



# The Unintended Consequence: The Shift from Environmental Fees to Taxes and Corporate Tax Compliance

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**Abstract.** This study investigates the unintended consequences of China's reform shifting from environmental pollution fees to an environmental protection tax. Utilizing a difference-in-differences model with A-share listed companies as a quasi-natural experiment, we analyze the policy's impact on corporate tax compliance. The results indicate that the reform significantly reduces tax compliance among heavily polluting firms. Mechanism analysis reveals that increased regulatory pressure and internal cost burdens drive firms to adopt avoidance strategies, specifically through related-party transactions and strategic inter-provincial relocation to regions with lower tax rates. Heterogeneity analysis shows these negative effects are more pronounced in firms with high pollution intensity, regions with strict environmental regulations, and areas with weak tax enforcement. These findings highlight the risk of strategic avoidance undermining fiscal order and suggest the need for enhanced inter-departmental coordination, unified national tax standards, and optimized incentives to balance environmental governance with tax compliance.

**Keywords:** Environmental Protection Tax; Tax Compliance; Green Economy

## 1 Introduction

China historically relied on administrative orders and the pollution discharge fee system to curb corporate pollution. However, defects such as vague standards, weak enforcement, and local intervention limited its effectiveness in internalizing environmental externalities. Theoretically, the environmental protection tax aims to curb emissions by raising costs. Yet, at the micro level, this policy may trigger complex responses. A critical question arises: Does the surge in compliance costs force firms into non-compliant strategies like tax avoidance to survive? In other words, might this green reform inadvertently reduce overall corporate tax compliance?

Existing literature focuses on the direct impacts of environmental protection tax on pollution reduction, innovation, or performance [1-3], largely overlooking its shock to overall tax behavior. Firms operate in a multi-tax environment where behaviors are

influenced by enforcement intensity and institutional incentives. Ignoring potential spillover effects [4] limits policy evaluation accuracy.

The replacement of fees with taxes serves as a mandatory, normative exogenous shock. While achieving legal transformation, it may indirectly influence compliance via strengthened enforcement, altered investment treatment, and increased transparency. However, the impact is non-linear: rising tax burdens may squeeze profits, inducing evasion. Thus, the relationship between environmental protection tax and tax compliance is context-dependent and requires rigorous testing.

This paper analyzes the impact, transmission channels, and boundary conditions of the fee-to-tax reform on corporate tax compliance. Using the implementation of the Environmental Protection Tax Law as a quasi-natural experiment, we employ a difference-in-differences model on A-share listed firms. Results indicate the reform significantly reduces tax compliance among heavily polluting firms. Mechanism analysis reveals firms avoid taxes primarily through related-party transactions and strategic regional relocation driven by regulatory pressure and cost increases. Heterogeneity analysis shows stronger effects in high-pollution firms, regions with strict environmental regulation, and areas with weak tax enforcement.

Contributions include expanded dimensions by providing first systematic evidence of the unintended negative impact on overall tax compliance, enriching green tax reform evaluation. The study deepens understanding by integrating environmental regulation and tax behavior, identifying related-party transactions and geographic relocation as key avoidance channels [12][13]. Policy implications highlight risks of strategic avoidance and regional arbitrage due to insufficient coordination, recommending enhanced inter-departmental collaboration and promoting national unification of tax rates and enforcement to ensure dual goals of environmental governance and fiscal order [14][15].

## 2 Research Design and Data Source

### 2.1 Model Construction and Variable Selection

We utilize the implementation of the Environmental Protection Tax Law as an exogenous shock. Heavily polluting firms constitute the treatment group; others, the control group. The difference-in-differences model is specified as follows:

$$BTD_{ijt} = \alpha + \beta \text{Treat}_j * \text{Post}_j + \gamma X_{it} + \eta_t + \varphi_i + \mu_j + \xi_{ijt} \quad (1)$$

The dependent variable ( $BTD_{ijt}$ ) represents the degree of tax avoidance, calculated using Book-Tax Differences (Chang Lin, 2025). Robustness checks use modified Book-Tax Differences. The core explanatory variable ( $\text{Treat}_j * \text{Post}_j$ ) is the interaction of a dummy for heavily polluting industries and post-implementation years. The coefficient captures the policy effect. Control variables ( $X_{it}$ ) include Firm Size, Cash Flow, Leverage, Return on Assets, and Top Ten Shareholding Ratio [5]. Fixed effects account for firm, time, and industry-time variations.

## 2.2 Data Source and Descriptive Statistics

Sample comprises A-share listed companies from the China Stock Market and Accounting Research database covering the period from two thousand and twelve to two thousand and twenty-one. Exclusions apply to financial firms, special treatment or particular transfer status firms, and those with missing data. Continuous variables are winsorized at the one percent and ninety-nine percent levels. The final sample includes over eighteen thousand firm-year observations covering nearly three thousand firms, with approximately eight hundred treated and over two thousand controls.

**Table 1.** Descriptive Statistics

Variable Name	Mean	Median	Min	Max	Obs
Tax Avoidance (BTD)	0	-0.001	-0.101	0.126	18394
EPT Policy (Treat*Post)	0.118	0	0	1	18394
Firm Size (size)	22.32	22.14	16.16	28.64	18394
Cash Flow (cash)	0.060	0.057	-5.334	2.871	18394
Leverage Ratio (lev)	0.416	0.409	-1.256	4.474	18394
Return on Assets (roa)	0.058	0.045	0	10.03	18394
Top 10 Shareholding (top10)	59.02	59.84	1.320	96.2	18394

Descriptive statistics indicate the mean tax avoidance measure is near zero with a standard deviation reflecting variation across firms. The policy interaction variable averages around twelve percent. Firm size, cash flow, leverage, return on assets, and shareholding concentration show distributions consistent with prior literature on Chinese listed companies [16][17].

## 3 Empirical Results

### 3.1 Baseline Regression Results

Table 2 presents baseline results. Columns progressively add fixed effects and controls. The coefficient for the policy interaction term remains significantly positive at the one percent level across all specifications. This confirms the fee-to-tax reform significantly reduced tax compliance and increased avoidance among heavily polluting firms.

**Table 2.** Baseline Regression

Variable	(1) BTD	(2) BTD	(3) BTD
Treat*Post	0.008*** (0.001)	0.005*** (0.002)	0.005*** (0.002)
Controls	No	No	Yes
Constant	-0.000 (0.000)	-0.000 (0.000)	0.034*** (0.010)
Fixed Effects	Yes	Yes	Yes
R-squared	0.0117	0.5339	0.5422
Observations	18394	18394	18394

### 3.2 Parallel Trend Test

Validity of the difference-in-differences approach requires parallel pre-trends. Following Beck et al. (2010) [6], we estimate coefficients for years relative to implementation. As shown in Figure 1, coefficients for pre-implementation periods are statistically insignificant, confirming no systematic difference prior to the policy. Post-implementation coefficients show a significant divergence, satisfying the parallel trends assumption [18][19].

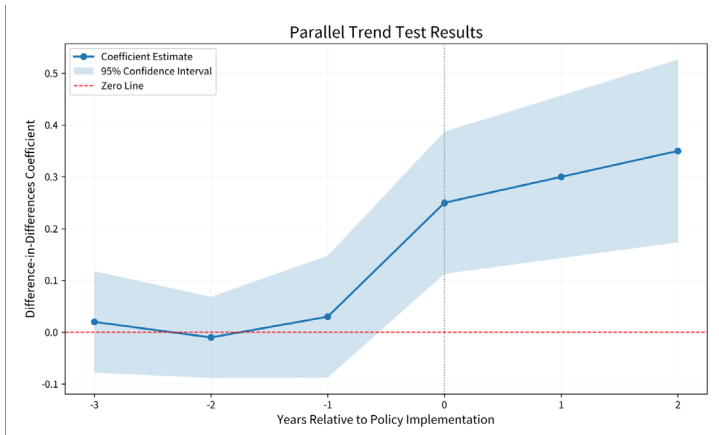


Fig. 1. Parallel Trends Test

### 3.3 Robustness Checks

First, a Triple Difference approach following Fan Yong and Li Haonan (2020) [7] interacts the policy with a dummy for regions raising tax rates. Table Three, Column 1 shows a significantly positive coefficient for the triple interaction term, confirming stronger negative compliance effects in high-tax regions.

Second, tests for anticipation and exogeneity following Beck et al. (2010) [6] involve adding pre-policy interactions or dropping the year prior. Columns 2 and 3 of Table 3 show insignificant anticipation effects and robust main results, supporting policy exogeneity.

Table 3. Robustness

	(1)	(2)	(3)	(4)	(5)
	Triple Dif- ference	Control for Anticipa- tion Effect in Year Be- fore Policy	Exclude Data from Year Be- fore Policy	PSM-DID	Alternative Dependent Variable
Variable	BTD	BTD	BTD	BTD	BTD
Treat*Post		0.007***	0.004***	0.005***	0.022***

		(0.003)	(0.002)	(0.002)	(0.007)
Treat*Post*Tax	0.003**				
	(0.001)				
Treat*Tax	-0.003				
	(0.003)				
Post*Tax	-0.000				
	(0.001)				
Tax	0.007*				
	(0.004)				
Anticipated Ef- fect of the Envi- ronmental Pro- tection Tax Law		-0.003			
		(0.002)			
Control Varia- bles	Yes	Yes	Yes	Yes	Yes
Constant	0.033***	0.034***	0.027**	0.034***	0.154***
	(0.010)	(0.010)	(0.011)	(0.010)	(0.045)
Fixed Effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.542	0.542	0.546	0.542	0.457
Observations	18394	18394	16186	18394	18394

Third, a Placebo Test following Cai et al. (2016) [8] randomly assigns treatment groups and policy years one thousand times. Figure Two shows placebo coefficients cluster around zero with insignificant p-values, confirming results are driven by the actual policy rather than noise [20][21].

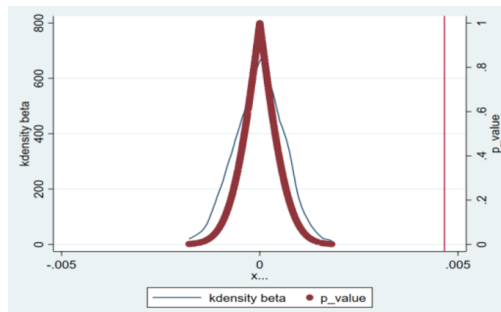


Fig. 2. Placebo Test

Fourth, Propensity Score Matching combined with Difference-in-Differences addresses selection bias by matching treated and control firms based on pre-policy characteristics. Table 3, Column 4 confirms the negative impact persists in the matched sample.

Fifth, an alternative dependent variable using effective tax rate as a compliance measure [9]. Table 3, Column 5 shows consistent results: the environmental protection tax significantly suppresses compliance.

## 4 Mechanism Tests

### 4.1 Motivation for Tax Avoidance

Stricter regulation and rising costs drive avoidance incentives. External pressure arises as the tax integrates environmental protection into the tax system, heightening scrutiny and compliance burdens including legal constraints and penalties. Increased costs exacerbate financial strain, prompting avoidance. Internal costs rise as higher environmental expenditures squeeze profits and competitiveness, leading firms to strategically avoid taxes to maintain profitability.

Empirical tests confirm both channels. External regulation, measured by log environmental penalties, shows the tax significantly increased regulatory pressure (Table 4, Column 1). Internal costs, measured by log environmental expenditures, show the tax significantly raised internal costs (Table 4, Column 2).

**Table 4.** Corporate Tax Avoidance Incentives

Variable	(1)	(2)
	External Environmental Regulation	Internal Environmental Costs
Treat*Post	0.135*** (0.036)	0.050* (0.028)
Control Variables	(0.001)	(0.000)
Constant	-0.228 (0.499)	0.844*** (0.196)
Fixed Effects	Yes	Yes
R-squared	0.205	0.668
Observations	18394	18394

### 4.2 Channels of Tax Avoidance

First, Related-Party Transactions allow firms to shift profits [10]. We measure this as the ratio of profit-affecting related-party transactions to pre-tax profit [11]. Total transactions show a significant increase (Table 5, Column 1). The effect is driven by intra-group transactions (Column 2, significant), not extra-group transactions (Column 3, insignificant). Internal group integration allows efficient resource reallocation and transfer pricing to reduce tax liabilities while avoiding external market risks.

**Table 5.** Corporate Related-Party Transactions

Variable	(1)	(2)	(3)
	Total Related-Party Transactions	Intra-Group Related-Party Transactions	Extra-Group Related-Party Transactions
Treat*Post	0.037*** (0.009)	0.037*** (0.009)	0.018 (0.031)

Control Variables	Yes	Yes	Yes
Constant	0.211*** (0.058)	0.241*** (0.058)	1.164*** (0.201)
Fixed Effects	Yes	Yes	Yes
R-squared	0.210	0.209	0.335
Observations	18338	18338	18338

Second, Inter-provincial Relocation enables firms to arbitrage policy differences by moving to regions with lower tax rates. Since provinces set rates within a statutory range, disparities exist. Overall relocation shows the tax significantly increased cross-province movement (Table 6, Column 1). Relocations are primarily to provinces with lower tax rates (Column 2, significant), not those with unchanged or higher rates (Column 3, insignificant). This indicates strategic policy arbitrage, risking pollution displacement and tax revenue leakage.

**Table 6.** Corporate Inter-Provincial Relocation

Variable	(1) Total Inter-Provincial Relocation	(2) Relocation to Provinces with Lower Tax Rates	(3) Relocation to Provinces with Unchanged or Higher Tax Rates
Treat*Post	0.078** (0.036)	0.057* (0.035)	0.029 (0.033)
Control Variables	Yes	Yes	Yes
Constant	-10.317*** (0.250)	-9.221*** (0.225)	-8.996*** (0.215)
Fixed Effects	Yes	Yes	Yes
R-squared	0.857	0.818	0.824
Observations	17495	18394	18394

## 5 Further Analysis

### 5.1 Firm-level Pollution Intensity

High-pollution firms face heavier tax burdens and thus stronger avoidance incentives. Splitting the sample by pollution intensity based on carbon emissions relative to output reveals a significant negative impact on compliance for high-intensity firms (Table 7, Column 1), while the effect is insignificant for low-intensity firms (Table 7, Column 2).

### 5.2 City-level Environmental Regulation Strength

Stricter local regulation increases compliance costs, potentially inducing avoidance. Using a composite index of sulfur dioxide and smoke or dust removal rates, results show a significant negative impact in regions with strong regulation (Table 7, Column

3), while the effect is insignificant in regions with weak regulation (Table 7, Column 4).

### 5.3 City-level Tax Enforcement Strength

Strong tax enforcement raises avoidance costs, mitigating the policy's negative impact. Using the ratio of actual to budgeted tax revenue, results show an insignificant effect in regions with strong enforcement (Table 7, Column 5), whereas a significant negative impact persists in regions with weak enforcement (Table 7, Column 6).

**Table 7.** Heterogeneity by Firm Pollution Intensity and Urban Environmental Regulation Strength

	(1) High Pol- lution In- tensity	(2) Low Pol- lution In- tensity	(3) Strong Env. Regula- tion	(4) Weak Env. Regula- tion	(5) Strong Tax Enforce- ment	(6) Weak Tax Enforce- ment
<b>Variable</b>	BTD	BTD	BTD	BTD	BTD	BTD
Treat*Post	0.011*** (0.002)	0.002 (0.002)	0.007*** (0.003)	0.002 (0.002)	0.003 (0.003)	0.004* (0.002)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.052*** (0.016)	0.043*** (0.016)	0.022 (0.015)	0.042*** (0.015)	0.029* (0.015)	0.015 (0.016)
Fixed Ef- fects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.642	0.634	0.612	0.629	0.615	0.644
Observa- tions	9267	9299	9243	9323	9202	9364

## 6 Conclusions and Policy Implications

Using the Environmental Protection Tax Law as a quasi-natural experiment, this study finds the fee-to-tax reform significantly reduced tax compliance among heavily polluting firms. Mechanisms include intensified external regulatory pressure and internal cost increases, driving avoidance via related-party transactions and inter-provincial relocation. Effects are pronounced in high-pollution firms, strictly regulated regions, and areas with weak tax enforcement.

Policy implications suggest enhancing coordination by strengthening information sharing and law enforcement collaboration between environmental and tax authorities to close regulatory loopholes. National unification should be promoted to coordinate tax rates and standards, reducing inter-regional arbitrage opportunities and curbing strategic relocation. A differentiated strategy implementing dynamic monitoring for high-

pollution firms and regions with weak enforcement is recommended. Finally, optimizing incentives by exploring the incorporation of environmental investments into tax deductions could alleviate compliance-cost-induced avoidance, ensuring dual benefits for environment and fiscal order.

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