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Does Environmental Policy with Veto Power Lead to Heterogeneous Emission? Evidence from China

Yan Fu [1,2], Jiaxing Cao [3], Xiaohui Wu [1], Jiale He [1], Zekun Zhou [1] and Yulin Zhao [1,*]

[1] College of Public Administration, Zhejiang University of Technology, Hangzhou 310023, China; fuyan@zjut.edu.cn (Y.F.); 201806051717@zjut.edu.cn (X.W.); 201906020806@zjut.edu.cn (J.H.); zhouzekun1001@outlook.com (Z.Z.)
[2] Zhejiang Institution of Talent Development, Hangzhou 310023, China
[3] School of Public Affairs, Zhejiang University, Hangzhou 310023, China; 12222104@zju.edu.cn
* Correspondence: zhaoyulin1015@126.com

Abstract: Under the high-powered target responsibility system since 2007, with newly added environmental criterion, this study seeks to examine the effectiveness of the target-based performance assessment as an accelerator for local officials to be "greener". This coercive environmental policy incorporates a stringent "one-vote" veto criterion for cadre promotion, meaning that officials who exceed emissions standards will not be promoted, no matter how outstanding their other performances are. Based on a panel data of 106 observations of provincial party secretaries from 31 provinces, this study examines how the target assessment intervenes in pollutant emissions through a new career incentive mode in China, and the conclusions are as follows: (1) Usually, provincial officials with higher political promotion incentives are characterized as a younger, lower-position cadre during the pre-stage of term, and tend to take GDP growth goals as a priority while treating environmental targets negatively. (2) Target assessment moderates the relationship between officials' position and SO_2 emission. The use of a one-vote veto in environmental pollution assessments has led to a shift of incentive structure, as political actors prioritize environmental protection as a means of increasing their chances of promotion. (3) The moderating effect of target assessment is heterogeneous, being significant only when officials are below 60 or before the third year of their term. This study sheds light on the previously opaque motivations behind green behaviors among officials, and provides empirical support for China's transition from a GDP-based assessment system to a green GDP-based promotion model.

Keywords: target assessment; promotion incentive; SO_2 emission; official characteristic

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1. Introduction

Environmental pollution has become a major problem globally. The classical theory of the Environment Kuznets Curve puts forward an inverted-U relationship between air pollution and per-capital income, which is exemplified by the prevalent economic growth speed in China's first two decades of reform and opening up, characterized by a focus on economic value at the expense of the deteriorative environment. This resulted in a simultaneous increase in pollution levels and economic growth rates. In order to pursue economic performance, local governments have attracted a large influx of foreign investment while lowering environmental requirements, leading to China being a "pollution haven" [1]. "Local government-enterprise collusion" further aggravates the degree of regional environmental pollution.

Environmental pollution in China needs to be analyzed from the perspective of political economy, as the pollution level is above ordinary and beyond the impact of industrialization [2]. Target assessment is an important factor in whether local governments regard environmental protection tasks as priority issues, as target-setting is a powerful measure to improve organizational performance in both the private and public sectors [3]. In the

1980s, China began to implement result-oriented governance reform, with the target-based cadre evaluation system as the core [4]. The central government set an overall goal for each mandatory indicator and gave it to all local governments step-by-step, with the implementation mechanism of "Administrative Subcontract" [5]. In order to motivate subnational bureaucrats, the fulfillment of mandatory targets is usually linked to the political promotion of major leaders, thus forming a high-intensity promotion incentive [6].

The "promotion tournament" theory has traditionally provided insight into the opaque process of political promotion, with economic growth being the primary factor in the target responsibility system used to determine who would stand out politically. In China, superior economic performance, whether absolutely or relatively better, has been a crucial factor driving the advancement of major local leaders [7]. On the basic principles of "open, democratic, internationally competitive, merit-based" cadre selection, the political promotion of local officials has been long dominated by economic development achievements. In essence, it is a product of mutual conditioning between the upper and lower local governments. The upper local government sets mandatory and quantifiable goals, and gives the local cadres strong career incentives in the political competition, prompting them to take the initiative to devote themselves to local economic growth, sometimes sacrificing the public interest of health care and clean air.

Inspired by the political promotion incentive with economic development as the primary cadre evaluation criteria, local officials actively attract investment and support enterprises to expand and exploit natural resources for short-term economic benefits. The construction of infrastructure such as railways, roads, and airports has rapidly improved investment conditions. Fueled by political promotion, pursuing large-scale economic infrastructure rather than environmental amenities has become a priority for local officials. With regard to industrial development, local government officials often prioritize the primary and secondary industries over the tertiary industry. The rapid expansion of local economic volume has met the key indicators of official promotion and sought political promotion advantages for local officials. Therefore, facing the contradiction between economic and environmental tasks, local governments bear unbalanced stimulation to pursue economic performance versus environmental performance goals, causing local officials to distort environmental behavior [8–10].

However, the "environmentally unfriendly" political promotion is facing challenges from increasingly serious environmental problems. A multitude of studies have fully revealed how environmental pollution undermines public health, as air pollution contributes to cardiorespiratory diseases, premature death, and child welfare [11–15]. Moreover, this adverse effect is region-wide, with spatial spillover effects and externalities. In China, the annual cost of disease treatment caused by air pollution has exceeded 20 billion CNY, indicating that the "growing the economy first, then treating pollution" model is unsustainable [16]. To address the environmental distortions caused by incentive misalignment in performance appraisals, in the Outline of the 11th Five-Year Plan (2006–2010) for National Economic and Social Development, China's central government set mandatory emission reduction targets for two pollutants, SO_2 and chemical oxygen demand (COD). Specifically, the central government requires that emissions of SO_2 and COD must be reduced by 10 percent during the 11th Five-Year Plan period compared with the Tenth Five-Year Plan period. In 2006, during the 11th Five-Year Plan period, the State Council issued the National Control Plan for the Total Emissions of Major Pollutants, which assigned the national SO_2 emission reduction targets to provincial levels. Provincial achievement of these goals was bound to performance evaluations of key provincial leaders. In 2007, The State Council issued the Method for Assessing the Total Emissions of Major Pollutants, setting up a "one vote veto" system for the nonfulfillment of the mandatory emission reduction targets [17]. In general, local governments with substandard pollutant emission reduction are not eligible to be rated as excellent, and local cadres will lose the promotion opportunity [18]. The one-vote veto system strengthens environmental accountability by raising political pressure on local governments to comply with environmental protection policies, thus reducing pollutant

emissions significantly [19]. Facing the goal of the transition to eco-friendly economic development, it is necessary to re-examine China's official promotion incentive mode to analyze the "black box" of local officials' environmental decisions [20]. Thus, does the introduction of the one-vote veto environmental pollution assessment shift the promotion inventive mode and further improve green development, and, if so, how? To answer the question, this paper uses a cross-section heterogeneity model to examine how the policies with veto power moderate the relationship between officials' career concerns and pollutant emissions, using the panel data from 31 provinces from 2003 to 2018. Such analyses contribute to solving the question of whether stricter environmental criterion could challenge the "environmentally unfriendly" political promotion mode and drive officials to be greener when they struggle with multi tasks. The rest of this paper is as follows: in Section 2, the literature review and research hypothesis are presented; Section 3 introduces the methods and data used in the article; Section 4 demonstrates empirical results and discusses the impact of the "one vote veto" policy; and Section 5 summarizes the main conclusions and gives the enlightenment of the policy on environmental governance.

2. Literature Review and Research Hypotheses

Since the 1980s, China has implemented a greatly centralized personnel management system: the principle of the party governing cadres and the nomenklatura system, namely, the leading body of CPC Central and Local Party Committee, the Organization Department of CPC Central and Local Committee hierarchically governing cadres' promotion and removal [9]. Though the fiscal decentralization reforms have granted local governments greater autonomy in economic development, as government officials in the administrative pyramid, the opportunity for political promotion in the officialdom transcends material incentives and becomes a more important motivation for official behavior [18]. The central government retains a centralized power to appoint local government officials, ensuring that local governments follow their policy preferences and achieve such mandatory goals at the national level. Therefore, compared with the weakness of environmental protection law reform, under the pyramid personnel management system, improving the priority of environmental protection objectives in cadre management assessment and implementing environmental cadre evaluation should be the most favorable weapons to motivate provincial, municipal, and even state-owned enterprise cadres. The one-vote veto system for environmental protection indicators provides a legal basis for local governments to prioritize environmental performance.

Additionally, the promotion incentives ensure that local officials adhere to the environmental protection indicators established by the central government. This hypothesis is supported by official promotion data. In recent years, studies have revealed that officials often face a trade-off between economic and environmental tasks. Although economic performance still dominates, there are some doubts about whether the introduction of emission reduction criterion in the assessment system can effectively change the promotion structure of local officials, and many empirical experiences demonstrate the increasing role of pollution emission indicators on officials' performance assessment [21]. A new "political tournament" is thus born [22–24]. Recent studies have shown that the one-vote veto system creates a threshold effect for environmental pollution in the promotion of officials, particularly in the context of the dual goals of economic growth and environmental protection. Officials are more likely to be promoted if environmental pollution is below a certain threshold, with economic performance playing a supporting role [25].

Therefore, the existing literature mainly examined how environmental quality influences the promotion probability of local officials, indirectly concluding that once environmental pollution indicators are included in the target assessment responsibility system and strongly linked with officials' political promotion, local officials will actively mitigate environmental pollution out of quicker political promotion [2]. In turn, do officials' expectations of the possibility of future promotion affect their resource allocation strategies, the investment in environmental protection tasks, and their environmental performance?

Existing research on the political economy analysis of environmental protection is still insufficient. We need to explore how the promotion incentives linked with officials' characteristics, including age, tenure, and position under environmental protection assessment, will affect environmental governance and whether the one-vote veto system will affect the officials' promotion structure.

2.1. The Impact Effect of Officials' Characteristic on Pollutant Emission

The age, tenure, and political level of officials are the internal characteristic factors of officials' promotion incentives. Personal characteristics are significant variables that influence officials' career trajectories in terms of political promotion. The age of officials is particularly crucial, as it represents their likelihood of being promoted. Since the elimination of the tenure system for leading cadres in 1982 and the implementation of mandatory retirement regulations, age has become a critical factor affecting the promotion prospects of government officials. Due to the special emphasis on the rejuvenation of leading cadres, the promotion opportunities are greatly reduced as the age of candidates increases and approaches the retirement age [9]. As officials approach retirement, officials' promotion space becomes more limited and their promotion efforts continue to decline [26]. In the multi-task principal-agent model, local governments as agents have obvious preferences in task selection [27]. The traditional promotion tournament model shows that local officials with strong promotion incentives tend to give priority to economic development when faced with conflicting tasks of environmental assessment and GDP assessment. Therefore, in the long run, when local officials have more promotion opportunities, they will adopt "radical" economic growth strategies to accumulate performance capital. Based on these analyses, our assumptions are made:

Hypothesis 1. *The age of local officials is negatively correlated with the level of pollutant emissions. Younger officials have more opportunities to be promoted, thus making the more emission decisions.*

The 1986 revision of the "Organic Law of the People's Republic of China on Local People's Congresses and Local People's Governments at All Levels" established a five-year term for party and government leaders. In 2006, the General Office of the Central Committee of the Communist Party of China issued the "Interim Provisions on the Terms of Appointment of Party and Government Leading Cadres", which limits individuals to a maximum of two consecutive terms in the same position. Usually, when the term of office of provincial officials ends at a relatively old age, if have not been promoted, they will almost certainly lose the possibility of promotion [26]. Officials in the early term have a greater chance of promotion. In a sense, the tenure system of officials as an implicit governance method strengthens the "promotion tournament". Local government officials often show higher performance in the first few years of their tenure, showing outstanding performance with high identification among similar officials, so that they can better meet the administrative goals set by their superiors and get promoted [28]. As a result, officials tend to vigorously boost economic growth early in their term of office, and the level of pollutant emissions also increases. Studies have found that CO_2 emissions appear in an inverted U-shaped development over the term of office, usually peaking in the fourth year—-that is, officials adopt a strategy of first emission and then emission reduction [29]. Thus, we put forward the following hypothesis:

Hypothesis 2. *There exists a negative correlation between the time period in local officials' terms and pollutant emissions. Specifically, in their early term, officials have a greater chance of being promoted, leading to a higher level of pollutant emissions.*

The Political Bureau of the Central Committee is the highest leading body of the Party, which is produced by the Central Committee of the Communist Party of China. Most provincial and ministerial officials who want to be promoted upward usually go through the path from central alternates and formal members to members of the Politburo and

standing committees of the Politburo. Formal members have become the upper limit for the promotion of most provincial officials [30]. As provincial officials who are also alternate members and full members of the Central Committee have entered the threshold of the highest power center, the marginal returns available for further upward promotion are gradually decreasing, so their promotion motivation is relatively low, while officials who have not yet crossed this threshold have strong promotion motivation and promotion efforts. Similar to the analysis above, the next hypothesis is put forward:

Hypothesis 3. *The political level of local officials is negatively correlated with the level of pollutant emissions, that is, the lower the political level, the stronger the promotion motivation, and the higher the level of pollutant emissions.*

2.2. Moderating Effect of Target Assessment between Officials' Characteristics and Pollutant Emissions

The age, tenure, political level, and other characteristics of officials are important reference factors for political promotion expectations. Although officials with strong promotion expectations (strong promotion opportunities and strong promotion motivation) have the traditional endogenous motivation to give priority to economic growth and thereby make emission levels higher, increasingly stringent environmental assessment stands to determine the promotion of cadres to an increasing extent, which will improve the enthusiasm of officials to control environmental pollution. Basically, the introduction of the one-vote veto system will change the strategic choice of officials' promotion behavior and affect the direction of officials' promotion expectations on environmental governance. Moreover, the process of local officials' response to various incentives and external competition is also the process of officials making optimal decisions based on their own considerations. Officials' personal characteristics will affect their efforts to implement environmental governance policies. Therefore, this study will further examine the interaction between the introduction of target assessment and the personal characteristics of provincial officials, and it will excavate the influence and deep mechanism of official heterogeneity on the implementation effect of target assessment. Accordingly, we put forward the following hypothesis:

Hypothesis 4. *The implementation of the environmental protection one-vote veto system alters the relationship between officials' personal characteristics and pollutant emission levels. Following the introduction of this system, the greater the promotion incentive for officials, the better the environmental governance outcomes, and the lower the level of pollutant emissions.*

Strict environmental regulations generally bring about a slowdown in regional economic growth. Therefore, local officials will adopt selective emission reduction behavior when facing the dual pressures of environmental governance and GDP growth. That is to say, officials face relatively loose pressure to reduce emissions for pollutants that are not included in the scope of environmental protection assessment, which will reduce the corresponding governance investment, and invest limited resources in pollutant treatment within the scope of assessment to maximize promotion benefits [31]. Previous studies have also found that policies related to the target responsibility system have an impact on SO_2 emission reduction, but do not reflect any spillover effects on CO_2 and wastewater emissions [31]. Therefore, this paper puts forward the following hypothesis:

Hypothesis 5. *The environmental protection of the one-vote veto system and officials' personal characteristics will not affect emissions of pollutants that are not listed as mandatory controlled ones compared to those that are listed.*

3. Methodology and Data

3.1. Data Description and Source

This study aims to examine the effectiveness of the one-vote veto policy in addressing environmental pollution and the varying responses of provincial officials toward this policy.

Therefore, we need to establish an econometric model to evaluate and analyze it. The study uses panel data of 31 provincial Party secretaries from 2003 to 2018. Table 1 displays the variables deployed in our research and their definitions and sources. The dependent variable is sulfur dioxide emissions; the explanatory variables are the tenure, age, and position of officials; and the control variables are local economic level, industrial structure, regional population, industrial pollution degree, and local pollution control degree. Section 3.2 will explain the reasons for the selection of indicators. The official data of the explanatory variables are from Baidu Encyclopedia. The official data in Baidu Encyclopedia are compiled by government departments and have high credibility. Additional data for this study were obtained from the China Statistical Yearbook and China Environmental Statistical Yearbook, which are reliable sources of accurate information to support our research. Table 2 provides the descriptive statistics for the variables presented in Table 1.

Table 1. Variables and description.

Variables	Definition	Type	Unit	Source
SO_2	SO_2 emissions in different provinces	Numerical variable	Ton	China Environmental Statistical Yearbook
PM2.5	PM2.5 emissions in different provinces	Numerical variable	Ug/m^3	Atmospheric Composition Analysis Group at Dalhousie University
Term	The length of an official's term	Numerical variable	Year	China Baidu Encyclopedia Public Data
Age	65 minus the age of the official in the year of the upcoming National People's Congress official position	Numerical variable	Year	China Baidu Encyclopedia Public Data
OP	Official position, whether it is a member of the CPC Central Committee	Dummy variable	/	China Baidu Encyclopedia Public Data
TA	Target assessment, it was 0 before 2008 and 1 after 2008	Dummy variable	/	/
LFR	Local government revenue	Numerical variable	100 million CNY	China Statistical Yearbook
PSI	Proportion of secondary industry in GDP	Numerical variable	/	China Statistical Yearbook
RP	Regional population	Numerical variable	10,000 people	China Statistical Yearbook
IWD	Industry waste water discharge	Numerical variable	10,000 tonnes	China Statistical Yearbook
IIG	Investment in industrial governance	Numerical variable	100 million CNY	China Statistical Yearbook

Table 2. Descriptive Statistics.

	N	Mean	SD	Min	Max	p25	p50	p75
SO_2	389	4.0470	0.8748	0.7768	5.2998	3.7586	4.1537	4.6776
PM2.5	389	15.6331	1.0965	12.1129	18.2531	15.2007	15.8429	16.1411
Term	389	3.0334	1.8918	1.0000	10.0000	2.0000	3.0000	4.0000
Age	389	6.9254	3.9405	0.0000	20.0000	4.0000	6.0000	9.0000
OP	389	0.8817	0.3233	0.0000	1.0000	1.0000	1.0000	1.0000
TA	389	0.6144	0.4874	0.0000	1.0000	0.0000	1.0000	1.0000
LFR	389	6.6547	1.1342	3.1797	9.1449	5.8388	6.7462	7.4995
PSI	389	47.6035	7.6121	21.3000	61.5000	44.3247	49.1000	52.8000
RP	389	3.5446	0.3283	2.7275	4.0674	3.3906	3.5824	3.7860
IWD	389	11.8191	0.9161	8.1470	13.7229	11.3141	11.8877	12.4695
IIG	389	11.6506	1.0725	7.5606	14.1637	11.0731	11.7926	12.3218

Note: date of SO_2, PM2.5, LFR, RP, IWD, IID are carried out logarithmic transformation.

We select provincial data rather than municipal data for several reasons. First, with five tiers of government in China, in the appointment system, the central government has a

direct right to appoint provincial officials, while the appointment of municipal government officials is affected by political factors at the provincial level, and the decision-making of provincial government officials demonstrates a direct reflection of the implementation of targets set by the central government. Second, urban pollutant control and emission measures are not always effective. They are easily misled by obsolete urban air quality monitoring systems with high selectivity and fall into the dilemma of technical governance [32]. The negative externalities of environmental governance will reduce the motivation of municipal governments to issue and implement environmental fiscal and taxation policies. Compared with provincial areas, urban areas have relatively small boundaries, while the transboundary nature of environmental pollution and the strong positive spatial dependence will drive cities to free-ride in environmental governance [33].

3.2. Specification of Variables

3.2.1. Explained Variable

This study focuses on sulfur dioxide emissions as the key indicator of environmental concern. In line with the Eleventh Five-Year Plan for National Economic and Social Development of the People's Republic of China, sulfur dioxide (SO_2) and chemical oxygen demand (COD) were identified as two obligatory targets by the Chinese central government [33]. The emission of sulfur dioxide in each province is used in this paper as a representation of the environmental performance and emission behavior of officials, as it is a crucial pollutant in China's emission control policy [5,34]. Additionally, this is also consistent with the necessary requirements for the promotion of officials outlined in the Assessment Method for Total Pollutant Emission Reduction issued by the State Council of China in 2007, which aims to achieve a reduction in sulfur dioxide emissions.

3.2.2. Explanatory Variable

This study chooses the relevant individual characteristics of the provincial party secretary rather than the provincial governor as the explanatory variable because, under the leadership system of "party governing cadres" in China, the actual power and resources of the party committee departments are far more than those of the administrative departments. During the process of environmental governance, the provincial party secretary possesses more power than the governor to determine the priority of environmental protection tasks. The time (tenure) of officials in local offices will change their performance by affecting their promotion incentives. Figure 1 is the provincial party committee of this paper.

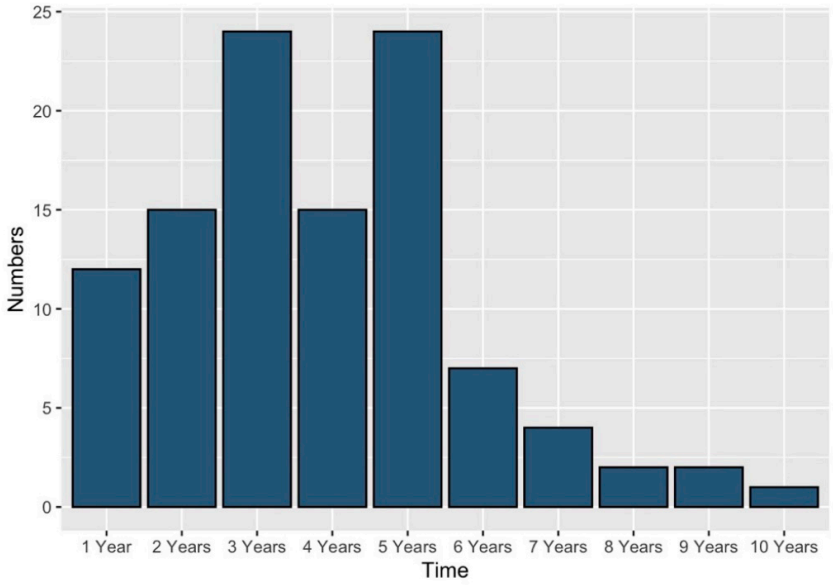

Figure 1. Term distribution of provincial Party secretaries.

The age of officials represents the space and possibility of their promotion. Since the appointment of officials in China is carried out through the National People's Congress, the traditional measurement of the age of officials may be inaccurate because of the error before and after the meeting. We refer to the research of Liang et al. (2015) and re-measure of officials' age. The relative age difference of officials is obtained using 65 (mandatory retirement age) to subtract the age of the official in the year of the upcoming National People's Congress, which can more accurately measure their promotion space by the age of officials [19]. Figure 2 shows the distribution of the relative age difference (the time from retirement) of officials.

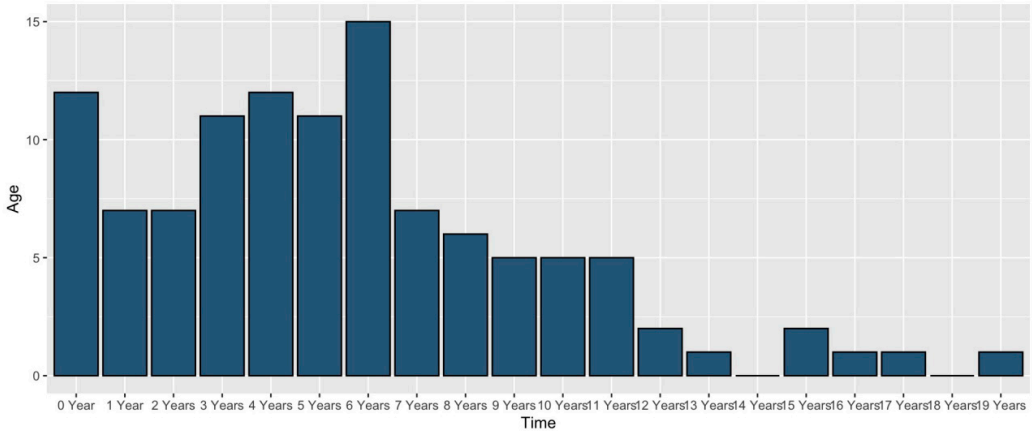

Figure 2. The age distribution from the retirement of provincial Party secretaries.

Official positions also alter the performance and behavior of officials. This research distinguishes the promotion incentives of officials by whether the provincial party secretary is a central committee member, as officials who are not central committee members want to be able to enter the threshold of the highest power center, which may cause them to manifest heterogeneous behavior [30].

3.2.3. Control Variable

The level of local economic development may be a crucial factor in determining environmental pollution and emissions. Local fiscal revenue, in particular, is a key metric for measuring the level of the local economy, especially after China's tax distribution system reform in 1994. This metric is closely tied to the local economic development strategy and behavior of officials [35]. Previous research has demonstrated that fiscal revenue and decentralization can have a significant impact on pollutant emissions [36]. Therefore, we include the level of local fiscal revenue as a control variable for sulfur dioxide emissions in order to account for the influence of local economic factors.

Different industrial structures can lead to variations in environmental pollution, as industrial emissions are a major source of environmental pollution. Therefore, differences in industrial structure can have a remarkable impact on environmental pollution, particularly if the share of secondary industry in GDP is high. Given the influence of industrial structure on environmental pollution in previous research, this study employs the share of secondary industry in GDP as a measure of the differences in industrial structure among different provinces [37,38].

The size of the regional population is another significant factor that influences environmental pollution and emissions. Population growth may lead to an increase in environmental pollution emissions [39,40]. Furthermore, population agglomeration and urbanization may also contribute to the concentration of industries and populations, which can increase the efficiency of pollution control and reduce the marginal cost of environmental protection through economies of scale [41]. Although the precise impact of population on environmental pollution requires further study, the number of people residing in a region is a crucial variable to consider when analyzing environmental pollution.

The relationship between industrial pollution and emissions is significant. The direct source of sulfur dioxide comes from industrial pollution. However, different types of industrial products in different cities will also lead to different types of pollutants. There is a proposed significant correlation between industrial wastewater and industrial sulfur dioxide emissions, and, therefore, when the dependent variable is sulfur dioxide, this paper selects industrial wastewater discharge to represent the urban industrial pollution level, which can be analyzed as an effective control variable [42].

The level of local pollution control will also lead to important changes in environmental pollution. Studies have pointed out that industry investment in pollution control can effectively reduce the generation of environmental pollution, and there are significant spatial differences in industrial pollution control investment [43]. Therefore, when analyzing whether the "one-vote veto" policy can effectively reduce sulfur dioxide emissions in various provinces, it is essential to take into account the level of pollution control in these areas and consider industrial pollution investment as an important factor in sulfur dioxide control.

3.3. Model Specification

Based on the above three assumptions, we employed a two-way fixed effects model to examine the impact of the one-vote veto on the emission behavior of local officials through the analysis of panel data, with all standard errors clustered at province level, as shown in Equation (1):

$$lnSO_{2it} = \beta_0 + \beta_1 OP_{it} \times TA_t + \beta_2 OP_{it} + \beta Controls_{it} + \gamma_i + \mu_t + \varepsilon_{it} \quad (1)$$

where $Controls_{it}$ is a vector of control variables and ε_{it} serves as a random error term. We include province and year-specific fixed effects to control for unobservable individual characteristics and time-varying macroeconomic conditions. To reduce the heteroscedasticity problem, we carried out a logarithmic transformation on the dependent variable and part of the control variable.

In policy evaluation, the difference-in-differences model has been one of the workhorse frameworks for empirical analysis in policy evaluation. However, for nationwide policies such as the "veto power" policy, it is difficult to effectively distinguish the experimental group and the control group, and it is difficult to evaluate them using the difference-in-differences model. Therefore, our model uses interaction terms for analysis. Taking the interaction term between OP and TA as an example, its coefficient represents the difference in emissions under different positions before and after the implementation of the veto power policy in 2008, because TA takes the value of 1 after 2008 and 0 otherwise. From Equation (1), we can obtain that:

$$\frac{\partial y}{\partial OP} = \beta_1 TA + \beta_2 \quad (2)$$

When the veto power policy was implemented in 2008 (TA = 1),

$$\frac{\partial y}{\partial OP} = \beta_1 + \beta_2 \quad (3)$$

When the veto power policy was not implemented in 2008 (TA = 0),

$$\frac{\partial y}{\partial OP} = \beta_2 \quad (4)$$

Therefore, by introducing interaction terms, we can analyze the changes in emission behavior before and after 2008. Before 2008, central political committee members (OP = 1) produced β_2 more emissions than non-central political bureau members (OP = 0); after 2008, central political committee members (OP = 1) still had $\beta_1 + \beta_2$ more emissions than non-central political bureau members (OP = 0), and the difference between the two is the

interaction term coefficient between *OP* and *TA*. This allows us to quantitatively analyze the effectiveness of the "veto power" policy implemented in 2008, and, at the same time, judge the differences in local government emission behavior before and after the policy among officials in leadership positions.

4. Results and Discussions

4.1. Baseline Results

Table 1 presents the results of the baseline regression. Due to the "one veto" policy (*TA*), which had a value of 0 before 2008 and 1 after 2008, it was perfectly collinear with time-specific fixed effects. Therefore, we examined the impact of the "one-veto" policy on environmental pollution control by focusing on its interaction term. We interact *OP* with *TA* in column (1) of Table 3, term with *TA* in column (2), and age with *TA* in column (3). Column 4 is a robustness result of the baseline regression by using PM2.5 as the dependent variable.

Table 3. Baseline results.

	(1)	(2)	(3)	(4)
		SO_2		PM2.5
OP × *TA*	0.156 **			−0.022
	(2.34)			(−0.93)
Term × *TA*		−0.003		
		(−0.30)		
Age × *TA*			0.002	
			(0.32)	
OP	−0.088 *	−0.009	−0.009	0.009
	(−1.82)	(−0.19)	(−0.18)	(0.56)
Term	0.004	0.009	0.007	−0.003
	(0.50)	(1.04)	(1.00)	(−0.73)
Age	0.003	0.003	0.001	0.001
	(0.59)	(0.64)	(0.16)	(0.38)
LFR	0.259	0.266	0.269	−0.015
	(1.43)	(1.43)	(1.44)	(−0.31)
PSI	−0.001	−0.002	−0.002	−0.001
	(−0.15)	(−0.26)	(−0.26)	(−0.78)
RP	−2.039 *	−2.079 *	−2.085 *	−0.564
	(−1.79)	(−1.80)	(−1.82)	(−1.51)
IWD	0.273 *	0.285 *	0.282 *	0.015
	(1.73)	(1.77)	(1.76)	(0.53)
IIG	0.092 ***	0.090 **	0.089 **	−0.002
	(2.77)	(2.59)	(2.66)	(−0.25)
Constant	5.262	5.278	5.329	17.663 ***
	(1.15)	(1.15)	(1.17)	(13.29)
Observations	389	389	389	389
Adjusted R-squared	0.975	0.974	0.974	0.996
Province FE	√	√	√	√
Year FE	√	√	√	√
Cluster	Province	Province	Province	Province

Notes: t statistics in parentheses; ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, the same below.

For a long time, the characteristics of officials have been considered an important factor influencing their administrative behavior, as different characteristics may give them varying degrees of promotion incentives [9,21,29,44]. The baseline results from Table 3 demonstrate the negative correlation between an official's political position and the level of SO_2 emissions, thus confirming Hypothesis 3. We have found that different official positions may affect the sulfur dioxide emissions in their provinces to meet their development needs after the implementation of a veto policy. As to Hypotheses 1 and 2, according to previous studies, there is a significant inverted-U shape correlation between tenure and promotion

probability, and a slightly weak inverted-U shape correlation between age and promotion probability [25], which indicates that officials younger or in earlier term with a higher advantage in promotion may emit more. However, we did not find significant effects of tenure and age on sulfur dioxide emissions in Table 1, and we still need to further analyze the potential effects of officials' tenure and age.

Furthermore, Model 4 had the same setting as Model 1, but the dependent variable was changed to annual PM2.5 emissions. The coefficient of OP, term, age, $OP \times TA$ in Model 4 were not significant, which further confirms the Hypothesis 5. This is because sulfur dioxide was the main pollutant controlled in the "one veto" system, and PM2.5 was not the main pollutant. Therefore, the regression results in Table 1 are robust.

4.2. The Potential Mechanism of Official Characteristics on Emission

Although the age and tenure of officials did not directly affect sulfur dioxide emissions in the baseline regression results, we need to further discuss how the characteristics of officials, such as tenure and age, affect the behavior of local governments in reducing sulfur dioxide emissions. To explore the impact mechanism of officials' tenure and age on sulfur dioxide emissions in different positions, we further split the sample, conduct the regressions separately, and compare the results. The results are presented in Table 2, which includes the regression results of Models 1 and 2 for officials who are and are not members of the Central Political Bureau, respectively. Model 3 and Model 4 demonstrate the effect of officials' age on sulfur dioxide emissions within their respective provinces.

The regression analysis results show that tenure and age have heterogeneous effects on officials in different positions. Through Model 1 and Model 3 in Table 4, we found that if the provincial party secretary is a member of the central committee ($OP = 1$), the length of his tenure and the age at retirement do not significantly affect sulfur dioxide emissions in his province; conversely, if the provincial party secretary is not a member of the central committee ($OP = 0$), his tenure and age will significantly affect sulfur dioxide emissions in his province. According to Model 2, for provincial party secretaries who are not members of the central committee, there is a negative effect of tenure on SO_2 emissions, significant at the 5% level, meaning that officials who have been in office longer tend to emit less sulfur dioxide. Model 4 indicates that officials who are not members of the central committee ($OP = 0$) would reduce sulfur dioxide emissions in their provinces when they approach retirement age gradually. Previous studies consider the independent and homogeneous impact of officials' age, tenure, and position, the three factors affecting promotion [9,21,29,44]. However, Table 4 indicates that age, tenure, and position may have different functions in officials' promotion. Without considering one-vote veto environmental policy, officials' political position may play a threshold role in officials' promotion and their emission decisions. It is only when officials are not member of the Central Committee, which means they have bigger motivation to step into a higher position, that their age and tenure will function in promotion tournament and thus effect SO_2 emission.

4.3. The Heterogeneous Effect of Official Characteristics before and after the Policy

Through the analysis above, we have found the differential effects of different positions before and after policy changes on the sulfur dioxide emissions in the provinces where officials are located, indicating the roles of officials' tenure and age. Therefore, we further conducted heterogeneity analysis by introducing the interaction term to the subsample regression. By dividing officials into different age and tenure groups, we explored the potential impacts of officials' characteristics on emissions. The duration of an official's tenure is a crucial factor that affects their promotion prospects and political incentives. Although the average and median tenure in descriptive statistics is 4 years, research has shown that the transfer of provincial leaders is often judged based on whether they have served for 3 years or less in a particular location [45]. In addition, for officials' age, 60 is considered a watershed age for Chinese officials. Officials who are within five years of retirement have a low probability of being promoted, while officials under the age of 60

are more eager to have further promotion opportunities and retire at a higher political position, which is considered a regularity in officials' promotion in China [46]. Therefore, we reported the results of four grouping regressions using 3 years and 5 years as the division criteria, as shown in Table 5.

Table 4. Disaggregated regression results by item *OP*.

	(1)	(2)	(3)	(4)
	***OP* = 1**	***OP* = 0**	***OP* = 1**	***OP* = 0**
Term	0.004	−0.021 **		
	(0.58)	(−2.95)		
Age			0.002	0.021 **
			(0.50)	(2.95)
LFR	0.169	−0.133	0.175	−0.133
	(1.00)	(−0.21)	(1.07)	(−0.21)
PSI	0.001	0.006	0.001	0.006
	(0.09)	(0.45)	(0.10)	(0.45)
RP	−2.527 **	−0.064	−2.392 **	−0.064
	(−2.22)	(−0.03)	(−2.08)	(−0.03)
IWD	0.228	−0.066	0.224	−0.066
	(1.44)	(−0.53)	(1.41)	(−0.53)
IIG	0.100 ***	0.010	0.099 ***	0.010
	(3.08)	(0.27)	(2.99)	(0.27)
Constant	7.960 *	5.867	7.489	5.674
	(1.77)	(1.05)	(1.66)	(1.01)
Observations	344	38	344	38
Adjusted R-squared	0.977	0.991	0.977	0.991
Province FE	√	√	√	√
Year FE	√	√	√	√
Cluster	Province	Province	Province	Province

Notes: t statistics in parentheses; ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, the same below.

Consistent with Table 1, according to Model 2, the regression results showed that before 2008 (TA = 0), non-Central Committee members (OP = 0) with less than 3 years of local tenure had 13.0% more sulfur dioxide emissions than those in provinces where Central Committee members (OP = 1) were located; after 2008 (TA = 1), non-Central Committee members (OP = 0) with tenure of 3 years or less had 8.9% less sulfur dioxide emissions than those in provinces where Central Committee members (OP = 1) were located. The difference was 21.9% (interaction coefficient, i.e., +13% − (−8.9%) = 21.9%), significant at the 5% level. The conclusion of Model 3 showed that before 2008 (TA = 0), non-Central Committee members (Pos = 0) with more than 5 years to retirement had 7.9% more sulfur dioxide emissions than those in provinces where Central Committee members (Pos = 1) were located; after 2008 (TA = 1), non-Central Committee members (Pos = 0) had 12.3% less sulfur dioxide emissions than those in provinces where Central Committee members (Pos = 1) were located. The difference was 20.2% (interaction coefficient, i.e., +7.9% − 12.3% = 20.2%), significant at the 5% level. Figure 3 represents the distribution of regression coefficients and their confidence intervals in Table 5. We can see that the overall effect is also significant, further supporting the above conclusions. In summary, the implementation of the "veto system" in 2008 has resulted in increased promotion incentives for provincial party secretaries holding relatively lower positions and who are younger, and has enabled them to achieve more significant results in reducing sulfur dioxide emissions. Hypothesis 4 is thereby verified.

Table 5. Mediating effect of *OP* by item term and age.

	(1)	(2)	(3)	(4)
	Term > 3	**Term ≤ 3**	**Age > 5**	**Age ≤ 5**
OP × *TA*	0.068	0.219 **	0.202 **	−0.059
	(1.08)	(2.24)	(2.11)	(−0.50)
OP	−0.046	−0.130 **	−0.079	−0.057
	(−0.80)	(−2.06)	(−1.04)	(−0.95)
Term	−0.001	−0.006	−0.008	0.011
	(−0.09)	(−0.43)	(−0.59)	(0.76)
Age	0.012	0.000	0.003	0.020
	(1.38)	(0.08)	(0.48)	(1.12)
LFR	0.276 **	0.250	0.310 **	0.193
	(2.14)	(1.01)	(2.14)	(0.72)
PSI	−0.015 *	−0.000	−0.004	−0.008
	(−1.88)	(−0.02)	(−0.62)	(−1.33)
RP	−2.593 **	−2.516 *	−3.335 ***	0.354
	(−2.60)	(−1.88)	(−3.63)	(0.23)
IWD	0.636 ***	0.212	0.289 *	0.334 **
	(5.29)	(1.21)	(1.82)	(2.07)
IIG	0.070 **	0.100 **	0.126 ***	0.060
	(2.11)	(2.71)	(3.43)	(1.57)
Constant	3.664	7.631	8.912 *	−2.780
	(0.92)	(1.32)	(1.94)	(−0.43)
Observations	131	258	235	153
Adjusted R-squared	0.985	0.973	0.980	0.977
Province FE	√	√	√	√
Year FE	√	√	√	√
Cluster	Province	Province	Province	Province
Empirical *p*-value	0.000		0.000	

Notes: t statistics in parentheses; ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, the same below.

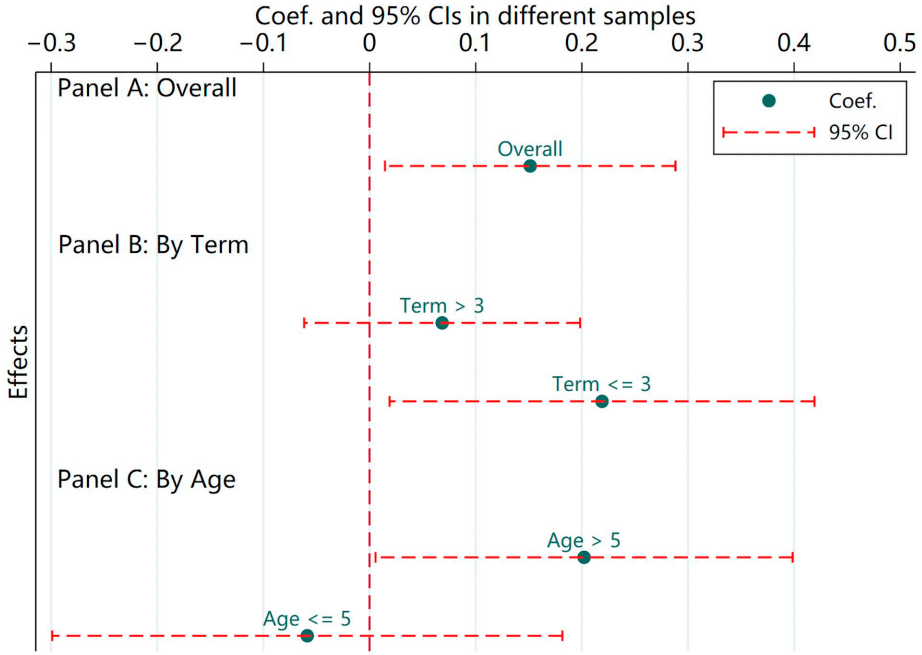

Figure 3. Visualization of regression results.

4.4. Further Discussions

4.4.1. Power and Restriction of Environmental Targets

In Western countries, governments developed a set of market-based policy instruments aimed at target enterprises to advance environmentally sustainable GDP and energy conservation in the absence of top-down mandatory assignment from higher-level governments. These policy instruments include interventions such as carbon tax policies to encourage the use of technology innovation and green technology. Whether local governments use regulatory or incentive environmental policy tools and how they implement policies usually depend on organizational structure of local governments (such as council-management government), public support, business community support, political ideology, and fiscal and human resource capacities [47,48]. However, under China's unique institutional arrangements, the implementation of emission reduction tasks relies more on one-vote veto target assessment and official promotion incentives. Target assessment functions effectively as official promotion is now tied to environmental performance.

The strategic emission reduction measures taken by local governments have confirmed the impact of veto power and career incentives on environmental performance. Comparing the impact of official characteristics on SO_2 and PM2.5 emissions, we found that whether an official is a central committee member and the interaction between target setting and being a central committee member significantly affect the former but not the latter. The "Method for Statistics of Major Pollutants" has been issued by the Ministry of Environmental Protection and other departments, which requires a 10% reduction in pollutant categories for the implementation of total emission control in the "plan". The "Eleventh Five-Year Plan" focuses on chemical oxygen demand (COD) and sulfur dioxide (SO_2), while the "Twelfth Five-Year Plan" and "Thirteenth Five-Year Plan" target COD, ammonia nitrogen, sulfur dioxide, and nitrogen oxides. SO_2 has always been a binding emission reduction indicator imposed from top to bottom by the state, while PM2.5 was only included in the key environmental governance indicators for city-level rather than provincial-level government officials in 2013. Officials' characteristics, such as whether they are central committee members, their tenure, and age, do not affect the achievement of non-binding indicators, but they do affect the achievement of binding indicators, such as environmental pollutants with high visibility (for instance, SO_2). Therefore, under assessment pressure and career incentives, local governments will adopt strategic emission reduction environmental protection measures but they may not effectively govern pollutants that are not hard targets.

4.4.2. Changes in Incentives by One-Vote Veto

There are strong links between officials' characteristics and career incentives, so age, tenure, and political level affect officials' behavior preferences accordingly. The main focus of previous research has confirmed the impact of industrial, economic, and demographic factors on pollutant emissions [49]. Political factors such as local government's competition and officials' concern with promotion also matter. For local government, setting ambitious goals on pollution reduction would lead to lower economic growth in the short run (local government competition on setting emission reduction goals), so officials must make a trade-off between the two performances. Therefore, this study further explored the relationship between officials' tenure stage, age, Central Committee member status, and SO_2 emissions, revealing the path by which promotion motivation and opportunities influence environmental decisions under two different performance assessment systems, as shown in Figure 4. Under GDP-centered assessment system: (1) Officials' political level affects the SO_2 emissions. When officials are members of the Communist Party of China, they tend to reduce emissions, while non-members facing strong promotion motivation may adopt high-emission decisions. (2) When provincial leaders are Central Committee members with insufficient promotion motivation, other characteristics including age and tenure stage, which reflect promotion opportunity, do not affect environmental decisions. Therefore, promotion motivation is a prerequisite for officials to prioritize environmental governance assessment tasks. (3) When provincial leaders are non-central committee

members, they have a strong motivation to achieve political promotion. When facing conflicting tasks, promotable officials tend to emit more SO_2 when they have a longer time before retirement, while terminal officials who are about to retire but have not yet been promoted tend to emit less. During the early stage of the tenure, officials tend to prioritize economic development and emit more, while in the later stage of their tenure, they tend to reduce emissions. This finding is in line with previous studies that have examined the relationship between officials' tenure and environmental pollution.

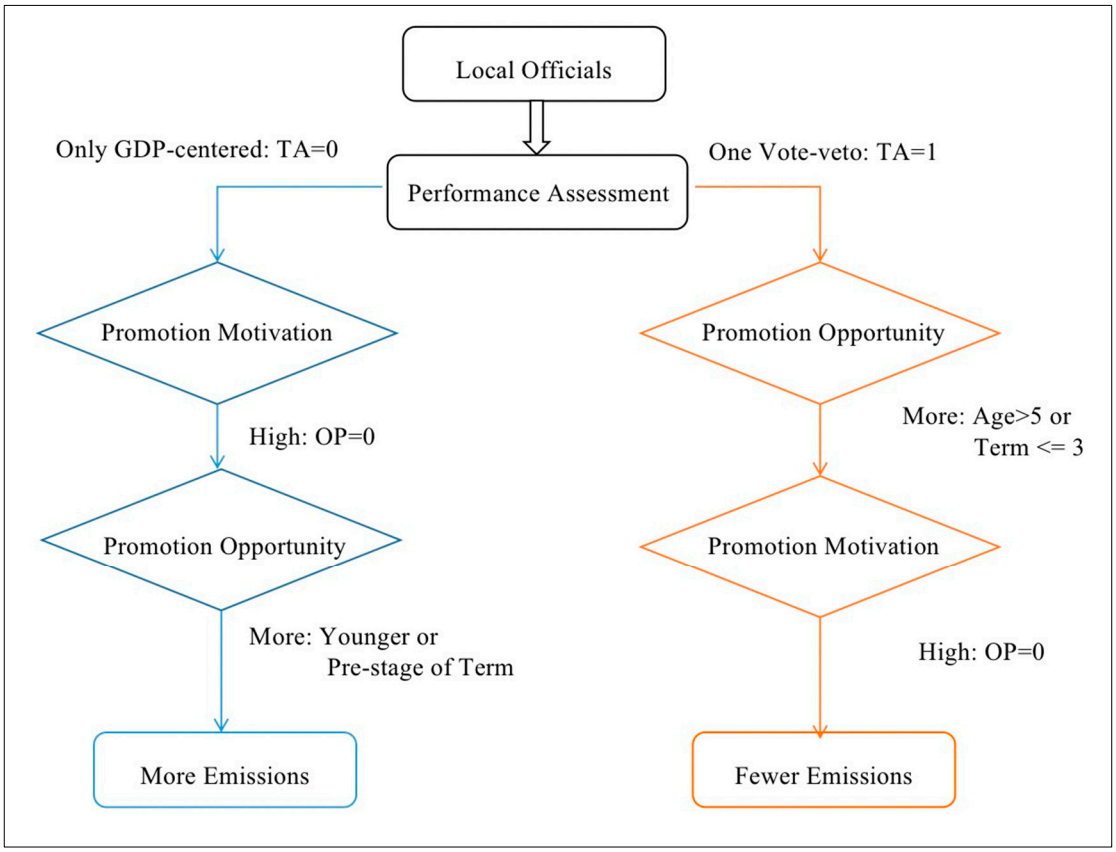

Figure 4. The influencing mechanism of one-vote veto on emissions.

The introduction of a target responsibility system has to some extent reshaped the officials' career incentive mode. In 2007, the central government introduced a strict environmental assessment system and changed the promotion incentive structure, causing a reverse relationship between official's characteristics and environmental decisions. Without considering the impact of the target responsibility system, officials with strong promotion motivation (non-central committee members) tended to emit more pollutants as well as develop regional GDP in order to obtain greater promotion opportunities. However, after introducing the target responsibility system into the mode, the moderating effect of target assessment (0.156) indicated that local officials with strong promotion motivation (non-central committee members) tended to emit fewer pollutants to obtain promotion after 2008, reflecting the power of the environmental protection index embedded in the one-vote veto system on officials' decision-making [18]. Local officials will strive to meet the central government's environmental targets to increase their political promotion opportunity, even if it may come at the cost of slowing down GDP growth. The study further found that this moderating effect was significant only before their third year in office or when they were under 60 years old. Term three and age 60 are two interesting indexes for officials: (1) The average term of provincial secretaries is 3.03 years according to Table 2, which is consistent with previous study [29], and a term more than 5 years in the same position is very rare in China's appointment system. "A new broom sweeps clean" is well known, and provincial

secretaries have a great expectation of position transfers in their earlier term and a rush to increase resource inputs. After the introduction of the one-vote veto, officials in the earlier 3 year term will strive to achieve more environmental performance under the greening evaluation mechanism. (2) A previous study has found that promotion becomes more unlikely when provincial leaders approach retirement age, and officials who are younger and competent would become top politicians under the cadre rejuvenation orientation [9,50]. After the introduction of the one-vote veto, officials younger than 60 years old have greater promotion opportunity and take more effort to make production cleaner.

These findings indicate that only officials who have higher promotion opportunities (younger, early-stage of term) would choose emission-increasing strategies from previous emission-reducing strategies after the introduction of the target responsibility system, indicating that local officials are sensitive to changes in performance systems within the bureaucratic pyramid. Therefore, it can be said that officials' political promotion incentives are heterogeneous, being greatest among the younger, pre-stage term and non-Committee number. So, differential incentive intensity linked to local officials' characteristics directly amplifies or suppresses the effectiveness of the central government's mandatory environmental policies. Officials of diverse characteristics will adopt dynamic resource allocation strategies to maximize their promotion utility.

5. Conclusions and Implications

Empirical evidence was found in the study to support the effectiveness of including environmental targets in performance evaluations, which broadens our understanding of the internal behavioral choices made by local officials as environmental policy implementers in the context of environmental assessments. This is beneficial for gaining a deeper understanding of the underlying reasons why officials with different characteristics choose different emission reduction strategies when faced with environmental targets, and why they can inform the improvement of the performance evaluation system and optimization of promotion incentives for officials. The main conclusions are as follows: (1) Local governments take strategic investment in emission reduction. They only actively react to the listed pollutant as mandatory targets. (2) Overall, the age, term, and political level of local officials is negatively correlated with level of pollutant emissions. Cadres with high motivation and a big chance of promotion tend to increase emission along with the rise of GDP. (3) The target assessment system changes the promotion incentive mode for officials, but the heterogeneity of officials' characteristics determines which environmental governance strategies they choose to implement. From this perspective, the study can offer a theoretical foundation for enhancing the environmental assessment system and environmental governance practices. This study has several implications for environmental governance practices.

First, the cadre assessment system that incorporates pollution emission reduction as a priority could improve environmental governance while GDP-centered targets would constrain local officials' input in environmental protection. When facing the dual pressures of emission reduction and economic development, local officials have varying attitudes towards competitive indicators and may exhibit strategic emission reduction behaviors. This implies that the performance evaluation system should emphasize regional environmental quality including carbon and water targets while also preventing strategic emission reduction behaviors by local officials, making local cadres more inclusive and greener.

Second, environmental sustainability requires officials to maintain consistent environmental performance during their tenure under normalized institution, which is not likely to be achieved by moving administrative enforcement of the law or short-term centralized spending. Although the implementation of target assessments can reduce emissions levels overall, environmental governance still faces significant challenges. Local governments should reflect on whether environmental target assessments that rely primarily on result control can maximize their incentive effect, and consider a closed loop system that requires

necessary environmental input as well, including improving clean production technique and the use of clean energies.

Third, environmental protection is a value that serves the public interest of society as a whole. Public scrutiny could enhance local government's environmental performance as environmental pressure from upper leaders is excessive while that from public is insufficient. Supervisory information provided by citizens or counterparts in the industry should be used to hold officials accountable for environmental damage and publish illegal production actors.

Finally, previous research has revealed a contradiction between economic growth and environmental performance targets. However, there are many promising ways of reconciling these seemingly conflicting needs. In the context of local government's competition, sustainable development goals are consistent with the good life and high-quality development of the people. Environmental quality plays an important role in attracting investment, intelligence, and migration, making environmental targets a part of modern economic system construction [51]. This is also the policy goal called, "lucid waters and lush mountains are invaluable assets".

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