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Priority to Self-Interest? Economic Development? Or Ecological Coordination? The Turnover of Local Officials and Environmental Governance in China

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Abstract: Under the background of government-oriented environmental governance in China, the environmental effect of local official turnover has become an important issue. How to improve governmental governance is an important issue that profoundly affects local environmental governance. Based on a literature analysis, this paper establishes an environmental-effect identification equation to deeply analyze the environmental effect of local official turnover on private enterprises. Then, this paper empirically analyzes the effect of local personnel turnover on the environmental pollution control of private enterprises and the persistence of this effect. The results show that the turnover of local officials has a positive effect on the pollution control investment of private enterprises, but the effect is not persistent. The interest collusion between local officials and private enterprises tends to be one main reason to explain the environmental effect, and two different types of interest collusions are determined: priority to self-interest and economic development. The reasons why the positive effect cannot last for long may be attributed to a lack of systematic and effective institutions or temporary administrative measures. It is important to make local officials fully realize the “green wealth” value of the ecosystems, to change their economic priorities. Finally, this paper proposes countermeasures for local governments on personnel affairs to promote environmental governance.

Keywords: official turnover; environmental governance; collusion; environmental effect



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1. Introduction

The environmental issue is one of the most serious challenges that China has faced since the 1990s [1]. The current form of environmental governance in China is still government-oriented environmental governance. The central government’s protection policies need to be implemented by local governments [2]. The responsibility of environmental governance is mainly assumed by local governments and their functional departments. Whether the local government can scientifically implement administrative law is directly related to the effectiveness of environmental governance. Environmental pollution is not only a problem of economic development but also refers to local government governance. The weakening of local government supervision is an important reason for the frequent occurrence of environmental problems. From early 2005 to 2007, the central government carried out four consecutive rounds of environmental law-enforcement inspections, which directly hit the increasingly prominent environmental pollution problems in China. In 2015, the trial Environmental Protection Inspection Program was promulgated. Environmental-protection inspection has become an important way to build an ecological civilization. Since 2015, the central government has successively launched two rounds of central government’s supervision, and the “environmental storm” has once again had a wide impact on the whole society.

Environmental protection supervision from the central government brings huge pressure on local government through accountability interviews and official turnover, which

have a profound impact on the process of local environmental governance. Under such pressure, local officials pay more attention to environmental governance. The turnover of officials is one of the most noteworthy changes in local government governance, which not only affects regional economic growth [3–6], enterprise investment [7–10], utilization of foreign capital [11], enterprise R&D (Research and Development), and innovation [12] but also affects the governance of local environmental issues [13–16]. Local personnel turnover has become one of the most important factors affecting environmental governance. The research on the impact mechanism of local personnel turnover on environmental governance is gradually being deepened. However, at present, most of the research mainly uses personnel turnover to match the regional environmental data of cities or provinces for environmental effect analysis, though this matching analysis of personnel turnover and enterprise environmental data is still not perfect and needs to be further studied. There needs to be more study on the enterprise-level impacts and the length of time these impacts last.

This paper establishes an environmental-effect equation to empirically analyze the effect of official turnover on private enterprise pollution control. Based on theoretical analysis, this paper puts forward two hypotheses. Around these two hypotheses, this paper matches the personnel-turnover information of local officials with the data of heavily polluting enterprises and empirically verifies the validity of the two hypotheses through the environmental-effect equation. Then, this paper analyzes the empirical results of the environmental effects of official turnover on enterprises. Further, this paper discusses the impact mechanism of local personnel turnover on local environmental governance to explain how personnel turnover affects enterprise pollution control. At last, this paper provides a reference for environmental governance by optimizing the turnover and policy priority of local officials.

2. Theoretical Analysis and Hypotheses

The administrative intervention of local governments has been considered an important factor affecting the improvement of local environmental quality and the fulfillment of enterprises' environmental responsibilities [14,15]. It has been proven to some extent that the turnover of local officials can improve the local ecological environment. For example, the turnover of party secretaries (the top leader of a local government) can significantly reduce the number of local water-pollution incidents [15] and temporarily improve the air quality [16]. There are two main possible mechanisms for the local officials' turnover affecting the environmental pollution control. (1) The interest collusion mechanism, which contains two aspects, the direct breaking way and the indirect deterrent way. On the one hand, changing local officials breaks the interest collusion between polluting enterprises and the former leaders, thus, the supervision of polluting enterprises is strengthened, and the number of illegal pollution events is reduced [15]. On the other hand, while breaking some interest collusions between polluting enterprises and local officials, the turnover of officials also has a short-term "deterrent" that alerts other existing collusion interests to reduce their environmental illegal activities, to not be punished in this special time. Inter-city turnover is more deterrent than same-city turnover [16]. (2) The economic tightening mechanism, which relates to the turnover of officials also having a temporary impact on local economic activities. It leads to a decline in the intensity of local economic activities [4,5], thereby indirectly reducing the pollution of the local environment. Environmental governance varies in different regions, but no matter which one of the two mechanisms works, the turnover of local officials has a certain positive effect on local environmental governance. Based on this, hypothesis 1 is proposed:

H1: *The turnover of officials may have a positive effect on the environmental governance of private enterprises.*

No matter whether from the perspective of collusion theory or from the perspective of the short-term impact of economic activities, the improving effect of local personnel turnover on private-enterprise pollution control appears to not be persistent. From the

perspective of collusion theory, if local officials collude with the private enterprises creating pollution, local officials act as an umbrella for the private enterprises that are creating pollution. When the officials who protect the private enterprise are replaced, some collusions between officials and the private enterprises creating pollution end, while other collusions are deterred. Thus, environmental governance is executed effectively, and the environmental conditions are improved. However, with the re-establishment of interest collusions, or the weakening of the deterrent effect, environmental-governance supervision is weakened, and the persistence of environmental improvement is not significant enough [16]. In another way, the turnover of officials may cause short-term economic fluctuations, and the investment in private business may drop, which accordingly reduce environmental pollution to a certain degree. After the short fluctuation, the local government runs smoothly, economic activities return to normal, and the investment intensity of the polluting private enterprises increases. Thus, environmental pollution is correspondingly deepened. Based on this, hypothesis 2 is proposed:

H2: *The effect of local official turnover on the environmental governance of private enterprises seems to not be persistent.*

3. Methodology and Data

3.1. Methodology

According to the existing literature [15–17], we take the local personnel turnover as a natural experiment to identify its impact on the pollution mitigation behaviors of heavily polluting firms. To be specific, the following linear model is used as our baseline model:

$$\text{Mitigation}_{ij} = \beta_0 + \beta_1 \text{Transfer}_i + \Phi \text{FirmAttr}_{ij} + \Gamma \text{OwnerAttr}_{ij} + \Lambda \text{CityAttr}_{ij} + \varepsilon_{ij} \quad (1)$$

The explained variable Mitigation_{ij} is the investment of private enterprises for pollution control. “ i ” and “ j ” stand for different cities and different enterprises, respectively. Transfer_i is the main explanatory variable; if the prefecture-level city where the enterprise is located has a turnover of the municipal party secretary in that year, there is $\text{Transfer}_i = 1$, otherwise, $\text{Transfer}_i = 0$. FirmAttr_{ij} are control variables for firm characteristics, including firm size, profitability, firm age, etc. OwnerAttr_{ij} are control variables for the characteristics of the firm owner, including the firm owner’s age, gender, education level, etc. CityAttr_{ij} are control variables for city-level characteristics, including the proportion of the secondary industry, economic development, fiscal deficit rate, etc. ε_{ij} is a random item. The main concern of this study is the coefficient β_1 , which reflects the difference in the investment for pollution control by private enterprises in prefecture-level cities with official turnover or without official turnover.

In addition, when we use the equation mentioned above to test hypothesis 1, Transfer_i , as the main explanatory variable, stands for official turnover in the current year. When the equation above is used to test hypothesis 2, Transfer_i stands for official turnover in the last year. We further use the regression equation above to figure out the differences in the effects brought about by different types of official turnover and to test the robustness of the model, referring to the inter-city turnover and the same-city turnover.

In addition to the normal linear model, we also use the Tobit regression [18] to avoid the problem of negative prediction. We build up the following Tobit model, where Mitigation_{ij}^* is the latent dependent variable:

$$\begin{cases} \text{Mitigation}_{ij}^* = \beta_0 + \beta_1 \text{Transfer}_i + \Phi \text{FirmAttr}_{ij} + \Gamma \text{OwnerAttr}_{ij} + \Lambda \text{CityAttr}_{ij} + \varepsilon_{ij} \\ \text{Mitigation}_{ij} = \max(0, \text{Mitigation}_{ij}^*) \end{cases} \quad (2)$$

We report the estimated results from both the OLS (Ordinary Least Squares) model and the Tobit model in Section 4.

3.2. Samples

The enterprise samples used in this study are the samples of China's private enterprise surveys in 2006, 2008, 2010, and 2012. China's private enterprise survey data adopt the method of cross-sectional stratified sampling survey and select 0.5% of the national private enterprise samples (with slight differences in different years) every two years for the survey. The samples are distributed in various industries and geographical areas. Therefore, this survey has been widely used in research on the operation of Chinese enterprises [19]. The data on the turnover of party secretaries in prefecture-level cities come from the database of Chinese political elites. The Chinese Political Elite Database includes the demographic information and political experience information of leaders of all prefecture-level cities and above in China since 1990 [20]. Other variables at the prefecture-city level are derived from the China Urban Statistical Yearbook.

In this paper, the samples are filtered according to the following three principles: (1) We exclude enterprises in the general service industry such as finance, accommodation, and catering as well as enterprises engaged in agriculture, forestry, animal husbandry, and fishery. We only retain three industries. One is the mining industry, another is the manufacturing industry, and the third one is the electricity, heat, gas, and water production and supply industry. (2) We also exclude the samples of municipalities directly under the central government and prefecture-level cities in Tibet, leaving only the samples of other prefecture-level cities. (3) We also remove the samples containing outliers through the program "winsorize" in Stata.

Considering the characteristics of the local government governance structure in China, previous studies on official turnover mostly used the turnover of local party committee secretaries to conduct simulation experiments [4,16]. Therefore, this study uses the turnover of municipal party committee secretaries as the research object. In this study, 40 party secretaries in these prefecture-level cities were transferred from the Chinese political elite database, accounting for 17% of total 230 surveyed cities (as shown in Appendix A, Table A1). Among these turnovers, 16 were transferred within the same city, accounting for 40%, and 24 were transferred from different places, accounting for 60%. The same-city transfers were usually the cases that the mayor was promoted to the secretary of the municipal party committee. There are many cases of transfers from other places, including from other prefecture-level cities in the same province and other provinces. Some of these are appointed by the provincial government or the central government.

3.3. Main Variables

In this paper, the measurement of corporate investment in pollution control is mainly based on the ratio of corporate investment in pollution control to operating income in the current year. It can remove the influence of inflation and control the fluctuation caused by the influence of scale. The descriptive statistics of the main variables used in this paper are shown in Table 1. (1) The proportion of investment in pollution control is the explained variable. The average value of the proportion of investment in pollution control to operating income is about 0.703, and the standard deviation is about 3.830, indicating that corporate investment in pollution control varies greatly in different cities or over time. (2) Official turnover is the main explanatory variable. Its value is 0 or 1. The average value is 0.213, referring to 1195 enterprise samples with turnover, about 21% of total 5600 enterprise samples (as shown in Appendix A, Table A1). (3) The others are control variables. The average profit rate of enterprises is about 8.148, and the standard deviation is about 15.505, indicating that the profit rate of heavily polluting enterprises seems very different. The average value of the proportion of sewage charges is 0.148, and the standard deviation is about 0.587, which shows that the heavily polluting enterprises have great differences in their expenditure on sewage charges.

Table 1. Descriptive statistics of variables.

Variables	Count	Mean	s. d.	Min	Max
Proportion of investment in pollution control (%)	5600	0.703	3.830	0.000	85.714
Official turnover (1 = have)	5600	0.213	0.410	0.000	1.000
Proportion of sewage charges (%)	5600	0.148	0.587	0.000	10.000
Average profit rate of enterprises (%)	5600	8.148	15.505	−100.000	100.000
Enterprise operating income (log)	5600	16.445	2.539	0.000	24.937
Enterprise age (year)	5600	8.031	4.930	0.000	27.000
Enterprise owner's age (year)	5600	46.062	8.433	15.000	90.000
Enterprise owner's college education (1 = yes)	5600	0.888	0.315	0.000	1.000
Enterprise owner's gender (1 = female)	5600	0.099	0.298	0.000	1.000
Proportion of secondary industry (%)	5600	50.825	9.155	15.700	85.920
GDP per capita (log)	5600	10.263	0.727	8.410	11.800
Fiscal deficit rate (%)	5600	0.994	1.166	−0.143	13.409

In this paper, the samples are divided into two groups with and without the turnover of the municipal party secretary, and the mean characteristics of the two groups are compared. Some descriptive statistics of the two groups are as follows: (1) The investment of the turnover group in pollution control is significantly higher than that of the non-turnover group. (2) There are a large number of truncated samples in both groups, and the median is 0. (3) Compared with the non-turnover group, the 75% quantile and 90% quantile of the turnover group were both higher than those of the non-turnover group.

4. Results and Discussion

4.1. Results

4.1.1. Empirical Results for Hypothesis 1

Based on regression Equations (1) and (2), different combinations of the control variables were controlled for empirical analysis, as shown in columns (1)–(4) in Table 2. Column (1) shows that the variables for firm characteristics, firm owner characteristics, and city characteristics were controlled. Column (2) shows that the variables for firm owner characteristics were controlled. Column (3) shows that the variables for firm characteristics were controlled. The effects of official turnover under different combinations of control variables were obtained (see Table 2). The results are as follows:

1. After controlling for the different explanatory variables listed in columns (1)–(4), official turnover still has a significant promoting effect on the investment of private enterprises in pollution control. As shown in Table 2, the turnover of the municipal party secretary increases the proportion of the investment in pollution control by 0.541. Moreover, the regression coefficients in columns (1)–(4) range from 0.541 to 0.583, which has a certain robustness.
2. The benchmark conclusion of this paper shows that the turnover of officials in prefecture-level cities may have a positive effect on the investment of local private enterprises in pollution control, which supports hypothesis 1. Investment in pollution control plays an important factor in environmental quality.

Table 2. The effect of municipal party secretary turnover on private enterprise pollution control investment: benchmark results.

	Proportion of Investment in Pollution Control (%)							
	(1)	(1)'	(2)	(2)'	(3)	(3)'	(4)	(4)'
	OLS	Tobit	OLS	Tobit	OLS	Tobit	OLS	Tobit
Official turnover in the current year (1 = have)	0.411 *** (0.142)	0.543 ** (0.222)	0.453 *** (0.150)	0.545 ** (0.237)	0.423 *** (0.148)	0.583 ** (0.232)	0.452 *** (0.150)	0.541 ** (0.238)
Environmental regulation								
Proportion of sewage charges (%)	1.783 *** (0.297)	2.479 *** (0.359)	1.494 *** (0.307)	2.499 *** (0.434)	1.791 *** (0.311)	2.491 *** (0.371)	1.497 *** (0.308)	2.513 *** (0.435)
Firm characteristics								
Average profit rate of enterprises (%)			0.016 ** (0.006)	0.034 *** (0.010)			0.015 ** (0.006)	0.033 *** (0.010)
Enterprise operating income (log)			0.050 ** (0.025)	0.613 *** (0.093)			0.050 * (0.025)	0.613 *** (0.095)
Enterprise age (year)			−0.028 *** (0.010)	−0.011 (0.018)			−0.024 ** (0.010)	−0.009 (0.018)
Firm owner characteristics								
Enterprise owner's age (year)					−0.012 ** (0.005)	0.007 (0.008)	−0.010 * (0.005)	−0.011 (0.010)
Enterprise owner's college education (1 = yes)					0.251 ** (0.119)	0.921 *** (0.260)	0.152 (0.125)	0.264 (0.265)
Enterprise owner's gender (1 = female)					−0.144 (0.186)	−0.795 ** (0.333)	−0.048 (0.204)	−0.441 (0.360)
City Characteristics								
Proportion of the secondary industry (%)			0.012 ** (0.006)	0.024 ** (0.012)	0.012 ** (0.006)	0.036 *** (0.011)	0.012 ** (0.006)	0.024 ** (0.012)
GDP per capita (log)			0.075 (0.092)	−0.075 (0.162)	0.098 (0.089)	0.166 (0.151)	0.079 (0.092)	−0.060 (0.163)
Fiscal deficit rate (%)			0.333 *** (0.089)	0.611 *** (0.133)	0.373 *** (0.091)	0.681 *** (0.135)	0.343 *** (0.091)	0.626 *** (0.136)
Samples	4758	4758	4073	4073	4407	4407	4043	4043
Log-likelihood	−11,959.6	−8059.3	−10,287.8	−6805.8	−11,131.3	−7454.0	−10,223.9	−6760.6
R-squared	0.112	0.027	0.099	0.040	0.128	0.033	0.099	0.040

Note: We report the marginal effect estimated by the Tobit model. The values in parentheses are heteroscedastic robust standard errors; *, **, and *** indicate significance at 10%, 5%, and 1% levels, respectively. The results by OLS are also reported in the table above.

4.1.2. Empirical Results for Hypothesis 2

To further explore the persistence of the effect of official turnover, according to the relevant research [16,17], the results of the previous year's turnover of municipal party secretaries were used as the main explanatory variable, and the rest of the settings are the same as those in Table 2. Based on regression Equations (1) and (2), different combinations of the control variables were controlled for empirical analysis (see Table 3). The results show that, in the second year after the turnover of the party secretary in prefecture-level cities, the effect of official turnover on the investment in pollution control by private enterprises seems to be not significant, as the value is only 0.096, which indicates that the official turnover may not have a persistent effect on the increase in the investment for pollution control. It appears that hypothesis 2 is supported.

Table 3. Persistence of the effects of official turnover.

	Proportion of Investment in Pollution Control (%)							
	(1)	(1)′	(2)	(2)′	(3)	(3)′	(4)	(4)′
	OLS	Tobit	OLS	Tobit	OLS	Tobit	OLS	Tobit
Official turnover in the former year (1 = have)	0.130 (0.109)	0.065 (0.168)	0.134 (0.124)	0.085 (0.185)	0.146 (0.119)	0.055 (0.175)	0.148 (0.128)	0.096 (0.189)
Environmental regulation								
Proportion of sewage charges (%)	1.622 *** (0.239)	2.199 *** (0.265)	1.262 *** (0.170)	2.145 *** (0.303)	1.643 *** (0.251)	2.220 *** (0.277)	1.263 *** (0.170)	2.151 *** (0.304)
Firm characteristics								
Average profit rate of enterprises (%)			0.002 (0.004)	0.010 (0.007)			0.002 (0.004)	0.009 (0.007)
Enterprise operating income (log)			0.047 * (0.025)	0.510 *** (0.107)			0.047 * (0.027)	0.510 *** (0.111)
Enterprise age (year)			−0.014 * (0.007)	0.001 (0.014)			−0.012 (0.008)	0.001 (0.015)
Firm owner characteristics								
Enterprise owner's age (year)					−0.004 (0.004)	0.016 ** (0.007)	−0.003 (0.005)	−0.001 (0.009)
Enterprise owner's college education (1 = yes)					0.306 *** (0.074)	0.833 *** (0.217)	0.208 *** (0.079)	0.256 (0.203)
Enterprise owner's gender (1 = female)					0.128 (0.214)	−0.315 (0.328)	0.217 (0.238)	−0.015 (0.368)
City Characteristics								
Proportion of the secondary industry (%)			0.009 (0.006)	0.015 (0.011)	0.008 (0.006)	0.021 ** (0.010)	0.009 (0.006)	0.015 (0.011)
GDP per capita (log)			−0.033 (0.106)	−0.172 (0.176)	0.029 (0.104)	0.086 (0.159)	−0.033 (0.105)	−0.164 (0.175)
Fiscal deficit rate (%)			0.192 ** (0.093)	0.374 *** (0.129)	0.223 ** (0.095)	0.430 *** (0.134)	0.194 ** (0.094)	0.375 *** (0.131)
Samples	3739	3739	3214	3214	3482	3482	3198	3198
Log-likelihood	−8644.8	−5966.4	−7410.0	−5017.9	−8064.6	−5521.1	−7377.0	−4993.5
R-squared	0.129	0.032	0.082	0.039	0.144	0.037	0.083	0.040

Note: We report the marginal effect estimated by the Tobit model. The values in parentheses are heteroscedastic robust standard errors; *, **, and *** indicate significance at 10%, 5%, and 1% levels, respectively. The results by OLS are also reported in this table above.

4.1.3. Further Robustness Test through Different Types of Official Turnover

Based on the regression Equations (1) and (2), we further figured out the differences between the effects brought about by the inter-city turnover and the same-city turnover and test the robustness of the model. It was a classification regression based on the two types, including transfer from different places and in the same city (see Table 4). In the samples of this study, about 40% of the replacement of party secretaries in prefecture-level cities belonged to the same-city transfer. Model stability was checked. The results show that the environmental effect brought by the official turnover transferred from different places is stronger than that of the same-city transfer. The transfer of municipal party secretaries from different places tends to significantly increase the investment of private enterprises in pollution control by 0.931, which is almost five times as high as the same-city transfer. Although same-city transfer also has a positive impact, its magnitude seems to be relatively small and insignificant.

Table 4. The differences in environmental effects between officials transferred from different places and transferred from the same city.

	Proportion of Investment in Pollution Control (%)							
	Inter-City Transfer				Same-City Transfer			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Tobit	Tobit	Tobit	Tobit	Tobit	Tobit	Tobit	Tobit
Official turnover in the current year (1 = have)	0.985 *** (0.379)	0.947 ** (0.388)	0.926 ** (0.379)	0.931 ** (0.389)	0.196 (0.218)	0.165 (0.241)	0.216 (0.220)	0.178 (0.242)
Environmental regulation								
Proportion of sewage charges (%)	2.495 *** (0.383)	2.536 *** (0.454)	2.520 *** (0.384)	2.551 *** (0.455)	2.181 *** (0.270)	2.117 *** (0.290)	2.194 *** (0.269)	2.122 *** (0.290)
Firm characteristics								
Average profit rate of enterprises (%)		0.032 *** (0.011)		0.031 *** (0.011)		0.014 ** (0.007)		0.013 ** (0.007)
Enterprise operating income (log)		0.635 *** (0.102)		0.636 *** (0.105)		0.503 *** (0.095)		0.503 *** (0.098)
Enterprise age (year)		−0.012 (0.019)		−0.011 (0.019)		0.002 (0.013)		0.003 (0.014)
Firm owner characteristics								
Enterprise owner's age (year)			0.008 (0.009)	−0.007 (0.011)			0.012 * (0.007)	−0.006 (0.008)
Enterprise owner's college education (1 = yes)			0.939 *** (0.245)	0.288 (0.241)			0.771 *** (0.233)	0.183 (0.237)
Enterprise owner's gender (1 = female)			−0.687 * (0.357)	−0.369 (0.387)			−0.482 (0.306)	−0.161 (0.343)
City Characteristics								
Proportion of the secondary industry (%)	0.031 ** (0.012)	0.023 * (0.013)	0.032 *** (0.012)	0.024 * (0.013)	0.026 *** (0.010)	0.017 * (0.010)	0.026 *** (0.010)	0.017 * (0.010)
GDP per capita (log)	0.201 (0.168)	−0.046 (0.182)	0.219 (0.170)	−0.025 (0.183)	0.115 (0.143)	−0.135 (0.157)	0.098 (0.144)	−0.130 (0.156)
Fiscal deficit rate (%)	0.685 *** (0.141)	0.606 *** (0.139)	0.699 *** (0.145)	0.620 *** (0.143)	0.450 *** (0.122)	0.407 *** (0.123)	0.447 *** (0.125)	0.413 *** (0.125)
Samples	3951	3624	3923	3605	4003	3663	3966	3636
Log-likelihood	−6689.4	−6046.6	−6638.3	−6014.5	−6389.6	−5775.1	−6331.0	−5739.0
R-squared	0.034	0.042	0.035	0.042	0.033	0.037	0.034	0.037

Note: We report the marginal effect estimated by the Tobit model. The values in parentheses are heteroscedastic robust standard errors; *, **, and *** indicate significance at 10%, 5%, and 1% levels, respectively. The results by OLS model are reported in Appendix A, Table A2.

4.2. Discussion

4.2.1. Deepening Analysis for the Formation of Interest Collusion between Local Officials and the Private Enterprises Creating Pollution

The big feature of the data in this paper is that they are just one kind of censored data, so there is a large number of zero points in the explained variable, and the data mostly do not obey the normal distribution, which may affect the robustness of the Tobit model [21,22]. Thus, we used Tobit and OLS models to convince each other and improve the robustness. The empirical results of the two models are relative consistent. It can be believed that local officials play an important role in environmental governance. It appears that hypothesis 1 is supported by this research. The turnover of local officials may have a positive effect on environmental governance by enhancing the investment of private enterprises for pollution control. The interest collusion between local officials and private enterprises seems to be one of the most important reasons to explain the environmental effect brought about by the turnover of local officials. The existing collusion may hinder the government's enforcement of corporate investment in pollution control. However, more importantly, the key point is how these interest collusions form, which is especially urgent to be fully understood and necessary to be overcome for improving environmental governance. As the policy maker, local officials' priority seems to be an internal deep motivation to choose whether to

collude or not with the private enterprises creating pollution. This could be interpreted in two ways, priority to self-interest or economic development, as shown below.

1. Priority to self-interest. When local officials give priority to self-interest and fetch illegal income from the private enterprises creating pollution, they would usually act as an umbrella for the private enterprises creating pollution. Lots of pollution activities may be ignored and, thus, escape from the relevant laws [23,24]. This kind of interest collusion may mainly come from local officials' pursuit of personal profit. Through all kinds of profit transmissions, interest collusion probably forms between local officials and the private enterprises creating pollution.
2. Priority to economic development. It is well-known that the "GDP only" preference is the long-standing policy orientation in China, which is the key performance measure for local officials. If local officials want to be promoted, they give priority to economic development, so environmental protection is usually neglected [25,26]. The private enterprises creating pollution sometimes play an important role in regional economic development, which reduces local officials' resolution to enhance environmental governance when they worry about the decline of local GDP growth. This kind of interest collusion may mainly be attributed to local officials' promotion, which makes local officials give priority to economic development, even though private enterprises create lots of pollution.

4.2.2. Key Points for Why the Positive Effect of Local Officials' Turnover on Environmental Governance Is Difficult to Keep

Hypothesis 2 is also supported by this research to some extent. It appears that the positive effect of local officials' turnover cannot last for long, which is not a good indication for us to improve environmental governance through local officials' turnover. It is totally necessary to figure out why the positive effect of local officials' turnover cannot last for long. It will help us to more efficiently take the way of local officials' turnover to improve environmental governance. The reasons why the positive effect of local officials' turnover cannot last for long may be summarized in two ways as below:

1. One reason may lie in the lack of systematic and effective institutions to prevent interest collusion. An interest collusion is usually difficult to be eliminated. It tends to be one complicated local relationship network when an interest collusion forms firmly. It appears more obvious that the deterrence of same-city transfer seems to be limited when we compare the differences in the environmental effects between inter-city transfer and same-city transfer [23,24]. Local promotion may just be the internal evolution of a local relationship network. Therefore, a set of systematic and effective institutions could help to thoroughly break through a local relationship network.
2. Another reason may be the temporary administrative measures taken for environmental supervision. Due to the "GDP only" preference, local officials usually take temporary administrative measures to reduce the aggravating pollution under the pressure of heavy environmental supervision from the central government. Local officials often take a one-size-fits-all approach to deal with this "environmental storm" supervision, which has a great effect on local economic development and social livelihood [27]. When one round of environmental supervision is finished, the measures of reducing pollution taken by local officials tend to be weakened. Long-term mechanisms may need to be strengthened [28]. The key point to coordinating economic development and environmental protection probably lies in making local officials realize that they can promote economic development through environmental protection.

4.2.3. One Possible Way to Coordinate Economic Development and Environmental Protection through Ecosystem "Green Wealth"

Further, more importantly, it is urgent to make officials fully aware of the multi-functionality of the ecosystems, which can provide multiple services at the same time [29–31]. Lucid waters and lush mountains are invaluable assets. For human beings, ecosystems not

only provide abundant material products and landscape tourism but also service functions such as climate regulation, water conservation, and pollution purification [32–35]. The value of an ecosystem's services is the "green wealth" of regional development, which is becoming an important part of regional economic development [36,37]. A sufficient scientific understanding of an ecosystem's functions and values seems to be an important basis for local officials to fundamentally change their development views. The "green wealth" of the ecosystem tends to be an important source of future regional development, which deserves all local officials' special attention. It is particularly noteworthy that the gradual formation of a national consensus on green development has made significant progress in ecological governance in China since the 18th National Congress of the Communist Party of China, with a rapid drop in pollution emissions [38].

5. Conclusions and Policy Implications

Under the current background of government-oriented environmental governance, it is of great importance to deeply study the effect of local personnel turnover on environmental governance and how to improve local government governance to effectively promote local environmental governance. Local governments mainly take charge of concrete environmental governance in China [39]. Focusing on the environmental effect of local personnel turnover, this paper matches the data of official turnover and private enterprises to analyze the environmental effect of official turnover on the enterprises. The conclusions are as follows:

1. Local officials' turnover may have a positive effect on the investment of private enterprises in pollution control. However, the effect of local officials' turnover on the investment in pollution control seems to not be persistent.
2. The interest collusion between local officials and private enterprises is one main reason to explain the environmental effect brought about by the turnover of local officials. The existing interest collusions may hinder the government's enforcement of corporate investment in pollution control. The formation of interest collusions probably lies in two different types: priority to self-interest and economic development given by local officials.
3. The reasons why the positive effect of local officials' turnover cannot last for long may refer to temporary administrative measures or a lack of systematic and effective institutions. The lack of systematic and effective institutions could not break through local relationship networks thoroughly. When environmental supervision is finished, the temporary measures for pollution control also tend to be weakened.
4. One possible way in the future to coordinate economic development and environmental protection is to fully realize the value of ecosystem "green wealth". The deep exploration of ecosystem "green wealth" may promote regional economic development.

The relevant conclusions of this paper have positive policy implications for how to improve local government governance to effectively promote local environmental governance as follows:

1. Personnel turnover may bring positive environmental effects to a certain extent. When interest collusion seriously hinders environmental governance, it is suggested to take the way of personnel turnover to overcome this issue. Meanwhile, it is also suggested to design a set of systematic and effective institutions and long-term measures to efficiently make full use of the personnel turnover policy. It is also suggested to take the way of inter-city transfer rather than same-city transfer to thoroughly break interest collusions.
2. It is necessary to consider the important role of local officials in environmental governance. The policy preferences of local officials usually have a great effect on environmental governance. Promoting local officials' priority from self-interest and GDP preference to the value of ecosystem services is an important way to promote environmental governance. Future work should test whether attitudes and understanding of "green wealth" in new officials affect the outcomes of environmental governance.

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Appendix A

Table A1. A summary of local official transfers during the research period.

Year	No. of Enterprise Surveyed	No. That Have Official Turnover	Share (%)	No. of Cities Surveyed	No. That Have Official Turnover	Share (%)
2006	1219	160	13%	88	16	18%
2008	1229	198	16%	80	13	16%
2010	1556	55	4%	42	3	7%
2012	1596	782	49%	20	8	40%
Total	5600	1195	21%	230	40	17%

Note: We would like to describe the detailed matching process, taking the sample in 2006 as an example. First, 1219 firms were surveyed by the Chinese Private Enterprise Survey (CPES) in that year. Second, we identified the location of these firms by their zip codes through the Baidu Open Map Service. We found that they were located in 88 Chinese cities. Third, we matched the 88 cities with the Chinese Political Elite Database (CPED). We found that 18% of the survey cities (16 cities) had transfers of local officials in the year 2006. Fourth, back to the CPES dataset, we found that 160 firms surveyed were located in cities with official transfers.

Table A2. The differences in environmental effects between officials transferred from different places and transferred from the same city through OLS.

	Proportion of Investment in Pollution Control (%)							
	Inter-City Transfer				Same-City Transfer			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Official turnover in the current year (1 = have)	0.791 *** (0.266)	0.776 *** (0.266)	0.763 *** (0.265)	0.761 *** (0.266)	0.092 (0.128)	0.147 (0.143)	0.091 (0.129)	0.159 (0.143)
Environmental regulation								
Proportion of sewage charges (%)	1.828 *** (0.321)	1.527 *** (0.320)	1.830 *** (0.322)	1.531 *** (0.321)	1.595 *** (0.244)	1.224 *** (0.168)	1.595 *** (0.244)	1.223 *** (0.169)
Firm characteristics								
Average profit rate of enterprises (%)		0.014 ** (0.007)		0.014 ** (0.007)		0.005 (0.004)		0.004 (0.004)
Enterprise operating income (log)		0.063** (0.026)		0.063** (0.027)		0.037 (0.025)		0.037 (0.026)
Enterprise age (year)		−0.029 *** (0.011)		−0.025 ** (0.011)		−0.014 * (0.007)		−0.012 (0.008)
Firm owner characteristics								
Enterprise owner's age (year)			−0.011 ** (0.005)	−0.009 (0.006)			−0.006 (0.004)	−0.005 (0.005)
Enterprise owner's college education (1 = yes)			0.300 *** (0.086)	0.199 ** (0.091)			0.210 * (0.112)	0.121 (0.118)
Enterprise owner's gender (1 = female)			−0.074 (0.203)	0.006 (0.221)			0.017 (0.192)	0.116 (0.215)

Table A2. Cont.

	Proportion of Investment in Pollution Control (%)							
	Inter-City Transfer				Same-City Transfer			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
City Characteristics								
The proportion of the secondary industry (%)	0.009 (0.006)	0.012 * (0.006)	0.010 (0.006)	0.012 * (0.007)	0.010 * (0.005)	0.010 * (0.006)	0.010 * (0.005)	0.010 * (0.006)
GDP per capita (log)	0.141 (0.101)	0.112 (0.105)	0.157 (0.102)	0.119 (0.105)	0.034 (0.093)	−0.009 (0.094)	0.035 (0.093)	−0.009 (0.093)
Fiscal deficit rate (%)	0.377 *** (0.094)	0.339 *** (0.093)	0.394 *** (0.097)	0.349 *** (0.095)	0.225 *** (0.087)	0.208 ** (0.088)	0.231 *** (0.088)	0.213 ** (0.089)
Samples	3951	3624	3923	3605	4003	3663	3966	3636
Log-likelihood	−10,020.2	−9193.5	−9957.4	−9152.0	−9301.0	−8500.7	−9226.0	−8448.5
R-squared	0.139	0.107	0.141	0.108	0.125	0.074	0.127	0.074

Note: We report the marginal effect estimated by the OLS model. The values in parentheses are heteroscedastic robust standard errors; *, **, and *** indicate significance at 10%, 5%, and 1% levels, respectively.

References

1. Sun, D.Q.; Zhang, J.X.; Zhu, C.G.; Hu, Y.; Zhou, L. An assessment of China's ecological environment quality change and its spatial variation. *Acta Geogr. Sin.* **2012**, *12*, 1599–1610.
2. Long, S.; Hu, J. On environmental pollution from the perspective of government-enterprise collusion: A theoretical and empirical analysis. *J. Financ. Econ.* **2014**, *10*, 131–144.
3. Jones, B.; Olken, B. Do leaders matter? National leadership and growth since World War II. *Q. J. Econ.* **2005**, *3*, 835–864.
4. Wang, X.B.; Xu, X.X.; Li, X. Provincial governors' turnovers and economic growth: Evidence from China. *China Econ. Q.* **2009**, *4*, 1301–1328.
5. Cao, G.Y.; Zhou, L.A.; Weng, X. Effects of leadership turnovers on economic growth and the underlying mechanism—Evidence from prefectural-level jurisdiction. *China J. Econ.* **2019**, *4*, 102–126.
6. Ali, A.M. Political instability, policy uncertainty, and economic growth: An empirical investigation. *Atl. Econ. J.* **2001**, *29*, 87–106. [\[CrossRef\]](#)
7. Alesina, A.; Perotti, R. Income distribution, political instability, and investment. *Eur. Econ. Rev.* **1996**, *6*, 1203–1228. [\[CrossRef\]](#)
8. Julio, B.; Yook, Y. Political uncertainty and corporate investment cycles. *J. Financ.* **2012**, *1*, 45–83. [\[CrossRef\]](#)
9. Sun, J.X.; Zong, J.F. Does the governors' turnover affect the behavior and performance of corporations? *Ind. Econ. Res.* **2014**, *5*, 92–103.
10. Wang, P.; Li, C.Y. Turnover of government officials, entrepreneurs following and investment efficiency. *Soft Sci.* **2020**, *6*, 91–96.
11. Lei, G.Y.; Liu, M.; Wang, W.Z. The replacement of officials in power, uncertainty and utilizations of foreign capital. *Res. Econ. Manag.* **2017**, *3*, 24–35.
12. Li, H.J. Governor's turnover, bank credit and R&D investment. *Sci. Res. Manag.* **2018**, *11*, 158–165.
13. Hughes, S.B.; Anderson, A.; Golden, S. Corporate environmental disclosures: Are they useful in determining environmental performance? *J. Account. Public Policy* **2001**, *3*, 217–240. [\[CrossRef\]](#)
14. Zhang, G.F. Government intervention, environmental pollution and corporate environmental protection investment—Evidence from listed companies of heavy pollution industries. *Res. Econ. Manag.* **2013**, *9*, 38–44.
15. Liang, P.H.; Gao, N. Personnel turnover, legal environment and local environmental pollution. *Manag. World.* **2014**, *6*, 65–78.
16. Guo, F.; Shi, Q.L. Official turnover, collusion deterrent and temporary improvement of air quality. *Econ. Res. J.* **2017**, *7*, 155–168.
17. Liu, G.Q.; Yang, Z.Q.; Zhang, F.; Zhang, N. Environmental Tax Reform and Environmental Investment: A Quasi-Natural Experiment Based on China's Environmental Protection Tax Law. *Energy Econ.* **2022**, *109*, 106000. [\[CrossRef\]](#)
18. Amemiya, T. Tobit models: A Survey. *J. Econom.* **1984**, *24*, 3–61. [\[CrossRef\]](#)
19. Chen, G.; Lu, P.; Lin, Z.; Song, N. Introducing Chinese private enterprise survey: Points and prospects. *Nankai Bus. Rev. Int.* **2019**, *4*, 501–525. [\[CrossRef\]](#)
20. Jiang, J. Making bureaucracy work: Patronage networks, performance incentives, and economic development in China. *Am. J. Political Sci.* **2018**, *4*, 982–999. [\[CrossRef\]](#)
21. Arabmazar, A.; Schmidt, P. An investigation of the robustness of the Tobit estimator to non-normality. *Econometrica* **1982**, *50*, 1055–1063. [\[CrossRef\]](#)
22. Wilson, C.; Tisdell, C. OLS and Tobit estimates: When is substitution defensible operationally? In *Economic Theory, Applications and Issues, Working Paper No. 15*; The University of Queensland: Brisbane, Australia, 2002.
23. Nie, H.H.; Jiang, M.J. Coal mine accidents and collusion between local governments and firms: Evidence from provincial level panel data in China. *Econ. Res. J.* **2011**, *6*, 146–156.

24. Fan, Z.Y.; Tian, B.B. Collusion for evasion: Evidence from the rotation of NTBs' directors in China. *China Econ. Q.* **2016**, *4*, 1303–1328.
25. Zhou, L.A. Governing China's local officials: An analysis of promotion tournament model. *Econ. Res. J.* **2007**, *7*, 36–50.
26. Cai, F.; Du, Y.; Wang, M.Y. The political economy of emission in China: Will a low carbon growth be incentive compatible in next decade and beyond? *Econ. Res. J.* **2008**, *6*, 4–11+36.
27. Chen, S.Y.; Xie, Z. An inquiry into the win-win policy for economic development and environmental protection—Start with the Lin Yi Air Pollution Abatement Incident. *Chin. J. Environ. Manag.* **2015**, *4*, 14–20+33.
28. Zhang, T.; Xie, L. The protected polluters: Empirical evidence from the national environmental information disclosure program in China. *J. Clean. Prod.* **2020**, *258*, 120343. [[CrossRef](#)]
29. Hector, A.; Bagchi, R. Biodiversity and ecosystem multifunctionality. *Nature* **2007**, *448*, 188–190. [[CrossRef](#)]
30. Villéger, S.; Norman, W.H.; David, M. New multidimensional functional diversity indices for a multifaceted framework in functional ecology. *Ecology* **2008**, *8*, 2290–2301. [[CrossRef](#)]
31. Jing, X.; He, J.S. Relationship between biodiversity, ecosystem multifunctionality and multiserviceability: Literature overview and research advances. *Chin. J. Plant Ecol.* **2021**, *10*, 1094–1111. [[CrossRef](#)]
32. Ouyang, Z.Y.; Wang, R.S.; Zhao, J.Z. Evaluation of ecosystem service functions and their ecological economic value. *J. Appl. Ecol.* **1999**, *5*, 635–640.
33. Zhang, Z.Q.; Xu, Z.M.; Cheng, G.D. Evaluation of ecosystem services and natural capital value. *J. Ecol.* **2001**, *11*, 1918–1926.
34. He, H.; Chen, F.; Zhang, H.L. Research progress on ecosystem services. *J. China Agric. Univ.* **2009**, *6*, 41–45.
35. Xie, G.D.; Zhang, C.X.; Zhang, C.S.; Xiao, Y.; Lu, C.X. The value of ecosystem services in China. *Resour. Sci.* **2015**, *37*, 1740–1746.
36. Song, W.F.; Li, G.P.; Han, X.F. The Value of Ecosystem Services: Economic Theory Context and Modern Interpretation. *Sci. Technol. Manag. Res.* **2015**, *9*, 244–249.
37. Jiang, W.; Wu, T.; Fu, B.J. The value of ecosystem services in China: A systematic review for twenty years. *Ecosyst. Serv.* **2021**. [[CrossRef](#)]
38. Huan, Q.Z. Green transformation strategy requires clearer path selection. *People's Trib.* **2016**, *32*, 26–27.
39. Yang, J.; Xue, D.; Huang, G. The Changing Factors Affecting Local Environmental Governance in China: Evidence from a Study of Prefecture-Level Cities in Guangdong Province. *Int. J. Environ. Res. Public Health* **2020**, *17*, 3573. [[CrossRef](#)]

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