WEP Warwick Evans Publishing

Transactions on Economics, Business and Management Research
ISSN: 2960-1789, eISSN: 2960-2254 | Volume 13
BMMFT 2024

An Empirical Study on The Impact of Host Countries' Environmental Regulations on Chinese OFDI

Chen Fang *

Nanjing University of Science and Technology, Nanjing, China

* Corresponding Author Email: fang1029chen@163.com

Abstract. With the widespread adoption of green and low-carbon development concepts globally, economic growth has also been imbued with more elements of green development. Thus, the environment protection factors take more and more important role in the evaluation system of foreign investments all around the world, which raise the question of whether and how the escalating environmental regulations of host countries can affect Outward FDI (OFDI). Using a uniquely merged dataset of Chinese firm-level OFDI and country-level environmental regulations data over the sample period 2009–2019, this paper investigates the impact of host countries' environmental regulations on Chinese OFDI from both host countries' and multinational enterprises' perspectives, and adds evidence from developing countries with weaker regulations to the 'pollution haven theory'.The conclusions show that Chinese multinational corporations are easily attracted by lax environmental regulations in alternative countries when choosing overseas locations, while strict environmental regulations in host countries reduce the investment probability of Chinese multinational corporations . Overall, the 'pollution haven effect' exists in the process of Chinese enterprises' overseas investment location choice, and several robustness checks confirm our findings. Heterogeneous tests indicate that non-OECD countries are more likely to become pollution havens than OECD countries who have more stringent environmental regulations. Mechanism analysis indicates that the natural resource rent of each country could moderate the impact of host countries' environmental regulations on Chinese OFDI. Implications for both policy and managerial decision-making are also discussed.

Keywords: Environmental regulations; Pollution haven hypothesis; Chinese OFDI.

1. Introduction

In the 1990s, American economists (Grossman & Krueger,1991) first studied the relationship between per capita income level and environmental pollution, and then Panayotou(1993) summarised this inverted U-shaped relationship as the famous 'environmental Kuznets curve', and the environmental problems caused by economic development came into people's attention. The environmental problems caused by economic development have come into people's attention, especially the relationship between environmental pollution and trade and investment has become the focus of academic research and policy research.Copeland & Taylor(1994), when analysing the trade problems of the North and South countries, creatively summed up the comparative advantages of environmental factors leading to the transnational and trans-regional transfer of polluting industries as the'Pollution Haven Hypothesis'. Pollution Haven Hypothesis, the pollution haven hypothesis comes from the traditional theory of comparative advantage in international trade, the hypothesis will be the environment and capital, labour, as the same as the enterprise production as an important factor of production, environmental factors on the comparative advantage of environmental factors to influence the investment and trade pattern of the environmental factor-intensive industries between the countries from the developed countries with relatively more stringent environmental regulations. Multinational corporations from developed countries with relatively strict environmental regulations will transfer part of their production to countries with relatively lax environmental regulations for the purpose of reducing environmental costs; while some developing countries, in order to gain a competitive advantage in attracting foreign direct investment from developed countries, take the initiative to lower environmental standards and sacrifice the environment for economic development, and trade liberalisation leads to developing countries' environmental quality to low Copeland &

Taylor, 2013). The pollution haven hypothesis outlines the relationship between environmental regulation and foreign direct investment and has been one of the hot topics in international business, international trade, environmental and regional economics research since its formulation. The hypothesis has been widely discussed because, if it is valid, it implies that, under the international division of labour, developing countries are exposed to environmental pollution from the production of consumer goods in developed countries and become victims of environmental protection in developed countries, and that economic globalization will exacerbate the North-South divide and the imbalance in world pollution emissions.

Scholars have searched for reasonable theoretical explanations for the pollution shelter hypothesis from different perspectives and have used different methods to test it empirically. The H-O theory that, in the case of environmental factors become an important factor of production, the comparative advantage of environmental factors between countries determines the international division of labour and trade, countries with comparative advantage in environmental factors to specialize in the production and export of environment-intensive products, environment-intensive industries to countries and regions with a comparative advantage in environmental factors, the transfer of international trade increases the total social welfare of countries, but the environmental factors have a comparative advantage. The transfer of environmentally intensive industries to countries and regions with comparative advantages in environmental factors in international trade increases the total social welfare of countries, but the environmental quality of the regions into which environmentally intensive industries flow declines as a result.

Against the backdrop of rising protectionism in international trade and investment and the outbreak of the COVID-19 in recent years, and the overall downturn in international foreign direct investment, China's outward foreign direct investment still maintains a large scale, the position of Chinese enterprises in the global value chain continues to improve, and Chinese capital has become an important force to be reckoned with in the field of international trade and investment. By the end of 2022, China's outward FDI flow will be US$163.12 billion, ranking 2nd in the world. The fields of China's outward FDI cover almost all major categories of national economic industries, including manufacturing, business services, finance and insurance, wholesale and retail, etc. In particular, the manufacturing industry accounts for more than one-third of the total amount of outward investment, and the rest, such as information science and technology, are also increasing in proportion (China Outward Investment Statistical Bulletin, 2022).

OECD countries, except for Mexico, Chile, Turkey, and five new countries such as Colombia and Costa Rica joining in 2020, are all developed countries, which basically cover developed economies and absorb more than 70 percent of global FDI, so it is of key significance to focus on the study of China's OFDI to OECD countries.

2. Theoretical analysis and hypothesis construction

2.1. Theoretical analysis

2.1.1. The theories of OFDI

The host country's market size, tax level, productivity, wage level, infrastructure, etc. all directly affect the cost and profit of enterprise production, and] Nielsen (2017) summarises these factors as purely economic factors affecting OFDI. In addition to economic factors, the host country's institutions and industrial agglomeration will also have an impact on OFDI

The institutions of a firm's business environment tend to determine the development opportunities and development impediments that a firm may have, and the existing literature focuses on the impact of institution-related business risks, transaction costs, bureaucracy, government corruption, political stability,etc.Guzman-Anaya(2018) analyses the regional determinants of Japan Automotive's presence in Mexico, and finds that three main factors determine the location of a plant: The presence of industrial parks, the agglomeration of Japanese automotive firms, and proximity to major Japanese

automotive equipment plants, while market size and labour quality are also important.Che et al.(2017) use firm-level data from 1999 to 2009 to examine the factors that influence the location of FDI investments in Chinese cities and find that agglomeration externalities play an important role.Hoang et al.(2018) using macro data for nine ASEAN countries from 1999 to 2011, showed that the location of FDI in ASEAN is influenced by host country factors such as market size, infrastructure quality, political stability, trade costs, in addition to the market potential of neighbouring markets.Belkhodja et al.(2017) based on a 1218 observed datasets, used Probit regression to study the determinants of FDI location choice in China, and the results showed that intellectual property rights, agglomeration economies, and investment in education affect the location of FDI in China, while these effects depend on the source of FDI.De Simone et al.(2016) used data from Hungary from 2001 to 2011 to study the impact of local public policies on OFDI choices and show that the favourable environment created by government interventions such as social welfare spending and special economic laws by local governments plays an important role in attracting OFDI.Merz (2017) uses information on the establishment of new financial services in 83 host countries to study how corporate taxation and financial regulation affect the location of OFDI in the financial sector and finds that host country taxes have a financial OFDI investment negatively, and stricter capital requirements also negatively affect the probability of investment by MNCs.

Most of the existing literature focuses on developed countries (or enterprises) as the object of investment, and most of the research on China focuses on inbound FDI, while the literature on China's outbound investment location choice is relatively small, and the existing research results may not be able to explain China's outbound investment behaviour, so it is necessary to take China's outbound investment as the object of research, and to examine which factors affect the location choice of China's outbound investment.

2.1.2. Pollution Haven Hypothesis

Among the theories on the impact of environmental regulations on the investment behaviour of enterprises, the most famous is the'pollution haven hypothesis'(Taylor, 1994) put forward by Copeland and Taylor in the 1990s. The theoretical logic of the Pollution Sanctuary Hypothesis is that the environment, like capital and labour, constitutes the production factors of enterprises, and the occurrence of environmental regulations will inevitably increase the environmental costs of enterprises, so rational manufacturers will move pollution-intensive production to areas with less environmental regulations in order to avoid environmental regulations and maximize profits. (Bommer, 1995; Pavelin & Porter, 2011.Tang ,2015) investigated the pollution haven effect of local market-oriented and export-oriented OFDI, and tested whether the responsiveness of these two types of OFDI to the host country's environmental regulations is different, and found that local environmental regulations have a significant deterrent effect on FDI, and that FDI is not only affected by local environmental regulations, but also by local environmental regulations. FDI is not only affected by local environmental regulations, but also by those of the immediate neighbouring countries. (Bu et al ,2013), based on the data of Chinese OFDI firms, verified that OFDI would be attracted by China's weaker environmental regulations in support of the pollution haven hypothesis, and concluded that CSR can significantly mitigate firms' behaviour in seeking pollution havens. (Lopezetal ,2018) used a multiregional input-output approach to study the environmental impacts of free trade agreements.The findings suggest that global value chains lead to China becoming a pollution refuge for other regions In 2008 China's exports increased world carbon dioxide emissions to 128 million tonnes.(Kann ,2018) used panel data for the American continent for the period 1990 to 2014. Mixed OLS, fixed effects, random effects and two-stage least squares regressions, respectively, did not find evidence of a pollution refuge effect in the American continent, which further concluded that environmental degradation in the American continent is influenced by energy use, population density and globalisation.

Existing literature has fully investigated the ‘pollution refuge’ both theoretically and empirically, and has achieved rich research results. Summarising the existing literature, this paper argues that the following aspects are worth exploring: further research is needed on the heterogeneity of firms. The

impact of environmental regulations on multinational corporations' overseas investment cannot be generalised due to the differences in investment behaviour among enterprises with different industry characteristics and business practices. The term‘environmental regulationneeds’further consideration. Most of the existing literature adopts the absolute value of the intensity of environmental regulation as the independent variable in the study of the pollution shelter hypothesis, and determines whether the pollution shelter hypothesis is valid through the sign of the coefficient of the environmental regulation variable. And institutional differences also affect the investment decision of enterprises.

2.2. Hypothesis Construction

Environmental regulation affects product competitiveness in two opposing directions.The environmental costs of production for firms increase as a result of environmental regulations, creating a‘cost disadvantage’for firms in terms of competition. If we consider environmental factors as important factors of production, then the stricter environmental regulation means that the price of environmental factors rises, and enterprises not only have to pay additional costs such as ‘pollution tax’and‘pollution fee’, but also need to purchase production equipment and pollution treatment equipment to support the production of clean products, environmental costs drive product competitiveness. Pollution treatment equipment, environmental costs drive up the production costs of products.

On the basis of the above analyses, this paper puts forward the following hypotheses.

Hypothesis 1: Chinese enterprises are attracted by loose environmental regulations when investing abroad, i.e., there is a pollution refuge effect in the process of Chinese enterprises' outward investment, and Chinese enterprises are more willing to invest in non-OECD countries than in OECD countries.

There are significant differences between industries in terms of pollution emissions, technology levels and policy sensitivities, and these differences lead to differences in the intensity and type of environmental regulations faced by different industries. For example, pollution-intensive industries, such as heavy and chemical industries, usually face stricter environmental regulations, while relatively cleaner industries, such as service and high-tech industries, may face less stringent environmental regulations. Strict environmental regulations may increase the production costs of enterprises, including investment in environmental protection equipment and pollution treatment costs. For firms in pollution-intensive industries, this cost increase may be more significant, which in turn affects their OFDI decisions. Some enterprises may choose to transfer production to regions with less stringent environmental regulations through OFDI to reduce production costs.

Hypothesis 2: Industry differences have a positive moderating effect on the negative shadow of environmental regulations in host countries. Polluting firms are more inclined to conduct OFDI to countries with more lenient environmental regulations.

In areas where natural resources are abundant, enterprises may have developed certain production patterns as a result of their long-term dependence on abundant and low-cost resources. When environmental regulations are strengthened, these firms may face higher cost increases. The industrial structure of natural resource-rich regions is often closely linked to resource-based industries. Stringent environmental regulations can lead to adjustments in the local industrial structure. From the perspective of natural resource-seeking motivation, environmental regulations can significantly affect firms' OFDI decisions. When a country implements strict environmental protection policies, it will prompt firms to raise environmental standards in the production process and increase investment in green technology, which may increase operating costs.

Hypothesis 3: Firms may tend to invest capital in countries with abundant natural resources and relatively lax environmental requirements in order to reduce production costs and maintain competitiveness.

3. Data, Models and Statistics

3.1. Data

This paper takes A-share listed companies in China's Shanghai and Shenzhen markets as the research sample. Due to the limitation of ESG and OFDI data, the sample period is 2009-2019. The financial information of the enterprises is obtained from CSMAR database. In order to ensure the accuracy of the data, this paper excludes the special financial industry and other industries with fewer observations, and also excludes the samples with missing key variables or obvious non-compliance with accounting standards. In order to avoid the influence of outliers, the samples with continuous variables of 1% above and 1% below are trimmed.

OFDI data of listed firms by definition includes two parts: greenfield investment and cross-border M&A data, the former from the Financial Times' fdiMarkets database and the latter from Thomson Reuters' SDC global M&A database. In this paper, we use the stock codes provided by SDC database and the English names of enterprises given by fdiMarkets database to obtain the information of listed enterprises in CSMAR database, and aggregate the investment data of greenfield investment and cross-border M&A at the enterprise-year level to obtain the OFDI data of each enterprise in the period of 2009-2019.

Outward foreign direct investment (OFDI) data for each enterprise for the period 2009-2019

The level of environmental regulation in the alternative countries will be an important explanatory variable in this chapter, and the selection of this indicator is related to the accuracy and scientificity of the final empirical results. In order to measure the environmental regulation of a certain country, this paper adopts the Environmental Performance Index (EPI) for analysis and research, which compares the environmental conditions of each country with its environmental policy benchmarks, quantifies the country's environmental performance, and is able to adequately respond to the strength and effectiveness of the implementation of each country's environmental policy.

3.2. Models

This paper draws on the studies of (Bu ,2014), (List & Co ,2000) and (Levinson ,1996), and adopts the conditional probit model to test the effect of Chinese firms' outward investment in pollution shelters. The conditional probit model is mainly used to analyse the influence of explanatory variables on the probability of 'success' of an event. The 'conditional probit model' is mainly used to analyse the impact of explanatory variables on the probability of 'successes of an event. On the one hand, the model can effectively fit binary discrete explanatory variables, which can effectively deal with the problem of not easily obtaining data on OFDI flows at the micro level, and on the other hand, it allows the explanatory variables to vary with individuals as well as programmes, i.e., it allows the choice of OFDI location to be affected by country-specific factors (e.g., the intensity of environmental regulations in the investment alternative countries). e.g., the intensity of environmental regulations in the alternative country of investment) and firm factors (e.g., the nature of the firm, etc.).

For a multinational corporation i from China, the alternative investment destination countries are y=1,2, -----J, where is a positive integer. In this paper, we assume that the profit of an MNC investing in production in country j is a function of country j's country characteristics.

$$\prod_{ij} = x_{ij} + \beta + \alpha_{ij} + \varepsilon_{ij} (i = 1,...,n;\ j = 1,...,n) \tag{1}$$

Based on the 'rational man' assumption, TNCs choose their investment destination based on the principle of profit maximisation after fully comparing the costs and benefits of producing in each country, i.e., TNCs choose to invest in country j if and only if investing in country j is more profitable than investing in all other countries. Thus, the probability that TNC i invests in country j can be expressed as follows.

$$P（\mathrm{y}_i = j / x_i) = P(\prod_{ij} > \prod_{ik}, \forall k \neq j)$$

$$= P（\varepsilon_{\mathrm{ik}} - \varepsilon_{ij} \leq x_{ij}\beta_j - x_{ik}\beta_k, \forall k \neq j) \quad (2)$$

Assume that $\{\varepsilon \mathrm{ij}\}$ is independently and identically distributed then:

$$P(y_i = j / x_i) = \frac{\exp(x_{ij}\beta)}{\sum_{K=1}^{J} \exp(x_{ij}\beta)} \quad (3)$$

In order to verify Hypothesis 1 and test whether the choice of overseas geographic location of Chinese firms is affected by the host country's environmental regulations, this paper conducts conditional Probit regression on the full sample of Chinese firms' outbound investments, and the regression equations are as follows:

$$\mathrm{Sub}_{ij} = \beta_0 + \beta_1 ER_j + \beta_2 X_j + \mu_{ij} \quad (4)$$

In order to test hypothesis 2 and analyse the possible moderating effect of industry characteristics on firms' investment behaviour, this paper adds a dummy variable for pollution-intensive industries (dum-dirty) and non-pollution-intensive firms to regression equation 4, which constitutes regression equation 5. The moderating effect of firm size 4 is tested by adding natural environmental rents to 4 and environmental regulation variables to form a cross term natural*ER. The significance and sign direction of the cross-term coefficients reflect the existence and direction of the moderating effect.

$$\mathrm{Sub}_{ij} = \beta_0 + \beta_1 ER_j + \beta_2 dum_1 * ER_j + \beta_3 + \mu_{ij} \quad (5)$$

$$\mathrm{Sub}_{\mathrm{ij}} = \beta_0 + \beta_1 ER_{\mathrm{j}} + \beta_2 \mathrm{natural} * \mathrm{ER}_{\mathrm{j}} + \beta_3 X_{\mathrm{j}} + \mu_{\mathrm{ij}} \quad (6)$$

3.3. Descriptive Statistics

In this paper, the natural logarithms of the continuous control variables are taken to reduce heteroskedasticity and to control for possible non-linear relationships. Table 1 shows the descriptive statistics of each variable.

Table 1. Descriptive Statistics

Variable	N	Mean	SD	p50	Min	Max
OFDI	4.18E+04	0.0652	0.2469	0	0	1
ER	4.18E+04	44.2133	13.2117	44.9068	12.0839	78.5321
EDB	3.33E+04	1.341	0.3653	1.2633	0.264	3.848
TMP	4.09E+04	0.4464	0.1818	0.3983	0.1651	1.0244
Firmage	2.86E+04	16.9224	7.1357	16	1	54
Roa	2.86E+04	-0.1117	17.9732	0.032	-2.15E+03	108.3657
Leverage	2.86E+04	0.6447	7.4303	0.5554	-0.1947	877.2559
Asset	2.76E+04	10.0149	2.7575	9.3257	-1.5013	17.3224
Soe	2.71E+04	0.9883	0.9352	1	0	3
OECD	4.18E+04	0.5368	0.4986	1	0	1
Kdesity	2.52E+04	13.7677	2.1323	13.2199	5.1183	23.5646
Govgrants	2.86E+04	0.8007	0.3995	1	0	1
Laborp	2.23E+04	15.1859	2.1109	14.634	6.2225	24.6689

4. Basic results

4.1. Benchmark regression

Columns (1) to (3) of Table 2 present the full-sample regression results and subgroup regression results with the inclusion of the OECD country dummy variable. The regression results in column (2) show that the coefficient of ER is significantly negative (-0.0070), indicating that the stricter the environmental regulation in the benchmark group of OECD countries, the lower the odds ratio P/(1-P) of Chinese firms investing, the lower the probability of investing, and the more likely it is that there is a pollution shelter effect of Chinese firms investing in the OECD countries. oecd*, the cross term between the dummy variable of the OECD countries and the variable of environmental regulation, is significantly positive (-0.0070). ER has a significantly positive coefficient (0.0229), indicating that there is a difference in the impact of environmental regulation between OECD countries and non-OECD countries. The regression result in column (3) shows that the coefficient of ER is significantly negative (-0.0089) greater than the regression result in the second column, which indicates that Chinese firms are more sensitive to environmental regulations in non-OECD countries, and that Chinese firms have stronger incentives to seek weaker environmental regulations in non-OECD countries.Tested Hypothesis 1

Table 2. Benchmark regression

Variables:	All	OECD	Non-OECD
ER	-0.0157***	-0.0070***	-0.0089***
	(-9.9237)	(-4.9173)	(-5.7476)
Firmage	-0.0022	-0.0006	-0.0026
	(-1.4289)	(-0.2883)	(-1.0876)
Roa	-0.1222***	-0.2091	-0.1362***
	(-5.5273)	(-1.3881)	(-4.0923)
Leverage	-0.3021***	-0.3160***	-0.3365***
	(-5.5806)	(-4.3536)	(-4.1278)
Asset	0.0098	0.0148	0.0029
	(1.3239)	(1.4057)	(0.2748)
Soe	-0.0425***	-0.0392**	-0.0436***
	(-3.5671)	(-2.3112)	(-2.6300)
Kdesity	-0.0057	-0.0172	0.0062
	(-0.6523)	(-1.4503)	(0.4501)
Govgrants	-0.2470***	-0.3646***	-0.2234***
	(-5.5339)	(-5.6796)	(-3.7377)
Laborp	-0.0243***	-0.0177	-0.0461***
	(-2.6851)	(-1.4779)	(-3.2747)
epinew1	0.0000		
	(.)		
1.oecd	-0.9098***		
	(-10.2584)		
1.oecd#c. epinew1	0.0229***		
	(11.4673)		
/			
lnsig2u	-20.4384	-20.1121	-20.2154
	(.)	(.)	(.)
N	21041	10796	10245

Notes: *t* statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.2. Heterogeneity test

To further test Hypothesis 2, this paper classifies the data into pollution-intensive and non-pollution-intensive firms based on the characteristics of OFDI parent firms? The regression results are shown in Table 3: the regression results in column (1) show that the coefficient of environmental regulation

ER is significantly negative (-0.0111), and the regression results in column (2) show that the coefficient of environmental regulation ER is significantly negative (-0.0057), which suggests that pollution-intensive firms are more affected by the host country's environmental regulations when investing abroad compared with nonpollution-intensive firms: pollution-intensive firms have a greater proportion of environmental costs in production and the nature of the industry leads to a stronger degree of environmental regulation, and are subject to more environmental regulation than nonpollution-intensive firms. Pollution-intensive enterprises have a large proportion of environmental costs in their production, and the nature of the industry leads to a stronger degree of environmental regulation, and they are more inclined to look for countries and regions with lax regulations when investing abroad, and lax environmental regulations are more attractive to pollution-intensive enterprises.

Table 3. Heterogeneity test

Variables:	**Pollution**	**Non-Pollution**
ER	-0.0111***	-0.0057***
	(-3.0579)	(-3.7269)
Firmage	0.0016	-0.0012
	(0.3075)	(-0.5183)
Roa	-0.3501	-0.1874
	(-1.1124)	(-1.0744)
Leverage	-0.4793***	-0.2680***
	(-3.2533)	(-3.2617)
Asset	0.0313	0.0034
	(1.4976)	(0.2694)
Soe	-0.0560*	-0.0284
	(-1.6490)	(-1.4240)
Kdesity	0.0549*	-0.0298**
	(1.7892)	(-2.2500)
Govgrants	-0.3213***	-0.3681***
	(-2.7252)	(-4.7546)
Laborp	-0.0811**	-0.0046
	(-2.5181)	(-0.3441)
lnsig2u	-17.4119	-18.5547
	(-0.0000)	(.)
N	3389	7407

Notes: *t* statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.3. Robustness check

To further ensure the validity of the regression results, this paper uses EDB data as well as temperature data instead of EPI indicators to conduct regression again to verify the robustness of the results. As

shown in Table 4, columns (2) and (3) demonstrate the results of the robustness test of replacing the EPI indicator with EDB data as well as temperature data. After replacing the EPI data, the impact of environmental regulations on Chinese firms' OFDI is still inhibitory and significant at the 1% level, which indicates that the conclusion that environmental regulations inhibit China's OFDI is reliable. Meanwhile, comparing the robustness test results of the EDB data and the temperature data, it can be seen that the regression coefficient of temperature is still larger than that of the EDB data, which indicates that the result that environmental regulations have a greater impact on the OFDI of Chinese firms from the perspective of the temperature change is robust.

Table 4. Robustness check

Variables:	**ER**	**EDB**	**TEM**
ER	-0.0054***		
	(-5.0274)		
Firmage	-0.0018	-0.0034**	-0.0019
	(-1.1635)	(-2.1014)	(-1.2198)
Roa	-0.1333***	-0.1208	-0.1268***
	(-6.0204)	(-1.1894)	(-5.6265)
Leverage	-0.3293***	-0.2672***	-0.3132***
	(-6.0729)	(-4.8731)	(-5.6762)
Asset	0.0065	0.0095	0.0078
	(0.8868)	(1.2325)	(1.0359)
Soe	-0.0412***	-0.0344***	-0.0393***
	(-3.4762)	(-2.7376)	(-3.2907)
OECD	0.1107***	-0.0341*	0.0643***
	(3.6818)	(-1.8555)	(3.3295)
Kdesity	-0.0071	-0.0125	-0.0091
	(-0.7930)	(-1.3768)	(-1.0132)
Govgrants	-0.3243***	-0.3687***	-0.3401***
	(-7.4204)	(-7.4817)	(-7.7360)
Laborp	-0.0373***	-0.0235**	-0.0361***
	(-4.1359)	(-2.4902)	(-4.0139)
EDB		-0.2122***	
		(-5.1928)	
TEM			-0.4870***
			(-7.8256)
lnsig2u	-20.4285	-20.3962	-19.7669
	(.)	(.)	(.)
N	21041	18407	20641
R^2			
adj. R^2			

Notes: t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01.

4.4. Mechanism testing

From the perspective of natural resource-seeking motivations, environmental regulations can significantly influence firms' OFDI decisions. When a country implements strict environmental protection policies, it will prompt firms to raise environmental standards in the production process and increase investment in green technologies, which may increase operating costs. In this case, firms may tend to invest capital in countries with abundant natural resources and relatively lax environmental requirements in order to reduce production costs and maintain competitiveness. According to the natural resource rent of each country, that can be classified as high natural resource rent as well as low natural resource rent. The specific regression results are shown in Table 5.

Column (1) is the full sample regression results, column (2) and column (3) are the regression results of adding natural resource-seeking drivers, according to the regression results show that environmental regulation has a greater negative effect on OFDI in high regulation countries, the regression coefficient is 0.0108, and it is significant at the 1 percent level, whereas it has a negative effect in low environmental regulation countries but is not significant, and the environmental regulation increases environmental costs of firms, thus leading to higher production costs and competitiveness of firms. Environmental regulations increase the environmental costs of firms, which leads to a decrease in OFDI in countries with high levels of regulations. In summary, environmental regulations inhibit China's OFDI through natural resource-seeking incentives, causing firms to favour investment in countries with low levels of environmental regulations, which confirms the pollution haven hypothesis.

Table 5. Mechanical testing

Variables:	ALL	Natural-higher	Natural-lower
ER	-0.0035***	-0.0136***	-0.0187***
	(-5.2199)	(-3.6930)	(-7.3770)
lnNRE	0.0303**	-0.6383***	0.7978***
	(2.1276)	(-3.6537)	(8.5180)
c.ER#c.lnNRE	-0.0010***	0.0128***	-0.0131***
	(-2.8784)	(3.7889)	(-8.0619)
Firmage	-0.0022	-0.0087**	0.0004
	(-1.4053)	(-2.1458)	(0.1467)
Roa	-0.1359***	-0.2974	0.0055
	(-6.0237)	(-1.0118)	(0.0281)
Leverage	-0.3354***	-0.2422*	-0.2175**
	(-6.0741)	(-1.7002)	(-2.3383)
Soe	-0.0433***	-0.0715**	-0.0351
	(-3.6561)	(-2.1677)	(-1.5526)
Asset	0.0083	0.0646***	-0.0044
	(1.1166)	(3.2631)	(-0.3214)
Kdesity	-0.0075	-0.0419*	-0.0053
	(-0.8396)	(-1.8963)	(-0.3313)
Govgrants	-0.3334***	-0.1097	-0.2166*
	(-7.5515)	(-1.0926)	(-1.8336)
Laborp	-0.0397***	-0.0175	0.0219
	(-4.3250)	(-0.8171)	(1.3271)
lnsig2u	-19.5526	-18.0014	-18.9384
	(.)	(-0.0000)	(.)
N	20737	4535	6261

Notes: t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01.

5. Summary

In recent years, China's outward investment has remained at a high level despite the overall decline in international foreign direct investment flows. China has become an important force to be reckoned with in the field of world investment by virtue of its strong capital power. While Chinese enterprises are going abroad on a large scale, the image of the Chinese state and enterprises has been greatly damaged due to the social irresponsible behaviour of individual enterprises on the environment. In the new context of environmental issues being widely emphasised and environmental regulations becoming stricter and stricter globally, this paper examines the impact of environmental regulations

on Chinese enterprises OFDI in terms of host countries'factors and enterprises' factors, and adds evidence of outbound investment from developing countries with weaker regulations to the Pollution Sanctuary Theory; At the same time, this study deepens the understanding of China's outbound investment. At the same time, this study deepens the understanding of China's outward investment behaviour and provides theoretical support for Chinese enterprises to better 'go global'.

On the whole, the'pollution shelter effect'exists in the process of Chinese enterprises' overseas investment location choice. The impact of environmental regulations on OFDI varies by type of enterprise. Compared with other types of enterprises, pollution-intensive enterprises and capital-intensive enterprises are more sensitive to environmental regulations when investing abroad, and are more likely to be attracted by loose environmental regulations; this paper does not find any evidence of a significant difference between the responses of state-owned enterprises (SOEs) and non-state-owned enterprises (NSOEs) to environmental regulations when investing abroad. The negative effects of CSR and firm size on environmental regulations are positively moderated by the tendency of firms to invest in countries with weaker environmental regulations, but this tendency decreases as CSR increases and firm size increases.

In order to further regulate the environmental behaviour of Chinese enterprises' overseas investment, improve the efficiency of outbound investment, and support Chinese enterprises to better 'go global', this paper puts forward the following suggestions.

Deepen domestic industrial restructuring. The motivation of enterprises to invest abroad is largely determined by the domestic industrial structure and competition pattern. Therefore, in order to regulate the environmental behaviour of enterprises investing abroad, we should start from adjusting the domestic industrial structure, accelerating the elimination of outdated production capacity, and thus driving the upgrading of the structure of outbound investment to optimize the international environment for Chinese enterprises' cross-border operation. Actively publicise the social responsibility of Chinese enterprises investing overseas in environmental protection and set up positive examples. The Chinese government should actively participate in the formulation of international environmental protection agreements, grasp the right to speak on international energy-saving and emission reduction issues, and take a leading role in international climate policymaking, so as to better safeguard the reasonable rights and interests of China and Chinese enterprises in the distribution of international interests. Strengthen bilateral cooperation between the national level and investment destination countries through high-level dialogues, promote the deep integration of Chinese enterprises with local industries, and strengthen the supervision and management of overseas investment as well as risk prevention and control. The approval of outbound investment should include environmental performance as a factor in the examination of enterprises' qualifications for outbound investment, and require enterprises to provide detailed environmental governance reports and environmental impact evaluations, so as to eliminate outbound investment behaviours that seek refuge from pollution at the source. At the same time to strengthen the external supervision of foreign investment enterprises regulatory departments to follow up the project and timely feedback on the project, to achieve real-time prevention and control of environmental pollution risks: improve the enterprise green credit financing methods, product environmental certification and other system design, strengthen the external supervision of stakeholders, multi-constraints to regulate corporate behaviour.

Acknowledgements

The author sincerely thanks her teachers and classmates for their help.

References

[1] Cheng Du, Li Gang. Current status and trend of environmental regulation intensity measurement[J]. Economic and Management Research,2017,38(08):75-85.

[2] Dai Yuqin,Ouyang Xiaoxun.Testing the pollution paradise hypothesis in China[J]. Enterprise Technology Development 2006(12):91-93.

[3] Deng Rongrong. Carbon-intensity of China's comparative advantage industries in exporting to the European Union: a retest based on China's 'pollution shelter effect'[J]. China Circulation Economy 2018,32(08):89-99.

[4] Dong Kun,Bai Bin. A test of the pollution paradise effect of inter-regional industrial transfer in China[J]. China Population Resources and Environment,2015,25(S2):46-50.

[5] Jingyan Fu, Lisa Li, an empirical study of environmental regulation, factor endowment and international competitiveness of industries--Based on panel data of Chinese manufacturing industry[J]. Management World 2010(10):87-98+187.

[6] Fu Jingyan, Li Liza. FDI, environmental regulation and pollution shelter effect--an empirical analysis based on Chinese provincial data[J]. Journal of Public Administration,2010,7(03):65-74+ 125-126.

[7] FU Jingyan,ZHAO Chunmei Does environmental regulation affect the export trade of pollution-intensive industries? --Analysis based on Chinese panel data and trade gravity model[J]. Economist,2014(02):47-58.

[8] FU Shuaixiong, ZHANG Keyun, ZHANG Wenbin, Environmental Regulation and the 'Pollution Paradise' Effect of China's Industrial Regional Layout[J]. Journal of Shanxi University of Finance and Economics,2011,33(07):8-14.

[9] Ge Shunqi, Luo Wei. Entry of multinational corporations and the industrial structure of China's manufacturing industry-A study based on the perspective of global value chain[J]. Economic Research,2015,501):34-48.

[10] Han Xiuli. Environmental Protection in China's Overseas Investment[J]. Research on International Issues,2013(05):103-115.

[11] He Wenhua. Testing the'Pollution Paradise Hypothesis'of FDI: Evidence from Eastern and Central China[J]. Contemporary Finance and Economics,2010(06);99-105.

[12] Li Mei, Lu Cheng. R&D internationalisation and firms' innovation performance - the moderating role based on institutional distance[J]. Economic Management,2019,41(01):39-55.

[13] LI Mei,YU Tianjiao Overseas R&D Investment and Parent Firms' Innovative Performance - Moderating Role Based on Firms' Resources and Internationalisation Experience[J]. World Economic Research,2016(08):101-113+134+137.

[14] Liang Q. Overseas investment and industrial agglomeration of multinational corporations[J]. World Economy,2003(09):29-37.

[15] Liu Houjun, Wang Danli the Impact of Tax Competition and Labour Market Development on the Technology Spillover Effect of FDI in China[J]. International Trade Issues,2011(06);142-149.

[16] Pang Lei. Measurement of the 'threshold' effect of overseas mergers and acquisitions and home country's technological progress--mechanism analysis and empirical evidence from OECD countries[J] Science Research,2017,35(04);544-556.

[17] Shen Kunrong,Geng QiangForeign Direct Investment,Technology Spillovers and Endogenous Economic Growth--Econometric Tests and Empirical Analyses of Chinese Data[J]. China Social Science,2001(05):82-93+206.

[18] Wang Lei, Huang Cong. Impact of China's environmental regulation on FDI from different source countries[J]. Journal of Nanjing Audit Institute,2012,9(06):63-70.

[19] Wang Jinbo. Institutional Distance, Cultural Differences and Location Choice of Chinese Enterprises' Outward FDI[J]. Asia-Pacific Economy,2018(06):83-90+148.

[20] Xia Youfu. Research on the Status Quo, Consequences and Countermeasures of Foreign Investment in China's Pollution-Intensive Industries[J]. Management World 1999(03):109-123.

[21] Xiang YF,Chen QN. Pollution refuge hypothesis and Linde's hypothesis--an empirical study based on China[J]. Economic Jingwei,2018,35(01):63-69.

[22] Yang Home,Deng Tao-tao. Market distance, market size and market entry order of Chinese enterprises' outward direct investment[J]Economy,2017,39(09):20-34.

[23] YANG Zihui, TIAN Lei. An inter-provincial study of the 'polluted paradise' hypothesis and influencing factors in China[J]. World Economy ,2017,40(05):148-172.

[24] Zhang Jifeng. An empirical study on the influencing factors of Chinese enterprises' overseas R&D investment[J]. International Economic and Trade Exploration,2014,30(07):74-83.

[25] Zhang Xiaoying Research on the Mechanism of the Impact of Environmental Regulation on Direct Investment--Based on the Perspective of Institutional Differences[J]. Economy Ask,2014(04):29-34.

[26] Barro, R. J.International data on educational attainment: Updates and implications[J]. Oxford Economic Papers, 2001, 53(3):541-563.

[27] Beazer Q H, Blake D J. The conditional nature of political risk: How home institutions influence the location of foreign direct investment[J]. American Journal of Political Science, 2018, 62(2):470- 485.

[28] Belkhodja O, Mohiuddin M,Karuranga E.The determinants of FDI location choice in China: A discrete choice analysis[J]. Applied Economics, 2017, 49(13):1241-1254.

[29] Bommer R.Environmental policy and industrial competitiveness: The pollution haven hypothesis reconsidered[J], Discussion Papers, SeriesΠ, 1995, 7(2):342-355.

[30] Brammer S J, Pavelin S. Corporate reputation and social performance: The importance of fit[J]. Journal of Management Studies, 2006, 43(3):435. 455.

[31] Brambor T, Golder c M.Understanding interaction models: Improving empirical analyses[J]. Political Analysis, 2006, 14(1):63-82.

[32] Bu M. Does lax environmental regulations attraot Chinese outward foreign investment? evidence from micro· -data[J]. Frontiers of Economics&Globalization, 2014, 14:181-198.

[33] Bu M, Liu Z, Wagner M, et al. Corporate social responsibility and the pollution haven hypothesis: Evidence from multinationals' investment decision in China[J]. Asia-Pacific Journal of Accounting & Economics, 2013, 20(1):85-99.

[34] Buckley PJ, Clegg LJ, Cross AR, et al. The determinants of Chinese outward foreign direct investment[J]. Journal of International Business Studies, 2007, 38(4):499-518.