

Unintended Results: Inter-Provincial Differences in Environmental Protection Tax Rates and Relocation Strategies of Polluting Enterprises

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The Environmental Protection Tax Law that took effect in 2018 gave local authorities a certain amount of discretionary power to set the local rates for environmental protection tax. The inter-provincial gradient tax rates pattern may induce strategic relocation of enterprises, leading to unintended policy results. Combined with the data on trans-regional investment of listed companies, this paper employs the Difference-in-Difference (DID) approach to study the impact of inter-provincially different environmental tax rates on the trans-regional migration of polluting enterprises. The study shows that due to the regional differences in the tax rates, the polluting enterprises opt for the relocation strategy of “avoiding high tax rates and opting for low rates”, setting up more subsidiaries in regions with relatively low tax rates. Further research demonstrates that the trans-regional migration induced by different tax rates can help reduce production costs and increase corporate profits, while dampening the corporate enthusiasm for green innovation in the short term and resulting in pollution transfer. This paper reveals the unintended policy effects that may derive from the environmental tax reform, providing concrete proof for the comprehensive evaluation and understanding of the actual policy effects of existing environmental tax reform.

Keywords: environmental protection tax rate, inter-provincial differences, corporate relocation, trans-regional investment

1. Introduction

China has in recent years continued to tighten the environmental regulation, while standardizing and perfecting its green tax system. In December 2016, the

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Environmental Protection Tax Law of the People's Republic of China, a separate tax law to advance the development of ecological civilization, was officially adopted for nationwide implementation beginning from January 1, 2018 (hereinafter referred to as “environmental protection tax reform”). Since then, China has embarked on a new journey of environmental protection. According to the law, the standing committees of local people's congresses are entitled to determine and adjust the specific applicable amount of local environmental protection tax within the statutory range of tax amount.¹ That's why the local implementation of the law has demonstrated the realistic feature of “distinct inter-provincial differences in environmental protection tax rates”. The environmental protection tax (EPT) has been introduced to use tax leverage to motivate enterprises to control pollution and produce environmentally friendly products, thereby promoting green transformation and development of enterprises. However, the actual regional differences in EPT rates have undoubtedly provide polluting enterprises with opportunities to avoid regulation through trans-regional migration. In practice, polluting enterprises usually have two options in the face of regionally different environmental regulations and constraints. One is to take active steps for transformation and pollution control, and the other is the passive migration to avoid costs. The former option meets the policy expectations, but for polluting enterprises, active measures for pollution control mean increasing costs or huge R&D investment in the early stage. The latter option of trans-regional migration could help enterprises quickly avoid the negative impact of environmental regulations, albeit greatly undermining the policy effect on environmental protection. Therefore, a study into the unintended effects brought about by the EPT reform is crucial to promoting the green and low-carbon transition of China's economy.

This paper is directly related to the literature on the study into the expected impact of environmental regulations on firms. Existing literature has found that environmental regulations will significantly affect corporate behaviors, such as pollution emissions, innovation and upgrading, and green transformation (Liu *et al.*, 2018; Sun *et al.*, 2020; Yu *et al.*, 2021). However, these studies mostly focus on the impact of environmental regulations on corporate behaviors in pollution control. Few of them incorporate regional differences in environmental regulations into the analysis framework, which may ignore an underlying fact—the large-scale trans-regional development of enterprises in China. A lot of factors, including infrastructure, information exchange and trade opening-up, have prompted many companies to overcome the limitations of regional development by setting up subsidiaries (Yang *et al.*, 2021). Due to the

¹ It should be pointed out that the environmental tax rate is described as “applicable tax amount” in the Environmental Protection Tax Law of the People's Republic of China and in the determination of locally applicable environmental tax amount, which in fact indicates “the tax amount paid per unit value”. In order to avoid confusion with other concepts of tax amounts, this paper uses the expression of “environmental protection tax rate”.

substitution effect between innovation and trans-regional migration in reducing the cost of pollution control, polluting enterprises have the motivation to take advantage of the inter-provincial differences in EPT rates and migrate across regions to avoid environmental regulations. If we ignore this situation, it would be difficult to evaluate the effect of environmental protection law reform in an all-round manner, which is not conducive to improving the green EPT system.

Early research on the impact of environmental regulations on enterprises' location choice focused more on differences among countries. Some scholars verified the existence of "pollution haven effect" in some countries (Keller and Levinson, 2002; Mulatu, 2017). The studies on China concluded that the economically underdeveloped regions are more inclined to become "pollution havens" to attract FDI inflows at the cost of environment (Ljungwall and Linde-Rahr, 2006; Dean *et al.*, 2009; Guo and Tao, 2009). Some scholars reckoned that regional differences in environmental regulations have little impact on industrial transfer (Xing and Kolstad, 2002; Kim and Rhee, 2019) and may even produce a "pollution halo effect" (Huang *et al.*, 2017).¹ With growing differences in terms of economic growth rate and governance goals across regions in China, the issue of inter-regional pollution transfer has gradually come to the attention of academia. A large number of studies have found that the pollution transfer induced by inter-regional differences in environmental regulations shows the following characteristics. One is the transfer in the principle of proximity (Shen *et al.*, 2017; Zhong and Wei, 2020). The second is the transfer from the east to the west (Cheng and Zhao, 2018; Jin, 2018). The third relates to the diverse forms of pollution transfer, including overall relocation, trans-regional investment, transfer within the group, and direct transfer through legal or illegal trade (Bao, 2009; Zhou and Zheng, 2015; Song *et al.*, 2021; Shen and Ren, 2021). Unfortunately, the existing literature usually defines the pollution transfer as observed changes in the macro output or pollution discharge, making it unlikely to identify the driving forces and economic effects behind enterprises' relocation decisions at the micro level.

On this basis, this paper proceeds from the gradient pattern of EPT rates across regions, employs the DID approach to explore the impact of EPT reform on the migration and trans-regional investment of polluting enterprises, and performs in-depth analysis into the internal motivation, feature, and economic effect of enterprises' trans-regional migration. The study finds that after the EPT reform, the listed polluting enterprises are more inclined to the migration strategy of "avoiding high tax rates and opting for low rates", setting up more subsidiaries in regions with relatively low tax rates. Further analysis shows

¹ Under the "pollution halo effect", the migrating enterprises are generally from areas with more stringent environmental regulations, and requirements from government and residents. Generally speaking, these enterprises are equipped with relatively advanced pollution treatment technologies. After migrating to the new region, they bring them with advanced equipment and technology, thereby saving factor input and improving the quality of local environment.

that enterprises in heavily polluting and capital-intensive industries are more willing to relocate, with capital flowing to areas with better-developed market economy and neighboring areas. In addition, cost constraints and profit incentives constitute the driving forces behind the enterprises' relocation decision due to inter-provincial differences in EPT rates. Nonetheless, the strategy fails to improve the companies' capabilities for green innovation in the short term, while resulting in the transfer of industrial sulfur dioxide pollution, verifying the existence of "pollution haven effect".

The potential contributions of this paper are shown as follows. First, the research perspective is relatively novel, since existing research focuses more on the policy intentions of environmental regulations, with few attention on the unintended policy effects. This paper creatively reveals the unintended effects of environmental regulations from the perspectives of the implementation of EPT reform and micro-entities' location choice for trans-regional investment. In this way, the study not only helps enrich the theory of environmental tax system, but also provides concrete evidence for comprehensively evaluating the effect of EPT reform. Second, this paper manages the endogenous problem of reverse causality in a better manner. Existing studies on environmental regulations and pollution transfer usually measure the stringency of environmental regulations based on the regional investment in environmental governance, with underlying endogenous problems. The implementation of the EPT Law reduced the room for enterprises to bargain and seek rent, and the regional difference in EPT rates cannot be predicted by enterprises, which is relatively exogenous to enterprises. Third, this paper overcomes the shortcomings of existing literature in research methodology. The difference in relative environmental costs caused by regionally varied environmental regulations is the most direct and vital driving force for enterprises' relocation decision (Luo *et al.*, 2016). However, most studies merely focus on unilateral tightening of environmental regulations in the location of the enterprise or the industrial cluster to explore the effect of trans-regional migration. This paper focuses on the relative differences in EPT rates among provinces and uses the "company-region-year" paired samples to examine the institutional motivations for trans-regional migration of enterprises in a more scientific way.

2. Institutional Background and Theoretical Model

2.1. Institutional Background

The environmental tax system in a true sense has been long absent in China, which only has a pollution discharge fee system. In 2003, the State Council promulgated the *Regulations on the Collection and Use of Pollutant Discharge Fees*, along with *Administrative Measures for the Collection Standards of Pollutant Discharge Fees*, and *Administrative Measures for the Collection and Use of Pollutant Discharge Fee*

Funds. Then, the system of collecting fees based on the total amount of pollutant discharge, similar to the existing EPT system, was put into practice. Since then, the pollutant discharge fees were collected on a growing scope of subjects and types, and the collection standards have become more refined and stringent. However, the effect of implementing the pollutant discharge fee system has been unsatisfactory due to the lack of tax rigidity and low collection efficiency (Huang and Li, 2018). In this context, China has been exploring the development of EPT system. On December 25th, 2016, the Standing Committee of the National People's Congress passed the "Environmental Protection Tax Law of the People's Republic of China", changing the pollutant discharge fees into the EPT and incorporating the EPT into law. The Law was stipulated for nationwide implementation beginning in 2018. The EPT Law delivers a smooth transition from the pollution discharge fee system to the EPT system in the principle of "tax burden shifting". Specifically, the taxable pollutants refer to solid wastes, noise, air pollutants, and water pollutants. The applicable tax rates for taxable solid wastes and noise should refer to the Table of Items and Amounts of Environmental Protection Tax as an annex to the EPT Law. The taxable air and water pollutants shall be determined based on the pollution equivalent. Each province could determine its local tax rates within the scope of the prescribed range, based on its own economic, social and ecological development goals, environmental carrying capacity and pollutant discharge situation. In practice, many provinces "shifted" the original pollution discharge fee standard to the EPT rate, but some provinces and cities gradually raised the tax rate.¹ In this way, the existing EPT in China shows a distinctive feature—differentiated EPT rates across regions. Judging from the applicable tax rates for major air pollutants in various regions, 14 provincial-level regions, namely Inner Mongolia, Liaoning, Jilin, Heilongjiang, Anhui, Fujian, Jiangxi, Yunnan, Xizang, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang, implemented the minimum tax rates after the EPT reform in 2018, which is the lower bound of tax rate for taxable air pollutants set by the law at RMB 1.20 yuan per pollution equivalent. Except for Beijing that implemented the upper bound of tax rate, other provincial-level regions set the tax rates for air pollutants within the range of RMB 1.8~10 yuan per pollution equivalent. As for the applicable tax rates for water pollutants, 14 provincial-level regions, namely Inner Mongolia, Liaoning, Jilin, Heilongjiang, Anhui, Jiangxi, Shandong, Yunnan, Xizang, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang, implemented the lower bound of tax rates at RMB 1.40 yuan per pollution equivalent after the EPT reform in 2018.

¹ Twelve provinces/regions, namely Jilin, Heilongjiang, Zhejiang, Anhui, Jiangxi, Hubei, Xizang, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang, didn't change the tax rates after the EPT reform (the "shifting" of tax rates). Nineteen provinces/regions/municipalities, namely Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia, Liaoning, Shanghai, Jiangsu, Fujian, Shandong, Henan, Hunan, Guangdong, Guangxi, Hainan, Chongqing, Sichuan, Guizhou, and Yunnan, raised their tax rates after the reform (the "raising" of tax rates).

Except for Beijing that implemented the an upper bound of tax rates, other provincial-level regions set the tax rates for water pollutants within the range of RMB 1.5~12 yuan per pollution equivalent. In addition, Inner Mongolia, Yunnan, and Shanghai adjusted their local EPT rates in 2019, and Inner Mongolia and Liaoning raised their EPT rates in 2020.

2.2. Theoretical Models and Research Hypotheses

With reference to the research of Levinson and Taylor (2008) and Shapiro *et al.* (2018), this paper applies a partial equilibrium model to analyze the effect of regionally different EPT rates on industrial transfer or corporate migration. To simplify the analysis, it is assumed that there are two jurisdictions in a country: Jurisdiction 1 and Jurisdiction 2, representing the original location and the target location respectively, while the prices of production factors (labor and capital) and the unit EPT rate t are given exogenously. Assume that in the initial state, in the Jurisdiction 1, there exists a group of polluting industries $\eta \in (0,1]$ that are sorted by polluting degree, and each polluting industry is composed of N enterprises that produce homogeneous products and discharge pollution. These enterprises move along with their industries, with $i(\eta)$ referring to the representative enterprise of industry η . There's no industry in Jurisdiction 2. Therefore, the pollution degree $\alpha_i(\eta)$ of enterprise i satisfies the conditions that $\alpha_i'(\eta) > 0$, $0 < \alpha_i(\eta) < 1$, meaning that the enterprises of different industries produce varied degrees of pollution. $Q_i(\eta)$ refers to the output of enterprise i in the industry η . The production costs for each unit of output of enterprise i in Jurisdiction 1 and Jurisdiction 2 are reflected as c_1 and c_2 , respectively. The labor force and capital can flow freely among regions. The capital cost is the main reason for differences in production costs between jurisdictions. Due to the trans-regional management costs caused by transferring partial investment of enterprise i to Jurisdiction 2, we have $c_1 < c_2$.

The production of each enterprise requires labor and capital of a specific industry, and pollution is a by-product of production. The enterprise will invest θ percent of production factors for emission reduction. Assuming that the production satisfies constant returns to scale and zero entry cost, the enterprises' net output after investing θ percent of production factors for emission reduction can be calculated in the following formula:

$$Q_i(\eta) = [1 - \theta_i(\eta)] F_i[K(\eta), L(\eta)] \quad (1)$$

The pollution emission E of representative enterprise i is a function of the production activities F and the emission reduction intensity θ , so the total emission E of enterprise i is:

$$E_i(\eta) = \phi_i[\theta_i(\eta)] F_i[K(\eta), L(\eta)] \quad (2)$$

Given that ϕ should be a decreasing function of emission reduction intensity θ , assume $\phi(\theta) = (1 - \theta)^{1/\alpha}$, where $0 < \alpha < 1$, with reference to Copeland and Taylor (2004). Then, apply it to the above Formula (2) and it can be seen that enterprises choose θ to minimize the production cost under the conditions of given labor and capital prices.

$$E_i(\eta) = [1 - \theta_i(\eta)]^{1/\alpha_i(\eta)} F_i[K(\eta), L(\eta)] \quad (3)$$

To simplify the analysis, the Formula (3) sets the pollution emission E as a relative value. In the case of relatively low EPT rate, enterprises wouldn't invest in pollution control. That is, $\theta = 0$, and the pollution emission E equals the output Q . In the case of relatively high EPT rate, enterprises would actively engage in pollution control. That is, $\theta > 0$ and the pollution emission decreases accordingly. Combining Formula (1) with Formula (3), we can get the following formula:

$$Q_i(\eta) = E_i(\eta)^{\alpha_i(\eta)} F_i[K(\eta), L(\eta)]^{1-\alpha_i(\eta)} \quad (4)$$

The above Formula (4) can be regarded as a Cobb-Douglas production function that regards pollution emission and net output as input factors, and the prices of the two are the unit EPT rate t and the finished product price c . Given the enterprise location in Jurisdiction 1 and based on the first-order condition for profit maximization, it can be known that the production cost of enterprise $i(\eta)$ in the industry η in Jurisdiction 1 is:

$$C_{i1}(\eta) = A_i(\eta) t_1^{\alpha_i(\eta)} c_1^{1-\alpha_i(\eta)} \quad (5)$$

Wherein, $A_i(\eta) = \left(\frac{1-\alpha}{\alpha}\right)^{\alpha-1} + \left(\frac{1-\alpha}{\alpha}\right)^{\alpha}$. Similarly, if enterprise $i(\eta)$ migrates to the target location in Jurisdiction 2, the production cost will become:

$$C_{i2}(\eta) = A_i(\eta) t_2^{\alpha_i(\eta)} c_2^{1-\alpha_i(\eta)} \quad (6)$$

If and only if $C_{i1}(\eta) > C_{i2}(\eta)$, that is, satisfying Formula (7), enterprise $i(\eta)$ in Jurisdiction 1 would transfer investment to Jurisdiction 2.

$$\frac{t_2}{t_1} < \left(\frac{c_1}{c_2}\right)^{\frac{1-\alpha}{\alpha}} \quad (7)$$

Since $c_1 < c_2$ and $0 < \alpha < 1$, it comes to that $\left(\frac{c_1}{c_2}\right)^{\frac{1-\alpha}{\alpha}} < 1$, making $t_2 < t_1$ an essential

condition for the establishment of Formula (7). That is to say, when there is a difference in EPT rates between regions and the tax rate t_2 in the target location is lower than the tax rate t_1 in the original location, the polluting enterprises may choose to invest in migration to the target location. The specific range depends on the unit production costs c_1 and c_2 at the two locations and enterprises' pollution degree α . Based on this, this paper puts forward Hypothesis 1 for verification.

Hypothesis 1: Inter-regional differences in EPT rates may lead to investment migration of polluting enterprises from regions with high EPT rates (original location) to regions with low EPT rates (target location).

If the above hypothesis 1 is established, let the function $H(\eta; t_1, t_2) = \left(\frac{t_2}{t_1} \right)^{\frac{\alpha(\eta)}{1-\alpha(\eta)}}$. There

exists an industrial threshold $\bar{\eta}$ to establish $H(\bar{\eta}; t_1, t_2) = \frac{c_1}{c_2}$, prompting enterprises of the industry $\eta > \bar{\eta}$ to migrate to Jurisdiction 2. If the EPT rate t_1 in the Jurisdiction 1 where the enterprise is located is raised to t_1^* , at the same level of $\frac{c_1}{c_2}$, the industrial threshold will change from $\bar{\eta}$ to η^* . Since the function $H(\eta; t_1, t_2)$ is a decreasing function of t_1 , then $\eta^* < \bar{\eta}$, indicating that more enterprises will choose to migrate their investment to the target location in Jurisdiction 2. This leads to the following Hypothesis 2.

Hypothesis 2: When there are inter-regional differences in EPT rates, if the EPT rate is raised in the region where the enterprise is located, the polluting enterprises' investment migration effect of "avoiding high rates and opting for low rates" will be more significant.

3. Research Design

3.1. Model Settings

To test Hypothesis 1, this paper draws on Ma *et al.* (2020) to employ the data of listed polluting companies in regions excluding Hong Kong, Macao, and Taiwan to establish a panel of data "listed companies c (with parent company located in region i) – the region of the subsidiary company j ($j \neq i$) – year t " (hereinafter referred to as "company-region"), so as to better examine the impact of environmental differences between the original location and the target location on enterprises' trans-regional migration. On this basis, the DID approach is applied to examine the impact of inter-provincial differences in EPT rates brought about by the EPT reform on enterprises' location choice for investment. The empirical model is set as follows:

$$Invest_{cjt} = \alpha_0 + \alpha_1 treat_{cj} \times post_t + \beta X + \mu_{cj} + \lambda_t + \varepsilon_{cjt} \quad (8)$$

Wherein, the core explanatory variable is $treat_{cj} \times post_t$. The $treat_{cj}$ denotes whether the listed company c invest in the region j with the EPT rates lower than in the region where its parent company is located. If yes, it belongs to the treatment group, with the value at 1; if not, it belongs to the control group, with the value at 0. The dummy variable $post_t$ denotes the implementation time of EPT reform, equaling 1 in the year of the reform and 0 in other years. The explained variable $Invest_{cjt}$ represents trans-regional investment activities, measured by the number of subsidiaries established by listed company c in other regions j . If Hypothesis 1 is true, α_1 should be significantly positive. X is a set of control variables, including corporate size, asset-liability ratio, profitability, age, number of board directors, proportion of independent directors, staff of subsidiaries, as well as regional differences in GDP per capita, industrial structure, and road area. μ_{cj} controls the fixed effect at the level of the region j where the subsidiary of the listed company c is located. This fixed effect not only absorbs the factors that do not change over time at the company-region level (such as the historical relationship between the listed company and a certain region), but also controls factors that don't change over time between two regions (such as the geographical distance between the two). At the same time, this paper controls the year fixed effect λ_t . ε_{cjt} is a stochastic disturbance, and the standard errors are clustered at the company-region level.

In order to further test the differential impacts of “raising” or “shifting” EPT (rate) reform on enterprises, this paper introduces the dummy variable $increase_c$ on the basis of Formula (8). The specific model setup is shown as follows:

$$Invest_{cjt} = \alpha_0 + \alpha_1 treat_{cj} \times post_t \times increase_c + \alpha_2 treat_{cj} \times post_t + \alpha_3 increase_c + \beta X + \mu_{cj} + \lambda_t + \varepsilon_{cjt} \quad (9)$$

Wherein, $increase_c$ denotes whether the EPT rate applicable to the region i where the parent company c is located is raised after the EPT reform. During the sample period, a total of 19 provinces in China raised the EPT rates. If the parent company of the listed company c is located in these regions, $increase_c$ equals 1. The EPT rates in the other 12 provinces remained the same during the sample period, and $increase_c$ equals 0. If Hypothesis 1 and Hypothesis 2 are both true, the coefficient $treat_{cj} \times post_t \times increase_c$ in Formula (9) should be significantly positive.

3.2. Data Source and Description of Variables

Industrial production is the main source of environmental pollution. This paper selects listed companies (mainly industrial companies) under the first level of industry classification of B, C, and D among all A stocks from 2015 to 2020 as the initial samples.

With reference to Xie *et al.* (2023), the information about subsidiaries is obtained from the notes to “long-term equity investment” in the annual report of the parent company of the listed company, and the detailed regional distribution is manually sorted out. This paper defines “trans-regional investment” as a domestic subsidiary in a province/region other than the registration place of the parent company. The initial samples are processed as follows. First, eliminate companies with special treatment (ST, *ST) during the sample period. Second, eliminate samples with relevant financial data missing. Third, eliminate sample companies with trans-regional changes in registration or operation place. Fourth, all continuous financial variables are winsorized at levels of 1% and 99 %. In the end, a total of 47000 “company—region” observations are obtained.¹

The information and financial data of listed companies in this paper are sourced from the CSMAR database. The data of regional EPT rate is obtained by manually sorting out the documents issued by the provincial development and reform commissions and environmental protection bureaus and the public information on official websites of the governments. Economic and social data at the provincial level is sourced from the National Bureau of Statistics, China Statistical Yearbook, and CEIC database.

4. Empirical Results and Analysis

4.1. Benchmark Regression: Inter-Provincial Differences in EPT Rates and Trans-Regional Investment

Table 1 presents the regression results at the company-region level obtained based on Formula (8). The explained variables in Columns (1) and (2) are the number of trans-regional subsidiaries invested by listed companies, and the control variables at the company and regional levels are gradually added. The results show that after the EPT reform, compared with regions with high EPT rates, the number of subsidiaries invested by polluting enterprises in regions with lower EPT rates increased by 0.101, accounting for 4.27% ($=0.101/2.368 \times 100\%$) of the average number of subsidiaries of listed companies in a single target region, and the effect was significant at the level of 1%. In other words, the inter-regional differences in EPT rates as a result of the EPT reform have indeed triggered the effect of migrating investment from regions with high EPT rates (original location) to regions with low EPT rates (target location). To avoid the influence of extreme values on the results, we also take the natural logarithm of the explained variables. The results shown in Columns (3) and (4) verify Hypothesis 1. The results of the control variables

¹ Due to space limitations, the descriptions of the main variables and descriptive statistics are not shown here, but they are available upon request.

show that the polluting enterprise's trans-regional investments increase with the growing number, size and age, and decreasing profitability of its subsidiaries.

Table 1. Benchmark Regression Results

Variable	(1) No. of trans- regional investment	(2) No. of trans- regional investment	(3) ln(No. of trans- regional investment)	(4) ln(No. of trans- regional investment)	(5) No. of trans- regional investment	(6) ln(No. of trans- regional investment)
<i>treat</i> $\times$ <i>post</i>	0.082** (0.039)	0.101*** (0.039)	0.016** (0.007)	0.019** (0.008)	0.076* (0.042)	0.016** (0.008)
<i>increase</i>					-0.228 (0.304)	0.070 (0.091)
<i>treat</i> $\times$ <i>post</i> $\times$ <i>increase</i>					0.173** (0.085)	0.019*** (0.005)
Control variables at company level	Y	Y	Y	Y	Y	Y
Regional control variables	N	Y	N	Y	Y	Y
Fixed effect	Y	Y	Y	Y	Y	Y
Observations	47000	47000	47000	47000	47000	47000
Adjusted R ²	0.825	0.826	0.856	0.856	0.826	0.856

Note: ***, ** and * denote significance at 1%, 5% and 10% respectively. The numbers in brackets are robust standard errors adjusted by company-regional clustering. The fixed effects include company-regional fixed effects and time fixed effects. The same below.

4.2. Further Test: Differences in the Policy Effects of “Raising” and “Shifting” EPT Rates

Columns (5) and (6) of Table 1 display the impact of “raising” and “shifting” EPT rates after the EPT reform on the polluting enterprises' location choice for trans-regional investment. The estimation results show that the coefficients for interaction term are all significantly positive, indicating that under the circumstance of inter-regional differences in EPT rates, if the EPT rate in the region where the polluting enterprise is located is raised (that is, the environmental regulation in the original location is stringent), the higher environmental protection costs will prompt the enterprise to adopt an environment-seeking strategy. It means transferring a part of investment to regions with lower EPT rates (that is, regions with less stringent environmental regulation) by setting up subsidiaries or other means of direct investment, so as to reallocate the production activities. The result supports Hypothesis 2.

4.3. Robustness Test

4.3.1. Parallel Trend Test

Satisfying the parallel trend is an essential premise of applying the DID model for causal inference. In other words, there is no difference in the trend of change between the treatment group and the control group before the policy implementation. This paper tests the parallel trend hypothesis with the event study methodology, with the model setup as follows:

$$Invest_{cjt} = \alpha_0 + \sum_{k=-4, k \neq -1}^2 \gamma_k D_k \times treat_{cj} + \beta X + \mu_{cj} + \lambda_t + \varepsilon_{cjt} \quad (10)$$

Wherein, $D_k \times treat_{cj}$ denotes the cross-product term between the dummy variable in the k th year before and after the policy implementation and the variable of whether to invest in region with low EPT rate. Taking the period before the policy implementation as the base period, compare the effects in each year before and after the policy implementation. The coefficients of the cross-product term in each year and their confidence interval boundaries at the level 95% are shown on the upper side of Figure 1. Before the policy implementation, there's no significant difference in the number of trans-regional subsidiaries invested by listed companies in regions with relatively high or low EPT rates. However, beginning from the year of policy implementation, the number of subsidiaries in the treatment group (regions with relatively low EPT rates) has been significantly higher than that in the control group (regions with relatively high EPT rates). Such policy impact has increased year by year, thereby validating the parallel trend hypothesis.

4.3.2. Placebo Test

This paper conducts the following two placebo tests. First, use the sample of non-polluting listed companies for regression test based on the benchmark model. The test results show that the impact of EPT reform on the location choice of non-polluting enterprises is no longer significant.¹ Second, a counterfactual test is performed based on a nonparametric permutation test. Specifically, randomly select a reform time first. Then, based on the number of provinces that adjusted EPT rates each year, perform random sampling among all provinces without repetition. Based on this, conduct random tests and regression at the two panels of reform time and province. The process is repeated 500 times. The distribution diagram of the estimation coefficients is shown on the lower part of Figure 1. The estimation coefficients of the DID term

¹ Due to space limitations, the estimation results are not shown here.

approximately present a normal distribution centered on 0, which confirms that the location preference of polluting enterprises for trans-regional migration is indeed induced by the EPT reform, rather than other common factors.

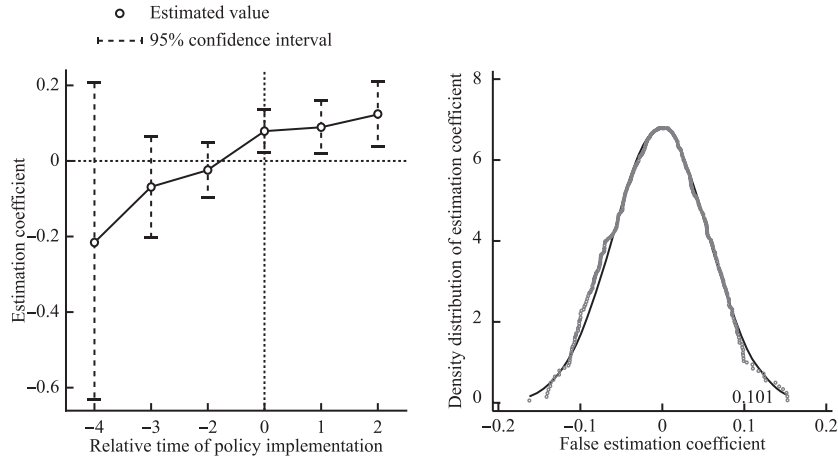


Figure 1. Parallel Trend Test and Placebo Test

4.3.3. Other Robustness Tests

This paper also carries out other robustness tests, like using a balanced panel, replacing the explained variables, eliminating municipalities, excluding the interference of policies and situations in the same period, using continuous variables for DID setup, increasing control of other fiscal and tax factors, and enriching fixed effects. The empirical results all support the benchmark conclusions of this paper.

5. Heterogeneity and Extended Analysis

5.1. Heterogeneity Analysis

5.1.1. Pollution Level of Enterprises

The EPT reform may affect the enterprises' location choice for trans-regional investment to significantly varying degrees. Compared with non-heavy-polluting enterprises, the heavy-polluting enterprises usually face higher costs incurred by environmental regulation. With the tightening of environmental regulations, the profit margins of heavy-polluting enterprises are increasingly squeezed. Therefore, in response

to more stringent environmental regulation, trans-regional migration becomes the primary choice for heavy-polluting enterprises (Wang and He, 2021).¹ With reference to Pan *et al.* (2019), in line with the Guidelines for Industry Classification of Listed Companies (revised in 2012), the sample polluting enterprises are categorized into heavy-polluting enterprises and non-heavy-polluting enterprise for regression test.² The results in Column (1) of Table 2 show that after the EPT reform, the inter-provincial differences in EPT rates are more significant, motivating heavy polluting enterprises to adopt the strategy of trans-regional investment to migrate from regions with high EPT rates to those with low EPT rates, so as to escape a higher compliance cost of environmental regulations.

5.1.2. Enterprises' Capital Intensity

The migration cost may exert an important impact on the enterprises' decision to migrate as a whole or in part under the influence of environmental regulations (Wu *et al.*, 2017). For capital-intensive enterprises, the overall migration cost includes a large amount of capital and time input for disposing or relocating a large number of fixed assets, setting up new production lines, and purchasing production equipment. The higher the capital intensity of the enterprise, the greater the overall migration cost, and the more willing is the enterprise to opt for partial migration through direct investment, such as setting up trans-regional subsidiaries. Therefore, this paper measures the capital intensity of enterprises by "fixed assets/number of staff", and then sets a dummy variable taking the value of 1 or 0 based on the median of each year for regression test. The results in Column (2) of Table 2 show that when faced with the inter-regional differences in environmental regulations brought about by the EPT reform, polluting enterprises with higher capital intensity are more likely to partially migrate to regions with lower EPT rates through trans-regional investment.

5.1.3. Spatial Characteristics of Trans-Regional Investment

Apart from environmental regulations, enterprises' migration decisions are more affected by the spatial characteristics of the original location and the target location (Weterings and Knoben, 2013), such as the geographical distance between the two places,

¹ Setting up subsidiaries in a different region could incur higher information costs, since they may not be enjoy the benefits of local resources and information convenience. Therefore, corporate decision-makers usually face a trade-off between the two costs. However, trans-regional investment could help heavy-polluting enterprises escape from the high cost of in-situ transformation, including high cost of pollution control, the weaker competitiveness, and the lack of market opportunities.

² This paper also categorized samples into heavy-polluting enterprises and medium- and light-polluting enterprises based on the pollution emission intensity of industries, leading to the same conclusions. The regression results are available upon request.

the level of economic development, market size, and the degree of financialization. Therefore, this paper defines migration in the principle of proximity as migration to a place neighboring the region where the parent company is located. The difference between the market index in the regions of the parent company and that of its subsidiaries is used to measure the quality of market environment.¹ The interaction terms between the EPT reform and the above variables are added to the regression, with the results shown in Columns (3) and (4) of Table 2. The coefficients of the interaction terms are all significantly positive, indicating that when other conditions are equal, polluting enterprises are more inclined to migrate to neighboring regions and regions with better market environment.

Table 2. Heterogeneity Analysis

Variable	Corporate pollution level	Corporate capital intensity	Spatial characteristics of trans-regional investment	
	(1)	(2)	(3)	(4)
<i>treat</i> × <i>post</i>	0.052 (0.039)	0.056 (0.040)	0.039 (0.036)	0.048 (0.043)
Dummy variable	−0.057 (0.172)	−0.044 (0.037)	−0.033 (0.625)	−0.067 (0.045)
<i>treat</i> × <i>post</i> × <i>Dummy</i> × <i>vedse</i>	0.127** (0.064)	0.097* (0.053)	0.206** (0.096)	0.128** (0.052)
Control variable	Y	Y	Y	Y
Fixed effect	Y	Y	Y	Y
Observations	47000	47000	47000	37286
Adjusted R ²	0.826	0.826	0.826	0.839

Note: The explained variable is the number of trans-regional subsidiaries. The dummy variables respectively denote whether the enterprise is heavy-polluting, capital intensive, whether local and target locations are neighboring areas, and whether the market environment in the target location is better (Due to space limitation, they are shown in one row). The market index in Column (4) is the data as of 2019, and thus the samples in 2020 are deleted.

5.2. Extended Analysis: Economic Effect Test

As demonstrated above, the EPT reform exerts a significant positive impact on the migration of enterprises to areas with low EPT rates. The analysis into the economic effect brought by trans-regional migration of enterprises is of critical importance for green development of enterprises and green governance of government. Therefore,

¹ The data is sourced from China Market Index Database and the data in different periods has been processed.

this paper carries out ex-post analysis into the cost-profit effect, innovation effect and environmental effect of trans-regional migration of polluting enterprises due to inter-provincial differences in EPT rates.

5.2.1. Cost-Benefit Effect

Based on the hypothesis about “cost compliance hypothesis”, the tightening of local environmental regulations will directly push up the environmental expenditure of enterprises, erode operating profits, and boost their tendency to migrate to regions with lower environmental costs for the purpose of reducing costs and maximizing profits. However, existing studies have shown that the geographical dispersion may damage corporate value (Garcia and Norli, 2012). The effect of trans-regional migration still depends on the trade-off between its costs and benefits. If the earnings brought by trans-regional investment are enough to make up for the additional costs of information and transportation incurred by migration, trans-regional migration may become the primary choice of polluting enterprises in response to stringent environmental regulation. The inter-regional differences in EPT rate after the EPT reform set the stage for polluting enterprises to escape environmental regulation through trans-regional migration, which greatly reduces the effect of EPT reform.

Due to a lack of open sources for financial data of subsidiaries, we examine the cost-benefit effect of corporate relocation induced by inter-provincial differences in EPT rates from the corporate group level of listed companies. The empirical model is set as follows:

$$Y_{ct} = \alpha_0 + \alpha_1 treat_c \times post_t + \beta X + \mu_c + \lambda_t + \varepsilon_{ct} \quad (11)$$

Wherein, the explained variable Y_{ct} denotes the economic performance of listed company c in the year of t ; and $treat_c$ is grouped based on the median of the proportions of trans-regional subsidiaries in regions with low EPT rates to the total number of trans-regional subsidiaries, with the dummy variables taking the value of 0 or 1. The control variables include the company-level variables in the benchmark regression, as well as per capita GDP, proportion of the secondary industry, and per capita road area in the region where the parent company is located.¹ The explained variables in Formula (11) are denoted by the logarithm of operating cost ratio (operating cost/operating revenue) and total profit respectively. The results in Columns (1) and (2) of Table 3 show that the relocation of listed companies to set up subsidiaries in other regions with lower EPT rates can effectively reduce the overall operating costs and significantly increase the overall profitability.

¹ To prevent the estimation bias caused by inconsistent model settings, we estimate the impact of inter-provincial differences in EPT rates due to EPT reform on corporate relocation decisions at the corporate group level correspondingly. The results show that the benchmark regression conclusions of this paper remain unchanged.

Table 3. Economic Effect Test: Cost-Benefit Effect and Innovation Effect

Variable	(1) Operating cost ratio	(2) Total profit	(3) No. of green patents	(4) No. of green patents for utility models	(5) No. of green invention patents
<i>treat</i> × <i>post</i>	−0.006** (0.003)	0.052** (0.023)	0.010 (0.025)	0.011 (0.017)	0.022 (0.025)
Control variable	Y	Y	Y	Y	Y
Company/Year fixed effect	Y	Y	Y	Y	Y
Observation	11446	10258	11444	11444	11444
Adjusted R ²	0.031	0.517	0.013	0.004	0.058

Note: The data sample is panel data at the company level, and the numbers in brackets denote the robust standard errors adjusted by clustering at the company level.

5.2.2. Innovation Effect

Polluting enterprises could avoid certain compliance cost of local environmental regulations through trans-regional investment in the short term, but the pressure of environmental regulations at original and target locations persists. Moreover, with the declining carrying capacity of environment at target location, growing public awareness of environmental protection, and increasing law enforcement capabilities of government bodies, the gap in environmental governance cost between original and target locations is expected to narrow gradually. Transformation driven by sci-tech innovation remains the only path for polluting enterprises. According to the hypothesis on “compensation for innovation”, properly designed environmental regulations will force companies to increase R&D expenditures to achieve innovation and upgrading of green technologies. To examine the effect of polluting enterprises’ trans-regional migration due to the EPT reform, the explained variables in the Formula (11) are respectively measured by the number of green patents, the number of green invention patents, and the number of green patents for utility models granted to the listed company in the year.¹ The results in Columns (3)–(5) of Table 3 show no significant change in the total number of green patents and the number of green invention patents of polluting enterprises in the current period, indicating no active efforts towards the green transformation and upgrading in the short term.

5.2.3. Environmental Effect

To explore whether the spatial layout adjustment of enterprises brought about by the

¹ Since some enterprises have zero green patent applications, the natural logarithm of the number of green (invention/utility models) patents plus 1 is used for measurement. The data is sourced from the CNRDS database for green patent research.

inter-provincial differences in EPT rates will transfer pollution from the original location to the target location, and based on the settings of the Formula (11), this paper takes the logarithms of the emissions of sulfur dioxide (SO₂) and nitrogen oxide (NO_x) that constitute the main pollutants in industrial waste gas, as well as the discharge of industrial waste water, chemical oxygen demand (COD), ammonia nitrogen emissions in industrial water pollution as indicators of environmental pollution.¹ The empirical results in Table 4 show that the emission of industrial SO₂ in the original location fell significantly by about 19.6%, while the that in the target location increased significantly by about 19.3%, albeit with no significant impact on the discharge of industrial wastewater and its main pollutants, and the emissions of air pollutant NO_x. These conclusions are valid after replacing the explained variables with per capita pollution emission. The above results verify the existence of “pollution haven effect” to a certain extent.

Table 4. Economic Effect Test: Environmental Effect

Panel A: Original location					
Variable	(1) SO ₂ emission	(2) NO _x emission	(3) Industrial wastewater discharge	(4) COD emission	(5) Ammonia nitrogen emission
<i>treat × post</i>	−0.196** (0.082)	−0.070 (0.048)	−0.071 (0.068)	0.036 (0.082)	−0.079 (0.105)
Control variable/ Fixed effect	Y	Y	Y	Y	Y
Observation	185	185	166	185	185
Adjusted R ²	0.866	0.839	0.511	0.833	0.855
Panel B: Target location					
Variable	(1) SO ₂ emission	(2) NO _x emission	(3) Industrial wastewater discharge	(4) COD emission	(5) Ammonia nitrogen emission
<i>treat × post</i>	0.193** (0.090)	0.064 (0.056)	0.038 (0.105)	−0.023 (0.079)	−0.058 (0.101)
Control variable/ Fixed effect	Y	Y	Y	Y	Y
Observation	185	185	166	185	185
Adjusted R ²	0.866	0.838	0.508	0.833	0.854

Note: The data sample is the panel data at the regional level, and the numbers in brackets denote the robust standard errors adjusted by clustering at the regional level.

¹ Four major pollutants, namely SO₂, NO_x, COD, and ammonia nitrogen, have always been the focus of pollution control. The differentiated EPT rates for these four pollutants are major contributors to the inter-provincial differences in EPT rates. The data is sourced from China Statistical Yearbook on Environment, provincial statistical yearbooks, and Reports on the State of the Ecology and Environment in China.

6. Conclusions and Policy Implications

This paper takes the introduction of EPT and the adjustment of EPT rate as quasi-natural experiments, uses the listed companies of polluting industries in China from 2015 to 2020 as the research sample, and employs the DID approach to study the impact of inter-provincial differences in EPT rates on enterprises' trans-regional migration strategy. The study finds that when faced with higher EPT rates, the parent company will transfer production to a subsidiary subject to lower EPT rates through the equity investment relationship. Such strategy of “avoiding high EPT rates and opting for low EPT rates” are more favored by parent companies located in regions that raised the EPT rates. Further study finds that the investment migration decision of listed companies due to the inter-provincial differences in EPT rates could reduce production costs and increase total profits in the short term, but fail to boost the corporate capabilities for green innovation, accompanied by the transfer of industrial SO₂ pollution from original location to target location at the macro level. Such “short-sighted” escape undermines the policy intention of the EPT. The research findings in this paper lead to the following policy implications.

Firstly, guided by the overall goals of pollution control, it's necessary to improve the top-level design and supporting measures of EPT policy, break the regional limitations in environmental governance, and prevent adverse policy effects at the institutional level. Judging from the current EPT rates in various regions, the EPT rates in some regions with poor environment and high pollutant discharge are relatively low, making it difficult to fundamentally motivate enterprises to control pollution, while setting the stage for the migration of enterprises in regions of higher EPT rates. Therefore, to improve the EPT system, it's a must to gradually raise EPT rates, make dynamic adjustments, and minimize the regional gap in EPT rates, in a bid to urge enterprises to step up pollution control.

Next, improve the collaborative governance system. As the issue of pollution transfer involves a wide jurisdiction, there may exist the problems of obscure law enforcement agencies and overlapping powers. In this case, an effective way to prevent pollution transfer lies in the inter-governmental collaborative governance. For instance, in the EPT reform, the Beijing-Tianjin-Hebei region and surrounding provinces generally set higher applicable rates for taxable pollutants, which effectively avoided the “beggarmy-neighbor” type of pollution transfer to the nearest place. However, due to the limited area of radiation, the scale effect hasn't yet emerged, requiring a nationwide consensus on coordinated regulations. Of course, coordinated governance involves coordination not only among local governments, but also among regions and among the control of multiple pollutants. The promotion and inspections from the top-level central government are the key to ensuring the effective implementation of environmental protection policies.

Finally, adopt the two-pronged approach of guidance and regulation to facilitate the transformation and upgrading of enterprises. The environmental policy aims to not only improve the environment, but also promote the coordinated development of green

innovation. The study in this paper finds that the trans-regional migration of listed companies driven by inter-provincial differences in EPT rates is a “short-sighted” move driven by interests, with a limited effect on the corporate transformation and upgrading based on green innovation. The EPT reform should be leveraged as an opportunity to promote corporate transformation and upgrading, for which a competent government and an efficient market are indispensable. On the one hand, given the sharp increase in the initial cost of EPT collection, the government needs to help polluting enterprises reduce the cost of transformation and upgrading by such means like increasing environmental protection subsidies and optimizing EPT preferential policies. On the other hand, establish a favorable market investment environment, rely on the market to strengthen the corporate awareness for environmental protection, and transform it into an endogenous driving force for green technology innovation.

References

- Bao, Q. (2009). An Analysis of Causes and Performance of Pollution Transfer in Different Regions in China's Economic Development. *Journal of North Minzu University (Philosophy and Social Science) (Beifang Minzu Daxue Xuebao)(Zhaxue Shehui Kexueban)*, 3, 72–76.
- Cheng, A., & Zhao, F. (2018). Quantitative Measurement of Trans-Regional Industrial and Pollution Transfer in China Based on Shift-Share Method. *China Population, Resources and Environment (Zhongguo Renkou Ziyuan Yu Huanjing)*, 5, 49–57.
- Copeland, B., & Taylor, M. S. (2004). Trade, Growth, and the Environment. *Journal of Economic Literature*, 42 (1), 7–71.
- Dean, J. M., Lovely, M. E., & Wang, H. (2009). Are Foreign Investors Attracted to Weak Environmental Regulations? Evaluating the Evidence from China. *Journal of Development Economics*, 90 (1), 1–13.
- Guo, J., & Tao, F. (2009). Agglomeration Effects, Environmental Regulation Policy and Foreign Direct Investment Location Choice—According to the New Economic Geography. *Industrial Economics Research (Chanye Jingji Yanjiu)*, 4, 29–37.
- Huang, J., & Li, Y. (2018). Pollution Spillover Effect and Environmental Tax Levy. *Public Finance Research (Caizheng Yanjiu)*, 4, 75–85.
- Huang, J., Chen, X., Huang, B., & Yang, X. (2017). Economic and Environmental Impacts of Foreign Direct Investment in China: A Spatial Spillover Analysis. *China Economic Review (Zhongguo Jingji Pinglun)*, 45, 289–309.
- Jin, X. (2018). Environmental Regulation and Domestic Pollution Transfer: Empirical Study Based on COD Emission Control Plan in 11th Five-Year Plan. *Industrial Economics Research (Chanye Jingji Yanjiu)*, 6, 115–125.

- Keller, W., & Levinson, A. (2002). Pollution Abatement Costs and Foreign Direct Investment Inflows to U.S. States. *The Review of Economics and Statistics*, 84 (4), 691–703.
- Kim, Y., & Rhee, D. (2019). Do Stringent Environmental Regulations Attract Foreign Direct Investment in Developing Countries? Evidence on the “Race to the Top” from Cross-Country Panel Data. *Emerging Markets Finance and Trade*, 55 (12), 2796–2808.
- Levinson, A., & Taylor, M. (2008). Unmasking the Pollution Haven Effect. *International Economic Review*, 49 (1), 223–254.
- Liu, Y., & Zhang, X. (2018). Emission Reduction Effects of Environmental Tax System and Its Regional Differences in China. *Taxation Research (Shuiwu Yanjiu)*, 2, 41–47.
- Ljungwall, C., & Linde-Rahr, M. (2006). Environmental Policy and the Location of Foreign Direct Investment in China. China Center for Economic Research Working Paper Series.
- Luo, L., Lei, P., & Meng, K. (2016). Corporate Environmental Seeking Strategy, Pollution-Intensive Production Transfer and Environmental Regulation. *China Population, Resources and Environment (Zhongguo Renkou Ziyuan Yu Huanjing)*, 1, 113–120.
- Ma, G., Cheng, X., & Yang, E. (2020). How Does Transportation Infrastructure Affect Capital Flows—A Study from High-Speed Rail and Cross-Region Investment of Listed Companies. *China Industrial Economics (Zhongguo Gongye Jingji)*, 6, 55–23.
- Mulatu, A. (2017). The Structure of UK Outbound FDI and Environmental Regulation. *Environmental and Resource Economics*, 68 (1), 65–96.
- Pan, A., Liu, X., Qiu, J., & Shen, Y. (2019). Can Green M&A of Heavy Polluting Enterprises Achieve Substantial Transformation under the Pressure of Media. *China Industrial Economics (Zhongguo Gongye Jingji)*, 2, 174–192.
- Shapiro, J., & Walker, R. (2018). Why Is Pollution from US Manufacturing Declining? The Roles of Environmental Regulation, Productivity, and Trade. *American Economic Review*, 108 (12), 3814–3854.
- Shen, K., Jin, G., & Fang, X. (2017). Does Environmental Regulation Cause Pollution to Transfer Nearby? *Economic Research Journal (Jingji Yanjiu)*, 5, 44–59.
- Shen, Y., & Ren, Y. (2021). Spatial Spillover Effect of Environmental Regulations and Inter-Provincial Industrial Transfer on Pollution Migration. *China Population, Resources and Environment (Zhongguo Renkou Ziyuan Yu Huanjing)*, 2, 52–60.
- Song, D., Zhu, W., Wang, B., & Ding, H. (2021). Are There “Pollution Havens” within the Business Conglomerate? *China Industrial Economics (Zhongguo Gongye Jingji)*, 10, 156–174.
- Sun, J., & Yuan, Z. (2020). Will the Environmental Tax Promote Enterprise

- Upgrading? —Based on the Mesomeric Effect of Innovation Investment. *Taxation Research (Shuiwu Yanjiu)*, 4, 95–102.
- Wang, Y., & He, Y. (2021). Environmental Regulations, Relocation of Heavy Polluting Enterprises and Collaborative Governance Effect: Evidence Based on the Establishment of Subsidiaries in Different Places. *Economic Science (Jingji Kexue)*, 5, 130–145.
- Weterings, A., & Knoben, J. (2013). Footloose: An Analysis of the Drivers of Firm Relocations over Different Distances. *Papers in Regional Science*, 92 (4), 791–809.
- Wu, H., Guo, H., Zhang, B., & Bu, M. (2017). Westward Movement of New Polluting Firms in China: Pollution Reduction Mandates and Location Choice. *Journal of Comparative Economics*, 45 (1), 119–138.
- Xie, Z., Chen, F., & Chen, Z. (2023). Incentives and Mobility: Asymmetric Fiscal Revenue and Expenditure Decentralization and Trans-Regional Flow of Corporate Capital. *Journal of Quantitative & Technological Economics (Shuliang Jingji Jishu Jingji Yanjiu)*, 1, 87–108.
- Xing, Y., & Kolstad, C. (2002). Do Lax Environmental Regulations Attract Foreign Investment? *Environmental and Resource Economics*, 21 (1), 1–22.
- Yang, J., Li, S., Yang, G., & Wu, W. (2021). Interprovincial Bilateral Trust and Inter-Regional Capital Flows: Based on the Perspective of Inter-Regional M&As. *Economic Research Journal (Jingji Yanjiu)*, 4, 41–59.
- Yu, L., Zhang, W., & Bi, Q. (2021). Can the Reform of Environmental Protection Fee-to-Tax Promote the Green Transformation of High-polluting Enterprises? — Evidence from Quasi-Natural Experiments Implemented in Accordance with the Environmental Protection Tax Law. *China Population, Resources and Environment (Zhongguo Renkou Ziyuan Yu Huanjing)*, 5, 109–118.
- Zhong, J., & Wei, Y. (2020). The Driving Forces of Pollution Transfer Nearby: Environmental Regulation or Economical Motivation? *Journal of Central University of Finance & Economics (Zhongyang Caijing Daxue Xuebao)*, 10, 115–128.
- Zhou, H., & Zheng, Y. (2015). The Impact of Environmental Regulation on Industry Transfer: Evidence from New Manufacturing Location. *South China Journal of Economics (Nanfang Jingji)*, 4, 12–26.