Environmental Tax Incentives and Corporate Environmental Behaviour: An Unintended Consequence from a Natural Experiment in China

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Abstract

Leveraging from the Environmental Protection Tax (EPT) Law in China as a natural experiment, we explore the impact of environmental tax incentives on corporate environmental engagement. Evidence shows that, after the implementation of the EPT law, there exists significant improvement in the environmental performance of firms located in regions with higher EPT rates. However, our results reveal an unintended consequence that the impact of environmental tax incentives on corporate environmental performance is more salient for non-heavily polluting companies rather than for heavy polluters that are more targeted by the EPT law. Our results still hold after a series of robustness checks such as the parallel trend analysis, controlling for multiple fixed effects, and addressing pre-policy macro-level differences across provinces. Overall, our study has important implications for understanding how tax-based regulatory policies promote corporate environmental performance concerning that corporations with severe surviving difficulties are less likely to react to environmental tax incentives.

Key words: Environmental tax incentives, environmental protection tax law, corporate environmental performance, China

1. Introduction

The fast economic development is usually associated with excessive energy consumption, especially in emerging economies, and therefore high risk of environmental damage (Xue, Zhu, Zhao, & Li, 2022). For example, China is experiencing severe environmental challenges along with decades of rapid economic growth. To achieve the goal of sustainable growth, the Chinese government launched the Environmental Protection Tax Law (the EPT Law hereafter) on 25 December 2017, which officially came into effect on 1 January 2018. The EPT Law was the first environmental policy in China that introduces environmental tax incentives to corporations to reduce pollution. Tax-based regulatory policies are commonly used to foster corporate productivity and competitiveness if they are designed properly (Costantini & Mazzanti, 2012). Widely used as a policy tool, environmental tax incentives have been found to promote corporate investment (Zhang, Chen, & He, 2018), increase exporting (Liu & Lu, 2015), facilitate corporate social responsibility disclosure (Kong, Xiong, & Qin, 2022), and encourage corporate innovation (Brown, Martinsson, & Thomann, 2022). However, it is still not clear whether and how environmental tax enforcement can effectively discipline corporate environmental behaviour.

Employing the EPT Law as a natural experiment, this study investigates the impact of environmental tax incentives on corporate environmental performance. Prior to the implementation of the EPT Law, the Pollutant Discharge Fee (PDF) policy was the mandatory tool since 1980s in China to regulate pollutant discharge. However, the PDF policy had several limitations, such as low levy standards for emissions, narrow scope of the levy, and no distinction of different pollutants (He, Wen, & Zheng, 2021; Li & Masui, 2019). Since the PDF Policy was replaced by the EPT Law, the cost of pollutant discharge increases greatly by taxing different types of pollutants at different rates. In addition, local governments have the authority to increase the tax rates up to 10 times of the minimum rate of different types of pollution

specified in the EPT Law. To enhance the expected beneficial effect of the EPT law, 12 provinces increased the local environmental tax rates to higher standards,[1] which provides an ideal setting to examine the impact of tax incentives on corporate environmental performance.

Although the EPT Law motivates corporate environmental engagement by introducing both incentives and punishments (Liu, Yang, Zhang, & Zhang, 2022), there might not exist significant differences in corporate environmental engagement between firms located in the 12 provinces that levy higher environmental taxes and the rest of provinces levy the standard taxes due to the critical role of sustainable development for corporations. Good environmental performance is beneficial to executive reputation (Wagner & Schaltegger, 2004) and also improves firms' access to financing (Du, Weng, Zeng, Chang, & Pei, 2017). Therefore, firms may universally increase their environmental commitments after the implementation of the EPT law regardless different environmental tax rates across provinces. However, it is reasonable to expect that to reduce taxes punishments, firms located in the provinces with higher tax rates may exert greater effort to reduce pollutants. Our study aims to add evidence on the impact of tax incentives on corporate environmental engagement given existing studies on the EPT Law are almost qualitative, and there are still very limited empirical evidence on the EPT effect of firm performance and behaviours (Liu et al., 2022).

Leveraging from the different environmental tax rates on the same pollutant discharge across provinces, we conduct a difference-in-differences (DID) analysis to tackle the research question, using firms located in the 12 provinces that implement higher environmental tax rates as the treatment group and firms in other provinces as the control group. The treatment group is expected to be more affected by the EPT Law, and therefore, the effect of environmental tax incentives on corporate environmental behaviour can be captured by changes in their

[1] The 12 provinces, which increase the EPT to a higher rate, including Beijing, Hebei, Shanxi, Jiangsu, Shandong, Henan, Hunan, Guangxi, Hainan, Chongqing, Sichuan, and Guizhou.

environmental performance. Using a sample of Chinese listed firms from 2015 to 2020, we first compare the before-and-after change of firms' corporate environmental performance of the treatment and control firms due to the EPT Law. We find that the treatment group has significant improvement in their environmental performance compared with the control group after the implementation of the EPT law. This result indicates that the tax incentives introduced by the EPT Law significantly increase corporate environmental engagement. To address the potential endogeneity concern, we employ the parallel trend test and control for pre-policy macro-level differences across provinces, our results remain robust. We further find that the EPT law effect is more significant in firms located in the provinces with weak regional legalization and in SOEs, indicating that the EPT law effect is more beneficial to firms in an environment with weak institutions.

Interestingly, our results reveal an unintended consequence that the impact of tax incentives on corporate environmental performance is more salient for non-heavily polluting companies than for heavy polluters. *The Ministry of the Environmental Protection of China* listed the heavily polluting industries in 2008, including building materials, petrochemical, papermaking, leather, and textile (Guo, Kuai, & Liu, 2020). A green policy naturally more focuses on heavy polluters who have a greater responsibility to reduce pollution activities (Zhu & Tan, 2022). However, our results suggest that for the treatment firms from heavily polluting industries, if they face severe financial constraints, the tax incentives introduced by the EPT Law do not generate a positive effect to increase their environmental commitments. However, for treatment firms experience fewer financial constraints, no matter they are heavy polluters or not, their environmental performance significantly increases after the implementation of the EPT law. Our results call for attention to policymakers that the EPT law is not effective in heavily polluting firms that are more targeted by the EPT Law, even though they are in the spotlight due to a bad polluting image.

We make important contributions to the literature regarding the utilization of tax-based policies to foster corporate environmental responsibility. It is still under debate whether tax-based mechanisms can promote favourable social behaviour. Literature indicates that non-tax-based government subsidies rather than subsidies granted through tax breaks are more likely to promote corporate social responsibility (Lee, Walker, & Zeng, 2017; Wang & Zhang, 2020). In addition, the use of emission tax policy may bring large distortions between regions, which causes more severe pollution in the end (Yanase, 2007). It is also found that corporate frauds increase with the received subsidies in the form of tax breaks (Raghunandan, 2018). However, we provide direct evidence that firms in general improve their environmental commitments after the EPT law, and the DID estimator further verifies that the increased environmental commitments are driven by the introduction of tax incentives. Our finding is in line with Brown et al. (2022) who find that tax-based environmental policies incentivise firms to adopt cleaner production processes. We further show that the positive EPT Law effect is more beneficial to firms located in regions with weak legalization and firms with overall weak governance, for example SOEs. Kong et al. (2022) document that commitment to social responsibility is not only a form of expenditure but more of an ethical behaviour that benefits the society. Our study has important policy implications that tax-based policies can play a significant role to reduce corporate pollution. As such, this study enriches the literature on tax incentives and corporate ethical behaviour.

In addition, our analysis suggests that tax incentives may not be able to promote corporate ethical behaviour when survival becomes problematic for corporations. The EPT Law targets more at heavily polluting firms who have a greater responsibility to reduce pollutant. However, we find that the EPT Law effect is not associated with improved environmental commitments in heavy polluters when they face severe financial constraints, indicating that corporations with severe surviving difficulties are less likely to react to tax incentives. Our result is in line with

the argument that financial constraints shape firms' responsiveness to tax incentives on R&D decisions (Klassen, Pittman, & Reed, 2004). The unintended consequence of the EPT Law found in this study has important policy implications, especially for economies with weak institutions. We argue that alleviating corporate financial constraints is critical to maximise the positive effect of a tax-based green policy, as such, companies will have better capability to commit more to their environmental responsibility. That is, to promote environmental responsibility in financially constrained firms, governments may consider using non-tax-based policies, for example government subsidies and green credits to build sustainability in those firms.

The remainder of the paper is organized as follows. Section 2 presents the literature and hypothesis development. Section 3 introduces the data and sample construction. Section 4 reports the methodology and empirical results. In Section 5, we perform the mechanism analysis and examine the heterogenous effect of the EPT law in various types of firms. Section 6 concludes the study.

2. Literature review and hypothesis development

2.1 Background of China's Environmental Protection Tax Law

To prevent environment deterioration, a series of regulations and policies have been implemented to improve environment performance and promote environmental protection awareness in China. For instance, in 1982, the State Council issued the PDF policy, which was the first regulation regarding pollutant discharge. However as discussed, PDF has low levy standards, narrow scope of the levy, and does not distinguish among different types of pollutants (He et al., 2021; Li & Masui, 2019). According to Li and Masui (2019) and Zheng and He (2022), the limited impact of the PDF on environmental protection does not stop China's environment from deteriorating, and China became the largest greenhouse gas emitter

in 2007. In spite of the continuous adjustment over time,[2] the PDF policy is still associated with weak control and lack of consistency in enforcement (Cai, Bai, & Davey, 2022). Since the PDF is prescribed by environmental authorities, firms who refuse or avoid the discharge fee will only face administrative punishments with a fine of no more than three times of the amount of payable (Cai et al., 2022; He et al., 2021; Li & Masui, 2019). Consequently, few firms pay the PDF because the cost of following tends to be higher than the cost of violating, which makes the PDF ineffective (Liu et al., 2022).[3]

To address the drawbacks of the PDF policy and achieve the goal of sustainable growth, the Chinese government passed the EPT Law in December 2017, which represents the first tax enforcement focusing on environmental protection in China. The EPT Law came into effect on 1 January 2018, at the same time, PDF was abolished. According to the EPT Law, EPT is levied on enterprises, institutions and other production operators who directly discharge taxable pollutants. The taxable pollutants include air pollutants, water pollutants, solid waste, and noises in general.[4] According to the EPT Law, firms are required to self-monitor the discharge of pollutants and calculate the EPT monthly and pay for it quarterly (Cai et al., 2022). Specifically, firms have the responsibility to identify taxable pollutants based on automatic monitoring equipment data or other methods as specified in the EPT Law. Pollutants are taxed based on different rates.[5] In addition, local governments have the authority to increase the tax

[2] For instance, the PDF of the air pollutant such as CO, SO_2, and dust was all 0.04 RMB per kg at that time. Realising the limitations of the initial endeavour, the government released the second version of PDF in 2003 which changed the levy scope from single pollutant to multi-pollutants and increased the charge rate from 0.04 RMB to 0.6 RMB per pollutant equivalent value. The third amendment of the PDF was made in 2014 and increased the levy fee of air pollutant to the minimum value of 1.2 RMB and water pollutant to 1.4 RMB per pollutant equivalent value.

[3] Based on Wu and Tal (2018), the amended PDF is still too low compared with pollutant abatement costs. Moreover, firms that largely contribute to local fiscal revenue can also negotiate the fee rate with the local government, resulting in insufficient regulation enforcement (Wu & Tal, 2018).

[4] Air pollutants contain 44 taxable items; water pollutants contain 65 taxable items.

[5] EPT for solid waste varies from 5 RMB to 1000 RMB per ton based on the waste type. Noises are taxed from 350 RMB to 11,200 RMB per month based on the level of decibel. As for air and water pollutants, the EPT Law specifies the minimum rate of 1.2 RMB and 1.4 RMB per pollutant equivalent value for air pollutants and water pollutants, respectively.

rate up to 10 times of the minimum rate. However, due to the consideration of the impact of EPT on local economy, not all the provinces increased the tax rate, around half of the provinces still applied the same minimum rate (Hu et al., 2019; Lu et al., 2019; Xue et al., 2022).[6]

Overall, firms are facing higher costs on pollution emissions after the implementation of the EPT Law. The more pollution emissions a firm produces, the higher the tax rate will be applied (Cheng, Chen, & Wen, 2022; Liu et al., 2022).[7] Compared with the PDF, the EPT Law improves the enforcement of China's environmental governance and offers an legal protection for environment (He et al., 2021; Zheng & He, 2022).

2.2 Hypothesis development

Until now, the conclusions regarding the impact of environmental regulations on corporate behaviour are still mixed. On the one hand, from a macro-level perspective, studies have illustrated that environmental regulations and policies significantly improve environmental protection. For instance, the implementation of the environmental-related taxation helps to reduce the discharge of air pollutants (Han & Li, 2020; Huang & Lei, 2021; Wang, Liu, Niu, Liu, & Yao, 2018) and other types of pollutants (Li & Masui, 2019). Meanwhile, the literature also reveals that environmental regulations significantly affect corporate behaviours. According to Liu et al. (2022) and Wen, Deng, and Guo (2021), environmental regulations such as tax policy can internalise the costs of pollutant emissions, thus, creating incentives for firms to reduce such costs and improve environmental governance accordingly. Moreover, the Porter hypothesis argues that environmental regulations can have a positive impact on firms by stimulating firms' innovative capabilities (He et al., 2021; Jiang, Wang, & Li, 2018; Porter & Vanderlinde, 1995). Researchers also provide empirical evidence supporting this argument

[6] For simplicity, provinces in this study also include autonomous regions and municipalities.
[7] Firms can obtain 25% and 50% off from the tax payable amount if air or water pollutant discharge is lower than 30% and 50% of the environmental standards, which provides an incentive for firms to reduce their pollutant discharge. Serving as a market-inventive method of environmental regulation, the EPT law encourages firms to improve their environmental activities (Cheng et al., 2022).

(e.g., Fu, Cai, & Jian, 2020; Kneller & Manderson, 2012; Testa, Iraldo, & Frey, 2011; Yang, Wang, Zhang, Lu, & Yi, 2022).

On the other hand, since environmental regulations may increase financial burdens for firms, it is argued that environmental regulations may result in adverse consequences. For instance, stricter environmental regulations have a negative impact on corporate revenue and profit (Wang, Xu, & Liang, 2021), productivity (Lanoie, Patry, & Lajeunesse, 2008), and exports (Fang, Liu, & Gao, 2019; Huang & Liu, 2019; Shi & Xu, 2018). Focusing on Chinese technology-intensive firms, Jiang et al. (2018) find that industrial regulations can restrict corporate innovation. It is also found that the implementation of the EPT Law in China causes corporate tax avoidance activities (Yu et al., 2021) and negatively influences firm performance (He, Wen, & He, 2020; Zheng & He, 2022).

However, concerning the impact of environmental tax incentives on corporate environmental performance, existing studies point out that legislation is a powerful tool that promotes the adoption of environmental practices (Paulraj, 2009). Therefore, properly designed regulatory policies are widely used to foster corporate productivity and competitiveness (Costantini & Mazzanti, 2012; Porter & Vanderlinde, 1995). Tax incentives have been found to promote corporate investment (Zhang et al., 2018), increase the probability of exporting (Liu & Lu, 2015), and facilitate corporate social responsibility disclosure (Kong et al., 2022). As for the EPT Law in China, researchers also show that the implementation of the EPT law affects corporate environmental investments (Cheng et al., 2022; Liu et al., 2022), financial performance (Zheng & He, 2022), leverage (Xiao, Li, & Wu, 2022), and stock prices (He et al., 2020).

The fee-to-tax reform is expected to enhance the enforcement of environmental regulations. The cost of pollutant discharge was greatly increased after replacing the PDF policy with the EPT Law. Since the EPT Law is a price-based environmental policy instrument

(Cheng et al., 2022), firms may have more incentives to improve environmental performance to reduce tax burdens. Consequently, both incentives and punishments introduced by the EPT Law may result in improved corporate environmental performance (Liu, Yang, Zhang, & Zhang, 2022). As discussed, not all provinces adjust the EPT rates for air and water pollutants (Xue et al., 2022). While some provinces apply the minimum tax rates, 12 provinces increase the EPT to higher rates, including Beijing, Hebei, Shanxi, Jiangsu, Shandong, Henan, Hunan, Guangxi, Hainan, Chongqing, Sichuan, and Guizhou (Long et al., 2022). We argue that adopting higher EPT rates signals a greater effort that local governments will put into improving environmental governance. Hence, due to the pressures from the government and the incentives to reduce tax burdens, firms located in provinces with higher EPT rates will be more affected by the implementation of the EPT Law and put more effort into reducing pollutants discharge. As such, we propose the following hypothesis:

Hypothesis 1: Environmental tax incentives introduced by the EPT Law are associated with better improvement in corporate environmental performance.

3. Sample and methodology

3.1 Data and sample

The initial sample of this study includes all Chinese A-share listed firms in the Shanghai and Shenzhen Stock Exchanges. Since the EPT Law officially came into effect on 1 January 2018, the sample period of the study is from 2015 to 2020 to focus on the three-year pre- and post-implementation period to examine the effect of the EPT Law. The annual financial data is obtained from the China Stock Market and Accounting Research (CSMAR) database. The environmental data is obtained from CSMAR and the Chinese Research Data Services Platform (CNRDS). After removing firms from the financial industry and observations with missing information, the final sample includes 4,527 firm-year observations. To address the impact of

outliers on our empirical results, we winsorise all continuous variables at the 1% and 99% percentiles.

3.2 Variables constructions

3.2.1 Corporate environmental performance measure

To study the impact of the EPT Law on environmental performance of listed firms, following Xie and Hayase (2007) and Escrig-Olmedo, Muñoz-Torres, Fernández-Izquierdo, and Rivera-Lirio (2017), we construct the corporate environmental performance index ($CEP_{i,t}$) considering four environmental-related aspects, including disclosure, awareness, green emission, and environmental investment.

First, we use environmental disclosure index ($Disclosure_{i,t}$) to capture environmental disclosure performance. Specifically, we focus on three disclosure activities and assign a value of one to each of the activities if a firm reveals environmental-related information in annual reports or corporate social responsibility reports, or environmental specific reports, respectively. After that, we aggregate the values from three disclosure activities to obtain the disclosure score and calculate $Disclosure_{i,t}$ as:

$$Disclosure_{i,t} = \frac{a\ firm's\ disclosure\ score - min\ (disclosure\ score\ of\ the\ year)}{max\ (disclosure\ score\ of\ the\ year) - \min(disclosure\ score\ of\ the\ year)} \quad (1)$$

Second, we construct environmental awareness index ($Awareness_{i,t}$) according to eight firm-level activities and assign a value of one to each of them if a firm 1) reveals its environmental protection concept, environmental guidelines, environmental management organisational structure, recycling economy development model, and green development; 2) achieves its environmental targets in the past year and sets the future environmental targets; 3) formulates environmental-related management system, regulations, and obligations; 4) implements environmental education and training; 5) engages in environment protection activities; 6) sets up emergency response mechanisms for major environmental emergencies;

7) receives awards for environmental protection; 8) executes the "Three Simultaneity" system.[8] We then aggregate the values from the eight awareness activities and calculate the awareness score$Awareness_{i,t}$ using the same approach as in Model (1).

Third, we measure a firm's environmental performance from an output perspective using the green emission index ($Green\ Emission_{i,t}$), which is a dummy variable that equals one if a firm applies techniques, measures, or policies that can reduce the discharge of either waste water,[9] sludge, gas, or greenhouse gas, and zero otherwise.

Lastly, we evaluate a firm's environmental performance from an input perspective using the environmental investment index ($Investment_{i,t}$). To proxy whether a firm engages in sustainable energy utilisation and energy conservation, we assign a value of one to each of the three activities if a firm 1) uses innovative equipment, techniques, or products that enhance environment protection; 2) applies renewable energy measures and policies of the circular economy; 3) applies techniques, measures, or policies that promote energy and resources saving. Applying the same approach, we obtain the aggregated investment score based on three investment activities and calculate $Investment_{i,t}$ using Model (1).

The $CEP_{i,t}$ index is constructed to proxy for overall environmental performance and is calculated as equally weighted average of $Disclosure_{i,t}$, $Awareness_{i,t}$, $Green\ Emission_{i,t}$, and $Investment_{i,t}$.

3.2.2 Control variables

Following the literature such as Boubakri, El Ghoul, Wang, Guedhami, and Kwok (2016) and Zhang, Liu, Ge, Hao, and Hao (2021), we control for a series of firm-level factors that may be associated with environmental performance. *Size* refers to firm size and is calculated as the

[8] The "Three Simultaneity" system refers to the designing, building, and operating of facilities for prevention and containment of pollution and other environmental protection facilities in the productive process.
[9] Industrial waste water is included in the Green Emission Index because it is one of the most important and high-impact pollutants in China.

natural logarithm of total assets. *Lev* is calculated as the ratio of total liabilities to total assets. *List Age* is calculated as the natural logarithm of the difference between the observation year and the listing year plus one. *BM* refers to the ratio of book value to market value. *ROA* is the ratio of net income to total assets. *Growth* is calculated as the ratio of the operating revenue of year *t* over the operating revenue from year *t*–1 minus one. *Cash Flow* refers to the net cash flow from operating activities scaled by total assets. The literature indicates that board characteristics and institutional ownership significantly affect corporate environmental performance (de Villiers, Naiker, & van Staden, 2011; Martínez-Ferrero & Lozano, 2021). Therefore, we construct *Indep* as the proportion of independent directors to the total number of directors on the board. We measure the percentage of shares owned by institutional investors using *INST*. Additionally, we also control for a firm's identity using *SOE*, which is a dummy variable that equals one if the firm is owned by the state and zero otherwise. The detailed variable definitions are presented in Appendix A.

3.3 Model specification

We adopt a difference-in-difference (DID) approach to examine whether and how listed firms' environmental performance is affected by the EPT Law. Since the EPT Law officially came into effect on 1 January 2018, we define pre-EPT Law period as years from 2015 to 2017 and post-EPT Law period as years from 2018 to 2020. The key step in the DID approach in this study is to identify firms that are more affected by the tax incentives introduced by the EPT Law. As discussed, 12 provinces in China increased their EPT rates in response to the EPT Law, while the rest remain the minimum rates. Therefore, we define firms headquartered in provinces with higher EPT rates as the treatment group and firms in provinces using the minimum EPT rates as the control group. Specifically, our DID regression model is as follows:

$$CEP_{i,t+1} = \beta_0 + \beta_1 Tax_i * Policy_t + \beta_2 Tax_i + \beta_3 Policy_t + \sum_k \beta_k Controls_{i,t} + \varepsilon_{i,t+1} \quad (2)$$

where $CEP_{i,t+1}$ is the measure of corporate environmental performance of firm i in year t+1. Our variable of interest is the interaction between Tax_i and $Policy_t$. Tax_i is a dummy variable that equals one if firm i is located in provinces with higher EPT rates, and zero otherwise. $Policy_t$ is a dummy variable that takes the value of one for years in the post-EPT period (2018-2020) and takes the value of zero representing the pre-EPT period (2015–2017). $Controls_{i,t}$ refers to control variables as discussed. In addition, we control for year and industry fixed effects.

The DID estimator is β_1, which measures the impact of EPT Law on CEP of firms headquartered in provinces adopting the higher EPT rates relative to the impact in firms subject to the minimum EPT rates. Based on Hypothesis 1, we expect the coefficient β_1 in Model (2) to be significantly positive.

4. Empirical results

4.1 Descriptive statistics

Table 1 reports the summary statistics of the main variables used in this study. The average value of *CEP* is 0.51, with a range from the minimum value of 0 to the maximum value of 1. On average, 40% of firm-year observations are in provinces adopting the increased EPT rates, and firm-year observations in the post-EPT period account for 53% of the total sample. The listing age of sample firms ranges from one year to 26 years, with the average listing age of around 11 years. The ratio of independent directors on the board is 38% on average and varies from 33% to 57%. The institutional ownership in our sample ranges from 0% to 89%, with an average value of 50%. In addition, there are about 53% SOE observations in our sample.

[Insert Table 1 about here]

4.2 Univariate analysis

We construct a univariate analysis to compare the change in *CEP* before and after the EPT Law in both the treatment and control groups and report the results in Table 2. Panel A of Table 2 presents the summary statistics of *CEP* in the pre- and post-EPT periods. The average value of *CEP* in the pre-EPT period is 0.490, which is lower than the average value of 0.519 in the post-EPT period. Therefore, in general, firms improve their environmental performance after the EPT Law came into effect.

Panel B of Table 2 reports the univariate analysis of the treatment and control groups. We find that both groups have similar *CEP* in the pre-EPT period as illustrated in row (a). Row (b) reports the results of the post-EPT period and it shows that the EPT Law significantly improve the environmental performance of treated firms as presented in Column (1), the result is significant at the 1% level. More importantly, compared with control firms, treatment firms have better environmental performance and the difference is statistically significant at the 5% level. Overall, Table 2 provides preliminary evidence that firms headquartered in provinces with higher EPT rates are associated with better environmental performance after the EPT Law, which preliminarily supports our hypothesis.

[Insert Table 2 about here]

4.3 Baseline regression results

Table 3 reports the regression results of the impact of the EPT Law on corporate environmental performance. Column (1) refers to a simplified model without control variables. Column (2) illustrates the regression results with all controls included. Consistently across Columns (1) and (2), the coefficients of *Tax*Policy* are both positive and significant at the 5% level. This indicates that compared with firms located in provinces applying the minimum EPT rates, firms in provinces applying the higher EPT rates are associated with a significant

improvement in their environmental performance after the implementation of the EPT Law. In addition, we find that the coefficients of *Policy* are positive and significant at the 1% level in both columns, implying the positive impact of the EPT Law on *CEP*. We also find that firms with the larger size, higher leverage, higher cash flow, and SOEs have better *CEP*, whereas firms that have been listed for a longer time and with higher BM ratio are associated with lower *CEP*.

Overall, the DID results are consistent with the findings in the univariate analysis and support our *Hypothesis* 1, indicating the environmental tax-based incentives introduced by the EPT Law significantly improve corporate environmental performance.

[Insert Table 3 about here]

4.4 Robustness tests

We conduct several robustness tests to check the robustness of our baseline regression results. First, we perform the parallel trend test to check the parallel trend assumption that is required by the DID estimator following Jacobson, Lalonde, and Sullivan (1993), and construct the interactive term of year dummy variable and treatment variable with 2017 as the base period. If the parallel trend hypothesis is satisfied, it is not difficult to infer that the regression coefficients of the interactive terms before 2017 should have no significant difference from 0. Figure 1 illustrates the parallel trend assumption. We set the year indicators from –3 to 2 representing the years from 3-year before to 2-year after the EPT Law. As illustrated in Figure 1, when we take the one-year before the EPT Law came into effect as the benchmark year, the 95% confidence intervals before the benchmark year all pass through zero, indicating there is no significant difference of *CEP* between treatment and control groups in the pre-EPT period. However, after the implementation of the policy, the interactive term coefficients are significantly higher than 0 and show certain sustainability, indicating the treatment group has

better *CEP* than control group in the post-EPT period. Overall, the assumption of the parallel trend is satisfied in our DID design, verifying the policy impact is effective.

[Insert Figure 1 about here]

We also control for multiple fixed effects and additional variables and report the results in Table 4. To address the possible influence of unobservable firm-level factors on *CEP* and mitigate the issue of missing variables, we replace the industry-fixed effects used in Model (2) with the firm-fixed effects. Column (1) of Table 4 reports the results of Model (2) when controlling for firm and year fixed effects. The coefficient of *Tax*Policy* remains positive and significant at the 5% level, which supports our baseline result. It is worth mentioning that we exclude the two dummies *Tax* and *Policy* from our regression model when controlling for firm fixed effects due to the potential multicollinearity.

Moreover, a challenge of the studies on policy change is that there might be other influences from macroeconomic factors. For example, the regional environment can be shaped by the regional economy, it is possible that the EPT rates are dependent on the local economic development, affecting the impact of the EPT Law on *CEP* in our study consequently. To address such concerns, we further control for the provincial macro-level factors in the pre-EPT period (2015–2017) in Model (2), which are measured as the average of the macro-economic indexes from 2015 to 2017. *Ingdp* refers to the natural logarithm of the provincial GDP per capita. *First_proportion*, *Second_proportion*, and *Third_proportion* are calculated as the ratio of value added of the provincial primary, secondary, and tertiary industry to GDP, respectively. *lnFiscal* is the natural logarithm of the provincial fiscal expenditure. In Column (2) of Table 4, the coefficient of *Tax*Policy* remains positive and significant at the 5% level after controlling for the regional economic conditions in the pre-EPT period, which further supports our baseline result.

[Insert Table 4 about here]

5. Additional analyses

5.1 Cross-sectional analyses of the EPT law effect

Institutional theory indicates that both legal system and government policies effectively affect corporate responses to regulations. For example, the institutional context significantly affects the efficacy of corporate governance in promoting proactive environmental policies (Akram, Abrar-ul-Haq, & Raza, 2018). As discussed in Yang, Lau, Lee, Yeung, and Cheng (2019), in a weak institutional environment, the government may not play an effective monitoring role regarding pollution. Similarly, Yee, Tang, and Lo (2014) argue that firms may become less likely to comply with regulations in a weak legalisation environment because they are sceptical of regulators' commitment to the regulatory goals.

Good institutional quality helps to promote legislation enforcement to reduce environmental pollution (Hassan, Danish, Khan, Xia, & Fatima, 2020; Lau, Choong, & Eng, 2014). Contrarily, the weak institutional environment may result in lax environmental standards, which creates pollution havens for polluters and intensifies environmental pollution (Berry, Kaul, & Lee, 2021; Dada, Ajide, & Sharimakin, 2021). Therefore, we argue that firms located in areas with weak legalisation enforcement tend to engage in more environmentally unfriendly activities due to the ineffective monitoring from a regulatory perspective. Consequently, these firms may be associated with worse environmental governance and produce more pollution. As a result, firms located in areas with weak legalisation enforcement may face higher costs of pollutant discharge after the implementation of the EPT Law. In order to reduce the tax burden, they are more likely to improve environmental governance, hence, having better CEP.

Therefore, we first examine whether the impact of the EPT Law on *CEP* varies across provinces with different legalisation enforcement, because legislation is a powerful driving force that urges firms to put effort on environmental issues (Bansal & Roth, 2000; Paulraj,

2009; Rugman & Verbeke, 1998). We measure regional legalisation enforcement using the score of market intermediary organisation development and legal system development from the marketisation index developed by Wang, Hu, and Fan (2021). We construct the subsample analysis based on the annual median value of the legalisation score. *High legalisation* represents provinces with the legalisation score higher than the annual median score, thus, having a better legalisation enforcement. *Low legalisation* refers to provinces with the legalisation score lower than the annual median score, indicating a poorer legalisation environment.

We report the results in Table 5. Column (1) refers to the high legalisation group. The coefficient of *Policy* is positive and significant at the 1% level, indicating the EPT Law improves *CEP* in general. However, the coefficient of *Tax*Policy* is insignificant, suggesting that the impact of the EPT Law on *CEP* between treatment and control groups is not statistically different when the regional legalisation environment is good. Column (2) refers to the low legalisation group that corresponds to provinces with a poorer legalisation environment. We find that the coefficient of *Tax*Policy* is positive and significant at the 1% level, indicating treatment group has higher *CEP* than control group after the EPT Law when firms are in provinces with a poorer legalisation environment. In addition, the empirical p-value shows a statistical difference between the two sub-samples at the 1% level. Overall, the subsample analysis in Table 5 indicates that the EPT Law has a stronger impact on *CEP* when the regional legalisation enforcement is poor.

[Insert Table 5 about here]

In addition, according to Salo (2008) and Manurung, Kusumah, Hapsari, and Husnatarina (2017), good corporate governance helps to maximise firm value to protect stakeholder interests. Consequently, firms with good corporate governance should be associated with better social and environmental performance (Manurung et al., 2017). For example, firms with good

governance practices tend to minimise environmental degradation and are associated with lower risk exposure regarding environmental consequences (Cong & Freedman, 2011). Using board independence to measure corporate governance, Rubino and Napoli (2020) find that board independence promotes the adoption of environmentally responsible practices. Similarly, Kock, Santaló, and Diestre (2012) also show that governance mechanisms can direct managers to adopt green practices. Moreover, existing studies reveal that ownership identity significantly impacts firm environmental performance (Earnhart & Lizal, 2006; Liu, Zhang, & Liang, 2019), green innovation (Pan, Chen, Sinha, & Dong, 2020; Wang & Jiang, 2021), and disclosure quality (Acar, Tunca Çalıyurt, & Zengin-Karaibrahimoglu, 2021).

Compared with non-SOEs, SOEs are associated with weaker corporate governance (Boateng, Cai, Borgia, Gang Bi, & Ngwu, 2017; Qiang, 2003). Therefore, SOEs may lack effective environmental management and produce more pollution. Li and Chan (2016) argue that, due to the weak corporate governance such as inefficient management, SOEs have fewer incentives to adopt new pollution abatement technologies and are associated with higher levels of pollution intensity. After the implementation of the EPT Law, SOEs may face larger tax burden due to the increased tax rate, which makes the impact of tax incentives more pronounced in SOEs than in non-SOEs. To verify this conjecture, we construct the subsample analysis concerning the controlling shareholder identity of listed firms and report the results in Table 6.

Column (1) of Table 6 represents SOEs, whereas Column (2) refers to privately owned firms. In Column (1) when sample firms are SOEs, we find that the coefficient of *Tax* is negative and significant at the 10% level, indicating treatment firms tend to have lower *CEP* in general. While the coefficient of *Tax*Policy* is significant and positive at the 5% level, which implies that the positive impact of the EPT Law on *CEP* is more pronounced in treatment SOEs than in control SOEs. As for non-SOEs reported in Column (2), we do not find significant difference between treatment and control firms regarding the impact of EPT Law on CEP. We

argue that SOEs in general have poor corporate governance compared with privately owned firms, and therefore the EPT effect is more significant in SOEs.

[Insert Table 6 about here]

5.2 The heterogenous analysis

Our results so far suggest that the EPT Law significantly improves CEP, especially in provinces adopting higher EPT rates. Cheng et al. (2022), Huang and Lei (2021), and Liu et al. (2022) indicate that high energy-consuming firms or heavy polluting firms are the major source of environmental pollution, thus, they are expected to be more affected by environmental regulations such as the EPT Law. Therefore, we further examine whether the EPT Law has a heterogeneous effect across different industries. According to the "*Catalogue of Classified Management of Environmental Protection Verification Industries of Listed Firms*" issued by the Ministry of Environmental Protection of China in 2008,[10] 16 industries are defined as heavy polluting in China, including thermal power, iron and steel, cement, electrolytic aluminium, coal, metallurgy, building material, mining, chemical, petrochemical, pharmaceutical, brewing, paper-making, fermentation, textile, and tanning. Therefore, we construct *Heavy*, which is a dummy variable equal to one if the firm belongs to heavily polluting industries, and zero otherwise.

We construct subsample analysis to test the heterogeneous effect of the EPT law across heavy and non-heavy polluting firms and report the results in Table 7. Column (1) refers to firms in non-heavy polluting industries. We find that the coefficient of *Tax*Policy* is positive and significant at the 5% level, indicating treatment firms from non-heavy polluting industries are associated with higher *CEP* after the EPT Law, compared with corresponding control firms. However, in Column (2), we do not find any significant impact of the EPT Law on *CEP* in heavily polluting firms. Interestingly, the results in Table 7 indicate that the EPT Law is more

[10] It is the Ministry of Ecology and Environment of the People's Republic of China now

likely to promote corporate environmental commitments in non-heavily polluting firms but has limited impact on heavy polluters. We argue this is due to the different degrees of surviving difficulties faced by non-heavily and heavily polluting firms. The impact of tax incentives introduced by the EPT Law weakens when firms are facing severe surviving difficulties.

[Insert Table 7 about here]

To examine the robustness of the heterogeneous effect regarding the EPT law, we first test the parallel trend assumptions for both non-heavily and heavily polluting firms, respectively. Figure 2 demonstrates the parallel trend analysis for non-heavily polluting firms using the year indicators from 3-year before to 2-year after the EPT Law. As illustrated in Figure 2, the 95% confidence intervals before the event year all pass through zero, indicating there is no significant difference in *CEP* between treatment and control firms from non-heavily polluting industries in the pre-EPT period. Figure 3 illustrates the parallel trend test for heavily polluting industries and we find the similar results. Overall, the assumption of the parallel trend is still satisfied for both non-heavily and heavily polluting firms.

[Insert Figures 2 and 3 about here]

In addition, using the subsample consisting of treatment and control firms, we control for firm-fixed effects in Model (2) and present the results in Columns (1) and (2) of Table 8. Columns (3) and (4) refer to the results of Model (2) controlling for additional pre-policy macro-level differences across provinces as discussed. Consistently, we find that the coefficient of *Tax*Policy* is positive and significant in non-heavily polluting firms but is not significant in heavily polluting firms, which supports our argument that the EPT Law has limited impact on *CEP* when firms are facing surviving difficulties.

[Insert Table 8 about here]

5.3 Channel analysis

The heterogeneous analysis indicates that the impact of EPT Law on CEP is more salient in non-heavily polluting firms than in heavy polluters. We argue this is due to the different degrees of surviving pressures firms face. Thus, we test our argument in this section by employing financial constraints to proxy for surviving pressures. Following Hadlock and Pierce (2010), we use *SA Index* as the proxy of financial constraints, which is calculated as follows:

$$SA\ Index = -0.737 * Size + 0.043 * Size^2 - 0.040 * Age \quad (3)$$

where *Size* is the natural logarithm of total assets and *Age* represents the listing age of a firm. The higher the value of *SA Index*, the higher the financial constraints, thus, more survival pressures a firm may have.

Table 9 reports the results of the subsample analysis (heavy versus non-heavy polluters) based on *SA Index*. In Columns (1) and (3), we find that the coefficients of *Tax*Policy* are both positive and significant at 5% and 1% levels, respectively. This finding indicates that the EPT Law significantly improves *CEP* in treatment firms when they face fewer financial constraints, no matter whether they are non-heavily or heavily polluting firms. Columns (2) and (4) refer to firms that face more financial constraints. We find that the coefficient of *Tax*Policy* is still positive and significant in non-heavily polluting firms. However, we do not find any significant impact of EPT Law on *CEP* in heavily polluting firms when they experience more financial constraints.

Firms in heavily polluting industries should be the major target of environmental regulations and policies. However, when heavily polluting firms face severe surviving difficulties proxied by the presence of high financial constraints, the tax incentives introduced by the EPT Law are less likely to promote environmental commitments of these firms. The findings in Table 9 support our argument that surviving issues can limit the impact of tax incentives on corporate environmental commitments. Our finding is in line with Klassen et al.

(2004) that financial constraints shape firms' responsiveness to tax incentives on R&D decisions.

[Insert Table 9 about here]

6. Conclusion

Using the implementation of the EPT Law as a natural experiment, this study investigates the impact of environmental tax incentives on corporate environmental performance. We further find that the EPT law effect is more pronounced in firms located in the provinces with weak regional legalisation and in SOEs. Our results indicate that the EPT law effect is more beneficial to firms in an environment with weak institutions. Our results still hold after a series of robustness checks such as the parallel trend analysis, controlling for multiple fixed effects, and addressing pre-policy macro-level differences across provinces.

Interestingly, the heterogeneity test shows that the EPT Law only positively affects CEP in non-heavily polluting firms but has limited influence in heavily polluting firms. The additional analysis further reveals that heavily polluting firms are not associated with improved CEP after implementing the EPT Law when they are facing severe financial constraints. We argue that alleviating corporate financial constraints helps to facilitate tax-based green policies. Our study has important implications for understanding how tax-based regulatory policies promote corporate environmental performance.

Appendix A. Variable definitions

Variable	Definition
Dependent variable	
CEP Index	Corporate environmental performance index calculated based on four aspects, including disclosure, awareness, green emission, and environmental investment.
Main independent variables	
Tax	Dummy variable equals one if the firm is located in provinces with higher EPT rates, and zero otherwise.
Policy	Dummy variable equals one for the period from 2018 to 2020, and equals zero for the period from 2015 to 2017.
Firm-level control variables	
Size	The natural logarithm of total assets.
Lev	The ratio of total liabilities to total assets.
List Age	The natural logarithm of the number of years between listing and the year of observation plus one.
BM	The ratio of book value to market value.
ROA	The ratio of the net income to total assets.
Growth	The operating revenue of year t over the operating revenue from the previous year minus one.
Cash Flow	The net cash flow from operating activities scaled by total assets.
Indep	The ratio of the number of independent directors to the total number of directors on the board.
INST	The percentage of shares owned by institutional investors.
SOE	Dummy variable that equals one if the firm is owned by the state and zero otherwise.
lngdp	The natural logarithm of provincial GDP per capita.
First_proportion	The ratio of value added of the provincial primary industry to GDP.
Second_proportion	The ratio of value added of the provincial secondary industry to GDP.
Third_proportion	The ratio of value added of the provincial tertiary industry to GDP.
lnFiscal	The natural logarithm of provincial fiscal expenditure.

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Figure 1. Parallel trend analysis on full sample

Figure 1 presents the parallel trend tests using the full sample under the 95% confidence interval. –3 to 2 representing the years from 3–year before to 2-year after the EPT Law. The value of zero refers to the benchmark year (–1) before the EPT Law came into effect.

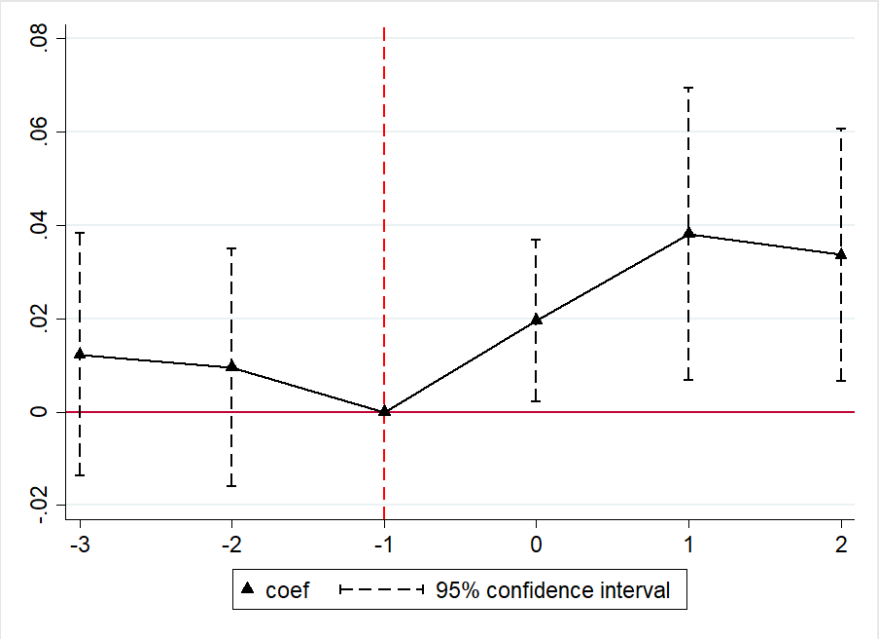

Figure 2. Parallel trend analysis on firms in non-heavy polluting industries
Figure 2 presents the parallel trend tests using firms from non-heavy polluting industries under the 95% confidence interval. –3 to 2 representing the years from 3-year before to 2-year after the EPT Law. The value of zero refers to the benchmark year (–1) before the EPT Law came into effect.

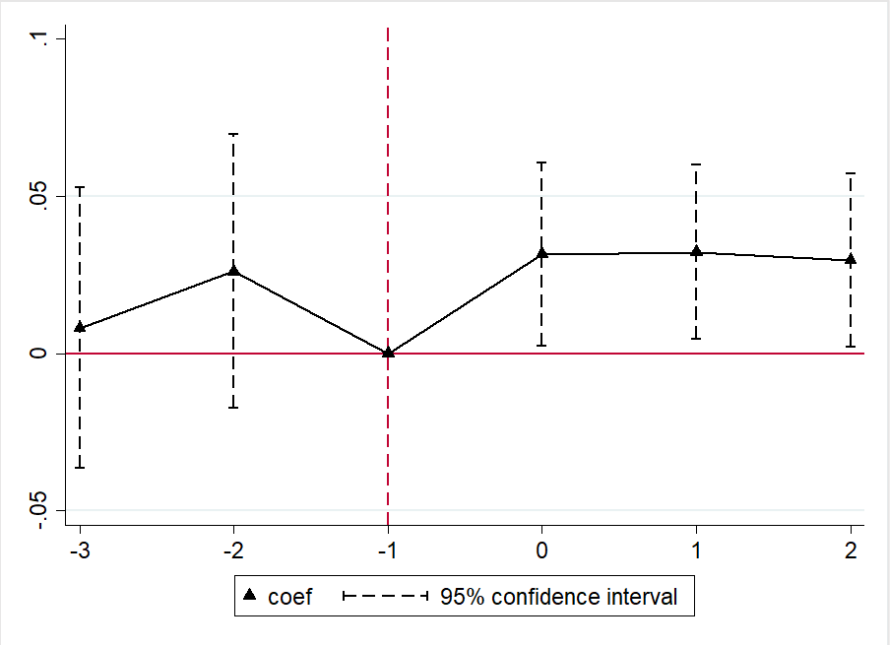

Figure 3. Parallel trend analysis on firms in heavy polluting industries

Figure 3 presents the parallel trend tests using firms in heavy polluting industries under the 95% confidence interval. –3 to 2 representing the years from 3-year before to 2-year after the EPT Law. The value of zero refers to the benchmark year (–1) before the EPT Law came into effect.

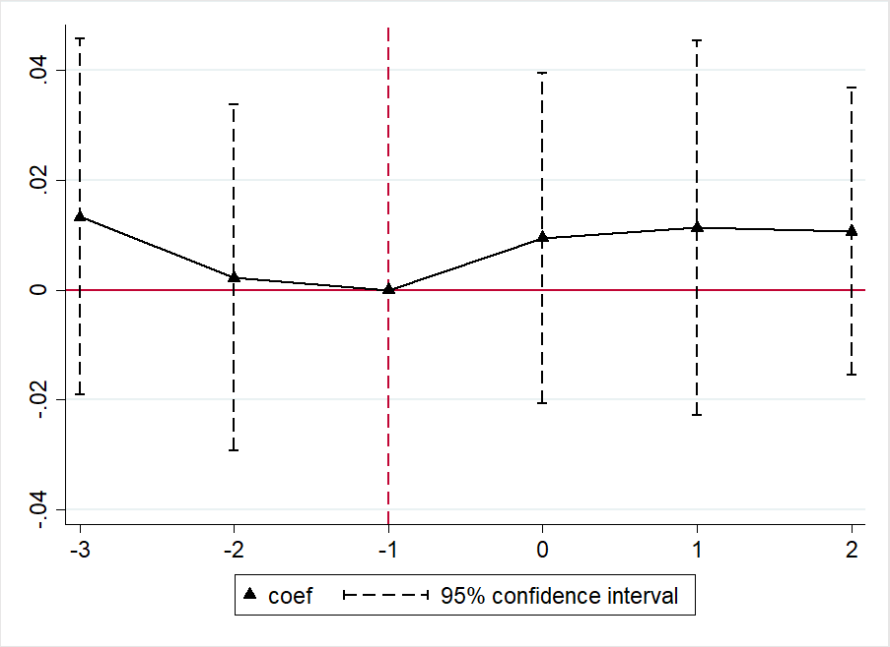

Table 1. Summary statistics

Table 1 reports the descriptive statistics of the main variables used in this study. The sample includes 4,527 firm-year observations from 2015 to 2020. The detailed variable definitions are presented in Appendix A.

Variable	N	Mean	Standard deviation	Min	First quartile	Mediane	Third quartile	Max
CEP index	4,527	0.51	0.22	0.00	0.32	0.53	0.68	1.00
Tax	4,527	0.40	0.49	0.00	0.00	0.00	1.00	1.00
Policy	4,527	0.53	0.50	0.00	0.00	1.00	1.00	1.00
Size	4,527	23.52	1.60	19.50	22.32	23.35	24.52	27.15
BM	4,527	1.90	2.30	0.08	0.52	1.03	2.20	10.28
Lev	4,527	0.50	0.21	0.05	0.34	0.51	0.66	0.97
ROA	4,527	0.04	0.06	–0.28	0.01	0.03	0.06	0.23
Growth	4,527	0.15	0.44	–0.64	–0.03	0.09	0.23	3.79
Cashflow	4,527	0.05	0.07	–0.20	0.01	0.05	0.09	0.24
Indep	4,527	0.38	0.05	0.33	0.33	0.36	0.43	0.57
List Age	4,527	2.47	0.76	0.00	2.20	2.71	3.04	3.30
INST	4,527	0.50	0.23	0.00	0.35	0.53	0.67	0.89
SOE	4,527	0.54	0.31	0.00	0.00	1.00	1.00	1.00

Table 2. Univariate analysis

This table reports the univariate analysis on CEP index. Panel A refers to the summary statistics of CEP index in the pre- and post-EPT Law periods. Panel B refers to the univariate analysis. ** and *** indicate the significant level at 5% and 1%, respectively. The detailed variable definitions are presented in Appendix A.

Panel A: Summary of the CEP index

	Sample Period: 2015 – 2017				Sample Period: 2018 – 2020			
Variables	*N*	Mean	Std. dev.	Median	*N*	Mean	Std. dev.	Median
CEP index	2,257	0.490	0.217	0.531	2,381	0.519	0.216	0.542

Panel B: Univariate analysis

Variables	Treated firms (1)	Control firms (2)	Differences (1) – (2)	*t*-test (1) – (2)
CEP index				
2015 – 2017 (a)	0.489	0.490	–0.001	–1.09
2018 – 2020 (b)	0.524	0.498	0.026	2.28**
Diff (b) – (a)	0.035	0.008	0.027	2.24**
t-Test (b) – (a)	4.27***	0.820		

Table 3. Baseline regression

This Table reports the regression analysis using *CEP index* as the dependent variable. *t*-statistics are in the parentheses. *, **, and *** indicate the significant level at 10%, 5%, and 1%, respectively. The detailed variable definitions are presented in Appendix A.

Dependent variable =	*CEP*	
	(1)	(2)
*Tax*Policy*	0.016**	0.017**
	(2.05)	(2.19)
Tax	–0.006	–0.021*
	(–0.55)	(–1.89)
Policy	0.033***	0.026***
	(4.55)	(3.37)
Size		0.053***
		(12.90)
Lev		0.047*
		(1.95)
List Age		–0.017***
		(–2.68)
BM		–0.006***
		(–2.61)
ROA		–0.030
		(–0.63)
Growth		0.003
		(0.69)
Cashflow		0.084**
		(2.12)
Indep		–0.076
		(–1.40)
INST		–0.002
		(–0.14)
SOE		0.026***
		(2.63)
Constant	0.447***	–0.685***
	(11.01)	(–7.12)
Observations	4,527	4,527
Industry FE	Yes	Yes
Year FE	Yes	Yes
Adjusted R^2	0.174	0.179

Table 4. Robustness – baseline

This table presents the robustness results of the baseline analysis. *t*-statistics are in the parentheses. *, **, and *** indicate the significant level at 10%, 5%, and 1%, respectively. The detailed variable definitions are presented in Appendix A.

Dependent variable =	*CEP index*	
	(1)	(2)
*Tax*Policy*	0.015**	0.015**
	(2.07)	(2.15)
Tax		–0.020*
		(–1.93)
Policy		0.026***
		(3.37)
Size	0.041***	0.030**
	(4.11)	(2.29)
Lev	0.064*	0.091**
	(1.93)	(2.00)
List Age	–0.032	–0.029
	(–1.63)	(–0.88)
BM	–0.005*	–0.008**
	(–1.81)	(–2.03)
ROA	–0.023	–0.001
	(–0.44)	(–0.01)
Growth	0.003	0.005
	(0.59)	(0.66)
Cashflow	0.057	0.086
	(1.33)	(1.45)
Indep	–0.082	–0.131
	(–1.22)	(–1.50)
INST	–0.005	–0.016
	(–0.20)	(–0.45)
SOE	0.031	0.028
	(1.31)	(0.84)
lngdp		0.058
		(1.45)
First_proportion		0.219***
		(2.76)
Second_proportion		0.215***
		(2.71)
Third_proportion		0.214***
		(2.69)
lnFiscal		0.007
		(0.18)
Constant	–0.374*	–2.235***
	(–1.66)	(–2.79)
Observations	4,527	4,527
Firm FE	Yes	No
Industry FE	No	Yes
Year FE	Yes	Yes
Adjusted R^2	0.113	0.191

Table 5. Additional tests: the role of regional legalisation

This table reports the subsample analysis concerning the impact of the EPT Law on CEP under different legalisation. *t*-statistics are in the parentheses. *, **, and *** indicate the significant level at 10%, 5%, and 1%, respectively. The detailed variable definitions are presented in Appendix A.

Dependent variable =	*CEP index*	
	(1) High Legalisation	(2) Low Legalisation
*Tax*Policy*	0.010	0.036***
	(1.06)	(2.63)
Tax	–0.015	–0.019
	(–1.29)	(–1.12)
Policy	0.023***	–0.005
	(2.58)	(–0.42)
Size	0.050***	0.052***
	(11.06)	(7.23)
Lev	0.035	0.085*
	(1.28)	(1.89)
List Age	–0.018***	–0.019
	(–2.60)	(–1.54)
BM	–0.004	–0.016***
	(–1.30)	(–3.57)
ROA	–0.006	–0.073
	(–0.11)	(–0.83)
Growth	–0.005	0.014
	(–0.79)	(1.56)
Cashflow	0.100**	0.041
	(2.07)	(0.56)
Indep	–0.056	–0.096
	(–0.88)	(–0.98)
INST	–0.005	0.029
	(–0.27)	(0.88)
SOE	0.026**	0.029*
	(2.28)	(1.75)
Constant	–0.648***	–0.686***
	(–6.02)	(–4.09)
Observations	2,402	2,125
Industry FE	Yes	Yes
Year FE	Yes	Yes
Adjusted R^2	0.304	0.376
Empirical P-value	0.000***	

Table 6. Additional tests: the role of government ownership

This table reports the subsample analysis concerning the impact of the EPT Law on CEP in SOEs and non-SOEs. *t*-statistics are in the parentheses. *, **, and *** indicate the significant level at 10%, 5%, and 1%, respectively. The detailed variable definitions are presented in Appendix A.

Dependent variable =	*CEP index*	
	(1) SOEs	(2) Non-SOEs
*Tax*Policy*	0.026**	0.005
	(2.45)	(0.40)
Tax	–0.026*	–0.011
	(–1.90)	(–0.71)
Policy	0.018*	0.035***
	(1.70)	(3.22)
Size	0.053***	0.052***
	(9.27)	(8.59)
Lev	0.055	0.046
	(1.54)	(1.39)
ListAge	–0.006	–0.019**
	(–0.53)	(–2.35)
BM	–0.005	–0.012***
	(–1.59)	(–2.63)
ROA	–0.050	–0.041
	(–0.62)	(–0.71)
Growth	0.000	0.007
	(0.03)	(1.11)
Cashflow	0.123**	0.052
	(2.14)	(0.93)
Indep	–0.118*	–0.027
	(–1.67)	(–0.30)
INST	0.003	0.003
	(0.11)	(0.12)
Constant	–0.626***	–0.704***
	(–3.81)	(–5.02)
Observations	2,435	2,092
Industry FE	Yes	Yes
Year FE	Yes	Yes
Adjusted R^2	0.355	0.341
Empirical P-value	0.000***	

Table 7. The heterogenous effects of tax policy on corporate environmental performance in heavy vs non-heavy polluting industries

This table reports the results of the impact of the EPT Law on CEP in non-heavily polluting and heavily polluting industries. *t*-statistics are in the parentheses. *, **, and *** indicate the significant level at 10%, 5%, and 1%, respectively. The detailed variable definitions are presented in Appendix A.

Dependent variable =	*CEP index*	
	(1) Non-heavy	(2) Heavy
*Tax*Policy*	0.022**	0.008
	(2.26)	(0.60)
Tax	–0.020	–0.024
	(–1.58)	(–1.51)
Policy	0.697***	0.001
	(6.00)	(0.06)
Size	0.053***	0.051***
	(10.63)	(7.53)
Lev	0.071**	–0.000
	(2.33)	(–0.01)
List Age	–0.013*	–0.031***
	(–1.77)	(–2.73)
BM	–0.010***	0.004
	(–3.39)	(0.81)
ROA	–0.039	–0.010
	(–0.68)	(–0.12)
Growth	0.001	–0.006
	(0.13)	(–0.58)
Cashflow	0.075	0.157**
	(1.58)	(2.14)
Indep	–0.061	–0.077
	(–0.93)	(–0.79)
INST	0.001	0.006
	(0.04)	(0.21)
SOE	0.042***	–0.019
	(3.47)	(–1.12)
Constant	–0.117	–0.440**
	(–1.14)	(–2.21)
Observations	3,168	1,359
Industry FE	Yes	Yes
Year FE	Yes	Yes
Adjusted R^2	0.181	0.152

Table 8. Robustness – the heterogenous effects of tax policy

This table presents the robustness results of the heterogenous effects of tax policy. *t*-statistics are in the parentheses. *, **, and *** indicate the significant level at 10%, 5%, and 1%, respectively. The detailed variable definitions are presented in Appendix A.

Dependent variable =	*CEP index*			
	(1) Non-heavy	(2) Heavy	(3) Non-heavy	(4) Heavy
*Tax*Policy*	0.018**	0.006	0.021**	0.004
	(2.15)	(0.41)	(2.34)	(1.14)
Tax			–0.017	–0.019
			(–1.50)	(–1.53)
Policy			0.577***	0.004
			(4.45)	(0.58)
Size	0.034***	0.053***	0.018	0.053**
	(2.70)	(3.08)	(1.09)	(2.27)
Lev	0.070	0.058	0.129**	0.008
	(1.61)	(1.03)	(2.23)	(0.10)
List Age	–0.021	–0.090**	–0.036	–0.029
	(–0.89)	(–2.55)	(–0.91)	(–0.48)
BM	–0.008**	0.004	–0.012**	0.007
	(–2.32)	(0.70)	(–2.55)	(0.86)
ROA	–0.028	0.012	0.025	–0.017
	(–0.44)	(0.13)	(0.30)	(–0.13)
Growth	0.000	–0.003	0.003	–0.007
	(0.04)	(–0.23)	(0.29)	(–0.38)
Cashflow	0.061	0.082	0.092	0.118
	(1.18)	(1.02)	(1.28)	(1.03)
Indep	–0.028	–0.158	–0.062	–0.172
	(–0.35)	(–1.23)	(–0.59)	(–1.02)
INST	–0.001	0.026	0.001	–0.012
	(–0.05)	(0.61)	(0.03)	(–0.19)
SOE	0.047	–0.012	0.051	–0.059
	(1.54)	(–0.29)	(1.17)	(–1.04)
lngdp			0.088*	0.039
			(1.73)	(0.57)
First_proportion			0.203**	0.299**
			(2.05)	(2.24)
Second_proportion			0.193*	0.302**
			(1.96)	(2.25)
Third_proportion			0.191*	0.304**
			(1.94)	(2.26)
lnFiscal			0.046	–0.044
			(0.92)	(–0.64)
Constant	–0.307	–0.408	–2.091**	–3.048**
	(–1.09)	(–1.03)	(–2.09)	(–2.27)
Observations	3,168	1,359	3,168	1,359
Firm FE	Yes	Yes	No	No
Industry FE	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.126	0.126	0.184	0.176

Table 9. Channel test: survival pressure (financial constraints)

This table presents the subsample analysis results using financial constraints. *t*-statistics are in the parentheses. *, **, and *** indicate the significant level at 10%, 5%, and 1%, respectively. The detailed variable definitions are presented in Appendix A.

Dependent variable =	*CEP index*			
	Non-heavy		Heavy	
	(1) Lower SP	(2) Higher SP	(3) Lower SP	(4) Higher SP
*Tax*Policy*	0.033**	0.031**	0.029***	–0.007
	(2.08)	(2.00)	(3.59)	(–0.35)
Tax	–0.011	–0.043**	–0.019	–0.043*
	(–0.69)	(–2.43)	(–0.96)	(–1.88)
Policy	0.033**	0.052***	–0.381	–0.001
	(2.57)	(3.50)	(–1.61)	(–0.01)
Size	0.058***	0.041***	0.047***	0.057***
	(9.57)	(5.30)	(5.61)	(5.56)
Lev	0.049	0.196***	–0.010	0.015
	(1.19)	(3.48)	(–0.20)	(0.21)
List Age	–0.017*	–0.001	–0.033**	–0.018
	(–1.67)	(–0.12)	(–2.19)	(–1.11)
BM	–0.012***	–0.010	0.006	–0.005
	(–3.65)	(–1.35)	(1.08)	(–0.36)
ROA	–0.035	0.015	–0.040	–0.017
	(–0.50)	(0.14)	(–0.38)	(–0.11)
Growth	0.004	–0.008	–0.014	–0.001
	(0.44)	(–0.80)	(–0.91)	(–0.03)
Cashflow	0.078	0.066	0.191**	0.099
	(1.25)	(0.83)	(1.97)	(0.80)
Indep	–0.019	–0.053	–0.134	–0.063
	(–0.23)	(–0.50)	(–1.05)	(–0.41)
INST	0.030	–0.028	0.048	–0.059
	(1.05)	(–0.90)	(1.20)	(–1.26)
SOE	0.042***	0.038**	–0.026	–0.019
	(2.90)	(2.22)	(–1.30)	(–0.76)
Constant	–0.817***	–0.547***	–0.147	–0.735***
	(–5.86)	(–3.19)	(–0.85)	(–2.95)
Observations	1,788	1,380	773	586
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.390	0.345	0.336	0.364
Empirical P-value	0.019		0.000***	