trade complementary effect. Liu et al. (2016) believe that the trade effect of OFDI varies with its development stage. Some scholars think that the trade effect of OFDI varies with the host country. Wang, Tian, and Xie (2014) believed that in terms of export trade, OFDI to emerging economies showed a significant role in promoting; OFDI to resource-rich countries showed a positive correlation with imports and exports. Li and Che (2019) believed that Chinese OFDI exerts an enormous function on the export of capital goods and technology goods. Zhang (2012) found that for host countries with abundant resources, Chinese OFDI has significant effects on promoting import and export trade, followed by Chinese OFDI for developed countries.

In the middle of the 20th century, the research of OFDI began to involve energy. Venables (1999) and others analyzed Chinese participation in Central Asia's oil resources. They believed that China would make a large amount of energy investment in the region in consideration of future economic growth and geopolitical issues. Ramasamy, Yeung, and Laforet (2010) consider that Chinese energy OFDI is

more diversified in terms of investment location selection by considering the host country and enterprise factors.

To sum up, the current academic research on OFDI mainly focuses on the trade effect of overall investment, while the research on the home country's import effect of different industries is less. In terms of energy supply, Chinese energy security is becoming increasingly severe. Based on the above considerations, this paper takes 2009-2018 energy OFDI related data as the starting point. It uses the static panel model to evaluate the impact of the Chinese energy industry OFDI on the energy import of the home country.

3 MEASUREMENT MODEL AND DATA

Firstly, this paper analyzes the correlation between Chinese total energy import and its influencing factors by using stata15.0 and draws a quadratic fit between independent variables and dependent variables (see Figure 1). Besides Y_1 , the other variables show a positive slope of the quadratic fitting line, indicating a positive correlation between Chinese OFDI and Chinese total energy import. Although the scatter diagram cannot fully explain the specific relationship between dependent variables and independent variables, the chart still shows that there is a clear correlation between the selected relevant variables and Chinese total energy import. The specific situation also needs to be discussed in the next step through the measurement model.

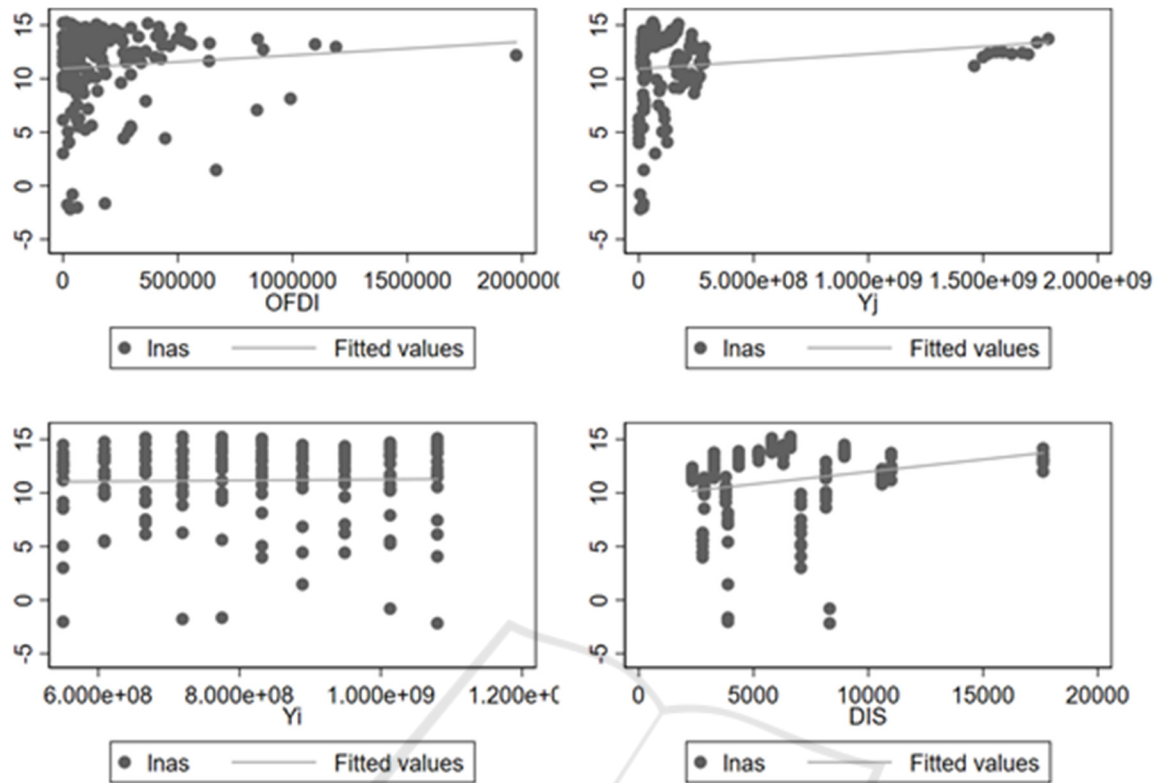


Figure 1. Correlation between total energy import of China and its influencing factors.

3.1 Model Construction

$$\ln AS_{ij,t} = \beta_{0,j} + \beta_1 \ln Y_{i,t} + \beta_2 \ln Y_{j,t} + \beta_3 \ln DIS_{ij} + \beta_4 \ln OFDI_{ij,t} + u_{it} \quad (1)$$

3.2 Measurement Method

Given the time correlation and cross-section correlation of the data, this paper selects panel data to study the relationship between Chinese energy OFDI and energy import. Because there are differences in the level of economic development of different countries and restrictions on the number of samples, this paper adopts the static panel model. At present, the academic circles mainly take fixed effect and random effect models for panel data processing. For careful consideration, this model uses both fixed force and random effect to make an econometric estimation.

According to the difference in income, this paper divides the data into three groups of samples: All countries, High-income country and Non-high-income countries. The results are presented in table 1. The p-value of the Hausman test is higher than 0.05, which shows that the estimation of random effect is appropriate, whether it is a population sample, a high-income sample, or a non-high-income sample.

3.3 Selection of Variables and Data Sources

Taking ten years (2009-2018) as the time scale and considering the continuity of investment, 18 countries are selected as the research objects. The specific countries are Australia, Brazil, the United Kingdom, Canada, India, Indonesia, Iraq, Laos, Malaysia, Vietnam, Pakistan, the Philippines, the Russian Federation, Saudi Arabia, Ethiopia, Turkey, Kazakhstan, and the United States. According to the world bank classification standard, this paper divides the national data into high-income samples and non-high-income samples. Besides, the sources of relevant indicators are as follows:

(1) Chinese total energy import data comes from the United Nations COMTRADE database, in which Chapter 32, chapter 33, chapter 34, and chapter 35 of sitrev. 3 are used for energy import, with a unit of USD 10000. Considering the inflation, this paper deals with the import data in constant US dollars (2010 = 100).

(2) The size of the country and represent the size of the home country and the size of the host country, respectively, which is expressed in terms of real GDP (2010 = 100) obtained through constant price processing. Its data source is the WDI database, and the unit is USD 10000.

(3) Distance (DIS), the GeoDist DataBase is selected as the primary source of data, and the kilometer is the unified unit.

(4) Chinese outward foreign direct investment (OFDI) selects the stock data of energy OFDI in "China Global Investment Tracker" (Only consider problem-free transactions). The data is processed at a constant price in 10000 US dollars (2010 = 100).

4 EMPIRICAL TEST AND RESULT ANALYSIS

Six groups of regression results can be obtained by estimating the random and fixed effects of the total samples and two groups of subsamples. Among them, all countries are models 1 and 2, high-income countries are models 3 and 4, and non-high-income countries are models 5 and 6. See table 1 for the specific results.

Note: Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The value in brackets below the coefficient is the standard error; FE and RE represent fixed effect model and random effect model respectively.

Based on the data of Chinese energy OFDI and host countries from 2009 to 2018, this paper uses a static panel as the research model to conduct empirical analysis. The results verify that its energy OFDI drives Chinese energy import trade. Specifically, first of all, compared with Chinese GDP and the geographical distance between two nations, energy OFDI and the host country's GDP have a more significant energy import effect. Secondly, the sub-sample analysis results show that for high-income countries, compared with Chinese GDP, energy investment from China, and the gap between the two nations have a significant role in increasing Chinese energy import. For non-high-income countries, compared with the distance between two nations and Chinese GDP, energy investment from China and its GDP have significant effects on promoting Chinese energy import.

The conclusion of this paper points out the direction for China to better integrate into the world energy market in the next step. First, we will continue to increase investment in OFDI. This study shows that OFDI in energy plays a decisive role in promoting Chinese trade and import. The current international background is the anti-globalization of trade and the increasing dependence of Chinese energy on foreign countries. Increasing Chinese OFDI in energy is conducive to promoting energy trade cooperation between China and other countries, eliminating trade barriers, and providing more policy options for Chinese stable energy supply. Second, in the selection of investment locations, relevant enterprises should

Table 1. Regression results of static panel model of Chinese energy OFDI.

Explanatory variable	All countries		High-income country		Non-high-income countries	
	RE (1)	FE (2)	RE (3)	FE (4)	RE (5)	FE (6)
lnofdi	0.2599** (0.1115)	0.2513*** (0.1085)	0.3754** (0.1883)	0.1473 (0.1030)	0.3286** (0.1526)	0.2988** (0.1504)
lnY _j	0.4134** (0.5619)	-2.1456*** (1.8272)	-0.0417 (0.2705)	-7.5951* (4.2659)	1.7667** (0.7356)	-1.4310 (2.531)
lnY _i	0.4606 (0.6162)	02.5110*** (1.1537)	1.8120** (0.9520)	4.4086*** (1.5507)	-0.2086 (0.8656)	1.9600 (1.8152)
Indis	-1.71609 (1.800)		-4.5167*** (1.5732)		-2.4273 (2.1896)	
_cons	-12.1323	-4.7515***	13.0904	66.5801	0.4370	-8.2592
sigma_u	3.1103	7.0028	0	8.6036	3.5965	6.3238
sigma_e	1.3276	1.3276	0.6711	0.6711	1.5310	1.5310
rho	0.8459	0.9653	0	0.9940	0.8466	0.9446
Hausman		0.3154		0.8358		0.8412

focus on the factors of GDP of the host country and distance between two nations. For high-income countries, we should focus on the bilateral geographical distance between the host country and China, while for non-high-income countries, the GDP of the host country should be the primary consideration.

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