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How Political Turbulence Changes Disincentives of Environmental Protection: Evidence from the Crime Crackdown in Chongqing

Abstract: Institutional disincentives often discourage major actors, such as politicians, corporate leaders, and the public, from taking practical steps to protect the environment in China. By using the crackdown on crime in the Chinese megacity of Chongqing as a case study, we argue that despite the strength of these disincentives, they are nevertheless highly susceptible to changes in the macro political environment, which can temporarily alter the regular preference order of these major political-economic actors and reduce industrial pollution. We employed the difference-in-differences approach and observed that the quality of surface water in Chongqing improved during the anticrime campaign because of reduced industrial wastewater discharge. However, after the campaign, the political atmosphere relaxed and the surface water quality declined. These findings suggest that reforming the institutions that shape the incentives of the major actors in environmental protection is critical to improving environmental protection in the long term.

Keywords: institutional disincentive, crime crackdown, difference in differences, surface water quality, business–government connections

1. Introduction

Developing countries often face the dilemma between economic growth and environmental protection. Most governments in developing countries prioritize development (Desai 1998; Tong 2007). As China has experienced tremendous economic growth, it has seen accelerated degradation of nearly all facets of the environment, including the water, air, land, and food supply (Cai et al. 2008; He 2010; Wang et al. 2010; Cao et al. 2014; Wang and Xu 2014). One of the most serious environmental challenges is water pollution. In 2013, only approximately 62 % of monitored water resources were classified as safe sources of drinking water; 18 % were classified as suitable only for industrial or irrigation use, and 20 % were classified as unusable, even for irrigation. Many rivers in China, such as the Yellow, Songhua, Huai, and Hai rivers, are heavily polluted.[1]

Environmental awareness is a recent development in China. More than 30 new environmental protection laws, most aimed at energy conservation and emission reduction, have been enacted by the central government since 2005 (Liu et al. 2015). The state is beginning to encourage local leaders to reduce urban pollution through the use of "green GDP" criteria in the cadre performance evaluation (Landry 2008). A city's commitment to environmental protection and sustainable development may also influence its neighbors through peer pressure and foster greater awareness and protection at the local level, as the county-level cities of the Suzhou Municipality demonstrate (Li et al 2011). Popular pressure may also encourage urban mayors to be more environmentally sensitive, because environmental activism increases the potential for social instability (Zheng et al. 2013).

Despite China's burgeoning environmentalism, the institutional disincentives for major actors, such as politicians, corporate leaders, and the public, have persisted and formed structural challenges hindering the protection and amelioration of the environment (Yee et al. 2013). The primary challenge is represented by state

[1]Annual Status of Environment Reports by the Ministry of Environment Protection in China, http://jcs.mep.gov.cn/hjzl/zkgb/2013zkgb/201406/t20140605_276490.htm accessed on 1 June 2015.

actors, who are at the center of policy making. Local officials, the turnover of whom is frequent, tend to select quick, low-quality, and even harmful approaches to implementing environmental policies (Eaton and Kostka 2014). Moreover, most local governments are not strongly motivated to monitor industrial pollution and enforce environmental regulations, because of their vested interests in the local economy, particularly in less developed regions (Yee et al. 2013). In seeking economic growth, which remains the priority in evaluating official performance, local governments may compete to attract investment by lowering environmental standards and racing to the bottom (Oates and Schwab 1988; Nie and Li 2006; Konisky 2007). The pervasive effects of informal government–business connections, such as *guanxi* and corruption, further exacerbate the problem (Yee et al. 2013). During enforcement campaigns, local governments and enterprises may falsify environmental data (Huang 2014; Van Aken 2015).

In addition, environmental protection bureaus (EPBs) are subject to the leadership of development-focused local governments. They are often short on funds, influence, and manpower. Although the EPBs have increasingly relied on the courts to collect levies from enterprises, these levies seem to fulfill only the role of revenue generation for the bureaus and have not reduced the rate of pollution by industries (Zhang et al. 2010). Constrained by their lower status in comparison to economic bureaucracies and various local *guanxi* networks, EPBs sometimes must refrain from collecting heavy levies and closing polluting factories from that are vital sources of local tax revenue (Tilt 2007).

Outside state regulation, firms treat environmental concerns as a cost factor. Most firms adopt environmental management practices only if they help reduce costs (Yee et al 2013). Direct pressure from civil society and the media has played a limited role in restraining firms' industrial pollution. Civil society in general has remained self-censored and nonconfrontational in the authoritarian regime (Yee et al 2013).

Because of the institutional disincentives discouraging these major political-economic actors from protecting the environment, the dawning of environmental consciousness in China has led to little positive environmental change (Van Aken 2015). This situation raises several questions. Are the fundamental institutional disincentives changeable? How can the institutional barriers be removed and "value–action" gap be overcome so that environmental concerns can be transformed into actual environmental protection?

We argue that the institutional disincentives for environmental protection are not unalterable. Nevertheless, because these disincentives are systemic, removing them may require altering the macro political environment to disrupt the policy preference order of those in power. Politically incentivized policy priority adjustment occurs in many types of political systems, but under different circumstances. Democracies often experience policy adjustments during election years, such as expansionary fiscal policies for stimulating the economy and gaining support for reelection (Nordhaus 1975; Golden and Poterba 1980; Detken and Gärtner 1993; Aidt et al. 2011). In addition, the rhythm of the electoral cycle may influence the tone of political communication between candidates and the electorate (Pan 2013). In authoritarian states, major political disruptions can motivate state agents to act on neglected or overlooked policies. Nie et al (2013) reported that during the National People's Congress and National Political Consultative Conference (*lianghui*), government officials are more concerned with social stability than they are with advancing economic development. Consequently, state actors are less willing to protect coal mining firms from public scrutiny and have pressured firms to reduce production during this period.

For environmental protection, the regular institutional disincentives of major actors and the alliance between government and polluting enterprises can also be disrupted by special political events, such as a change in governance, major political campaign, or large-scale image-building event. During the 2008 Beijing Olympics and 2014 Asia-Pacific Economic Cooperation meeting held in Beijing, the central government ordered factories

near the capital to cease production temporarily, providing almost-instantaneous but short-lived relief from air pollution. The "Olympic Blue" and "APEC Blue" skies made headlines worldwide.[2] In this case, a change in political priorities exerted a temporary change in the regular institutional incentives to ignore industrial pollution.

This paper investigates the process of disruption of the political–corporate relationship, and the reordering of priorities that follows, by examining the campaign against organized crime and corruption (*dahei*) in Chongqing, a large centrally administered municipality in southwest China, in 2009–2010. During this political turmoil, the first priority of most officials was survival, eclipsing the routine goals of financial gain and promotion. Civil society was empowered to speak out against elites guilty of corruption and abuse of power. Consequently, polluting industries were largely stripped of state protection during this period and acted to curtail pollution. Thus, although environmental protection and reducing pollution were not claimed as the goals or achievements of the campaign by the local government, the campaign unintentionally changed the behaviors of the major actors in environmental governance and generated an exogenous impact on the local environment. Accordingly, by using the difference-in-differences (DID) statistical method, we observed that this exogenous political shock corresponded to a short-term improvement in surface water quality in Chongqing. The unintended effects of the anticrime campaign on water quality reveal possible solutions to the problem of political disincentives preventing change in environmental protection and empirically demonstrate the environmental cost of these institutional barriers.

2. Crackdown on Crime and Surface Water Quality in Chongqing

The crackdown on organized crime in Chongqing, referred to as "the War on Organized Crime and Corruption," occurred between 2009 and 2010. The campaign was headed by Wang Lijun, the local head of the

[2]"Daily life comes to stand-still in Beijing during Apec", http://www.bbc.com/news/blogs-china-blog-29983799, accessed 17 May 2015.

Public Security Bureau (PSB), working under the direction of Bo Xilai, then the party secretary of Chongqing. Although organized crime was long known to be a serious problem in Chongqing, the crackdown was also suspected to be the result of a power struggle between Bo and his predecessor, Wang Yang. Bo launched the crackdown to boost his own profile and highlight the poor and corrupt state of governance under Wang Yang (Fewsmith 2010; Wang 2013; Wedeman 2012). The campaign involved wide-ranging government policies and actions. For the purpose of this research, we only briefly review the key events of the crackdown in chronological order.

Near the end of 2007, Bo was reassigned from his position as minister of commerce to the office of Chongqing party secretary. On 25 June 2008, Wang Lijun, a long-time supporter of Bo with a reputation for uprooting organized crime in Liaoning, was appointed vice party secretary of the Chongqing PSB. The PSB then initiated a citywide drive between 21 March 2009 and 20 September 2009, aimed at solving long-pending cases and capturing fugitives (*poji'an, zhuataofan*). On 25 June 2009, the Chongqing organized crime crackdown officially began, along with a noticeable increase in security personnel and police in the city. On 14 August 2009, the campaign peaked with the arrest of the deputy head of the Chongqing PSB, Wen Qiang. On 30 April 2010, the Chongqing PSB held a ceremony to praise and mark the end of the anticrime crackdown. According to Chongqing authorities, approximately 10,000 elite police, who were divided into 329 teams, were deployed during the campaign. By 28 April 2010, 337 criminal gangs were under investigation, and 228 criminal gangs had been prosecuted, of which 152 were described as violent youth gangs. A total of 4,781 people were brought in for questioning, 2,869 people were arrested, and 3,274 people were prosecuted. Approximately 3.146 billion RMB (US$461million) in assets was confiscated.[3]

[3]Phoenix News, "Special report on Crime Crackdown in Chongqing", http://news.ifeng.com/mainland/special/chongqingdahei/, accessed 16 September 2014.

Notably, available government documents and public speeches of Chongqing leaders related to the campaign made no mention of environmental protection, such as reducing water pollution and sewage discharge released by enterprises and industry, either as its goal or achievement. At the beginning of the campaign, maintaining social order and striking against organized crime were emphasized as the goal. At the end of campaign, improved public security and a more favorable economic environment were accentuated as the topmost achievements.[4] However, the campaign triggered a major upheaval in the ranks of the Chongqing government. The wide publicity and mobilization of different government agencies in urgently implementing top leaders' directives, a salient feature of most campaigns, facilitated the spread of a tense political atmosphere to different social sectors (Zhou 2011). Therefore, the campaign exerted an exogenous shock on the relationships among government actors, enterprises, and civil society, which affected the environment of Chongqing.

2.1 Government Actors

The campaign led to large-scale personnel changes in government, scrambling preexisting political connections. In the course of the citywide upheaval, at least 1,095 officials were arrested and investigated for abuse of power. Many of these officials held considerable power, such as the 18 officials who held positions above the county level. Fifty-six senior officials were accused of being "umbrellas" protecting organized crime.[5] Among these so-called "umbrellas," 36 officials were public security officers, 10 were former legal enforcers, and five were officials in the party or government hierarchies.

[4] For goals of the campaign, see "The Chongqing Municipal Party Committee and Municipal Government's Decision about Building Safe Chongqing", *Chongqing Daily*, 14 April 2009; and "Liu Guanglei's speech at the Municipal Anti-Terrorism Work Conference", *Chongqing Daily* 1 July 2009; and "Liu Guanglei's Requirements at the Municipal Comprehensive Management Work Conference", *Chongqing Daily* 18 July 2009. For achievements of the campaign, see "Striking Black, Created a New High Security Index", *Chongqing Daily* 7 December 2010.

[5]The document titled "Regulations by the People's Procuratorate of Chongqing Regarding Crackdown on Crime" defines "umbrellas" of crime syndicates as officials of the state who use the convenience of their official positions to support, harbor or connive with the growth, expansion and spread of crime syndicates, and to help them escape legal sanctions.

Although most officials investigated or arrested during the campaign worked in public security, the procuratorate, and the courts, and despite the lack of any apparent investigations of the department overseeing the environment during the campaign, the scale and ferocity of the campaign can be expected to have sent a chill through all government departments. The crackdown was accused of eroding the rule of law and using the banner of the anticorruption campaign to victimize political and personal rivals. One of our interviewees stated that the campaign terrorized the vast majority of officials. Many feared being labeled an "umbrella for criminal gangs." Officials in Chongqing took great caution to avoid any behavior that carried a risk of being caught and penalized during the campaign, particularly after the arrest of Wen Qiang, which was perceived as a strong signal of the seriousness and intensity of the campaign.[6] In addition, punishment during campaigns often tends to be harsh and arbitrary to create a wide deterrence effect (Zhou 2011). Therefore, a strong psychological deterrent to covering up industrial pollution was present. The large-scale turnover of personnel and the entry of new actors into the government disrupted the "interest-based network" built by officials and their corporate counterparts (Chen and Li 2011). This disruption weakened the ability of officials to protect polluting industries. With fewer constraints from *guanxi* networks, EPBs were more able to enforce environmental regulations. Exploiting the tense political conditions, the Chongqing EPB in 2009 took an iron-hand approach to illegal pollution. Reportedly, more than 50,000 enforcement personnel inspected 23,477 enterprises and uncovered 1,276 cases of illegal pollution.[7]

2.2 Firms

Outside the realm of the government, the campaign drew more than 100 enterprises, mostly private ones, into the whirlpool. Claiming that organized crime had penetrated numerous sectors, authorities' investigations

[6]Interview conducted in December 2011 in Chongqing.
[7] For the environmental safety of Yangtze River, Chongqing investigated more than 700 environmental cases, Available at http://www.022net.com/2009/12-25/426373353350781.html accessed 14 June 2015.

extended from energy, transportation, and real estate to grain, oil, meat, and produce. Nineteen private entrepreneurs were branded "mafia dons." Some of them were arrested, brutally tortured, and even executed, whereas others fled abroad. Many wealthy private entrepreneurs' assets were confiscated.[8] In September 2009, Wang Lijun established a foundation in memory of anticrime crusaders and solicited more than 70 million RMB (US$10.25 million) in donations from Chongqing entrepreneurs.[9] Several interviewees reported that private entrepreneurs in Chongqing perceived themselves as being among the main targets of the campaign.[10] Reportedly, more than 200 private entrepreneurs in Chongqing migrated to Canada out of fear of the "red terror." Therefore, even if firms were not involved in any illegal business or criminal activity, they were more careful with everyday management than usual to avoid arrest. The upheaval in industry also tore apart the existing web of clandestine government–enterprise connections. If enterprises wished to gain the same level of protection as they enjoyed before the crackdown, they had to construct wider and denser political connections, which is costly for firms. With less protection, many firms had to reduce their pollution.

2.3 Civil Society

While cracking down on organized crime and corruption, Bo initiated a series of Maoist-style campaigns to reinvigorate the city. He made prominent use of Maoist quotes and promoted the "Red Songs campaign" (*changhong*), encouraging communities, government departments, business sectors, schools and universities, and state media to sing revolutionary songs of the Chinese Communist Party. These initiatives largely promoted public morale and revived "red culture." Confiscating private enterprises was portrayed as a just means of redistributing wealth between the rich and the poor, elicited wide public support, and increased anxiety among

[8]Andrew Higgins, "Fugitive Chinese Businessman Li Jun Details Struggle Over Power and Property," *The Washington Post*, March 4, 2012, http://www.washingtonpost.com/world/asia_pacific/fugitive-chinese-businessman-details-struggle-over-power-and-property/2012/03/03/gIQATIJqqR_story.html

[9]"The truth of crackdown on crime", Available at http://www.nbweekly.com/news/special/201212/31973.aspx accessed 14 June 2015.

[10]Interview to an environmental NGO in Chongqing in February 2015.

private entrepreneurs.[11] Thus, during these campaigns, the public was greatly mobilized to influence public affairs. People were encouraged to report official wrongdoing to the government. Bo, during a municipal party committee meeting, claimed that the anticrime campaign was a "people's war." From the beginning of the crackdown until the end of October 2009, the Chongqing government had received more than 40,000 reports, 80% of which were provided by people disclosing their real name.[12] The "12369 environmental hotline" of Chongqing received 21,365 reports citywide in 2009.[13] Media reports of industrial pollution, including water pollution, also attracted more public attention and harsher punishments during this sensitive period. Thus, the ability of civil society to monitor the environmental impact of industrial activity was unintentionally boosted by the mass mobilization campaigns. This greatly discouraged industrial pollution.

In short, the Crime Crackdown Campaign, an exogenous shock, overturned preexisting political connections, hindered the building of new political connections, and imposed risks to the maintenance of existing political connections. The campaign also deterred firms' polluting behavior and increased the ability of civil society to monitor the environmental impact of industrial activity. Figure 1 summarizes the general causal path.

Insert Figure 1 Here

In the following sections, we describe statistical analyses conducted to empirically examine the short- and long-term effects of the exogenous political shock on firms' polluting behavior. Because of data availability, we focus on firms' illegal discharge of industrial wastewater.[14] We hypothesize that during the campaign against

[11] http://news.china.com/finance/11009723/20140414/18446329_1.html

[12] "Chongqing police received more than 40,000 reports about organized crime, 80% used real names", Available at http://news.xinhuanet.com/legal/2009-10/29/content_12354255.htm accessed 14 June 2015.

[13] "Environmental protection achieved positive progress citywide in 2009", Available at http://www.cepb.gov.cn/doc/2010/03/09/4365.shtml accessed 14 June 2015.

[14] Data of other types of environmental effects, such as toxic air emission, are unavailable on a weekly or monthly basis from 2009 to 2010.

organized crime, enterprises restrained themselves from illegally discharging wastewater, thus improving surface water quality. However, because the crackdown was not aimed at systematically altering the institutional disincentives of environmental protection, when the political turmoil passed, many structural problems in environmental protection returned and surface water quality declined.

3. Data, Methodology, and Econometric Model

Ideally, the study would have used industrial wastewater discharges to test the hypotheses, but these data are unavailable on a weekly or monthly basis. However, in 2009, the Chongqing Environmental Protection Bureau (CEPB) began publishing weekly reports on the surface water quality of the five rivers in Chongqing (i.e., the Yangtze, Jialing, Wu, Fu, and Qu rivers) according to samples from seven observation sites (i.e., Fengshouba, Liangtuo, Jinzi, Matou, Wanmu, Yuxi, and Zhutuo) on its official website (http://www.cepb.gov.cn). Industrial wastewater discharge is the largest contributor to water pollution, surpassing urban and agricultural water pollution. As open source data covering the period of anticrime campaign, the surface water quality data serve as a means for measuring the crackdown's effect on private industrial water pollution. Table 1 summarizes basic information on the observation sites published by the CEPB. The Yangtze and Jialing rivers each have two observation sites; the Wu, Fu, and Qu rivers each have one observation site. Three observations sites are sources of drinking water and five of them are located upriver from the Chongqing metropolitan area.

Insert Table 1 Here

We employed the DID approach to examine how the crackdown affected water pollution. By measuring the difference in the differences between treatment and control groups over time, the DID approach can be used to eliminate underlying variables simultaneously affecting both groups. Therefore, we first divided our sample into control and treatment groups according to whether the observation sites may have been affected by the campaign. We grouped the Wanmu, Yuxi, and Zhutuo sites into the control group, because they are located

upriver, where waters enter Chongqing from Sichuan and Guizhou. Neither Sichuan nor Guizhou initiated similar campaigns or experienced any large-scale personnel turnovers during the Chongqing crackdown. Moreover, no record shows that the districts where the three observation sites are situated were targeted during the campaign.[15] Thus, the water quality at the three sites can be assumed to have not been affected meaningfully by the crackdown. By contrast, the Liangtuo and Fengshouba sites are located in the metropolitan area, the central target area of the campaign. Government websites showed substantial personnel changes within central districts.[16] Although the Matou and Jinzi sites are located upriver from the metropolitan area, Hechuan district, where the two sites are situated, was also strongly influenced by the anticrime campaign, probably because it is adjacent to the metropolitan area. Several public security leaders and officers were removed from office and one criminal organization head was arrested in Hechuan.[17] Therefore, we included data collected from Matou, Liangtuo, Jinzi, and Fengshouba in the treatment group. Figure 2 illustrates the geographic distribution of the treatment and control groups.

Insert Figure 2 Here

The division of the study period is critical in the DID approach. As mentioned, the campaign officially began on 25 June 2009. However, the PSB began its campaign to "solve long-pending cases and catch escaped criminals" 3 months earlier, which may have affected the general social environment. Therefore, we defined the time period of 1 January to 21 March 2009 as the precrackdown period. We defined the crackdown period as 1 January 2010 to the date on which the Chongqing PSB called a meeting to praise the success of the campaign

[15]The record of personnel changes publicized by the PSB and Chongqing Procuratorate between 2009 and 2011 was used as a reference to identify if a district was targeted during crime crackdown.

[16] For instance, see government announcement of personnel change at http://www.cq.gov.cn/publicinfo/web/views/Show!detail.action?sid=1020854; and http://yz.cq.gov.cn/web1/info/view.asp?NewsID=37379

[17] For example, see personnel change in Hechuan district at http://www.cq.gov.cn/publicinfo/web/views/Show!detail.action?sid=1013462; and "Chongqing crime crackdown 'meat tyrant' Wang Tianlun was prosecuted; a meat gang born from violence", Available at http://news.sohu.com/20091209/n268792486.shtml

and end the crackdown. There are several reasons for selecting 1 January 2010 as the beginning of the anticrime campaign. First, beginning at this date enabled us to skip the period between 21 March 2009 and 1 January 2010 during which the campaign to solve long-pending cases and capture fugitives was active and to focus on the effect of the crackdown on crime on surface water quality. Second, the campaign peaked and attracted nationwide attention after Wen Qiang was arrested in August 2009 and when most government officials were investigated in late 2009. We can thus expect that the campaign began to affect wastewater discharge substantially only in late 2009. Finally, dating the beginning of the crackdown as January 2010 parallels the starting point of the precrackdown period from the year before and facilitates ruling out meteorological factors that may seasonally affect surface water quality. Thus, the crackdown period was between 1 January and 30 April 2010. Following this period, 1 May 2010 to the end of 2010 was defined as the postcrackdown period. Figure 3 illustrates the process and periods of the crackdown.

Insert Figure 3 Here

Insert Table 2 Here

The National Surface Water Environmental Quality Standard (GB3838-2002) divides surface water quality into five levels, from the least (Level I) to most polluted (Level V). Water of Levels I–III is considered safe for human consumption. Table 2 presents a summary of the surface water quality in Chongqing during different time periods. Before the crackdown, Level I water quality was not observed in the control or treatment group. During the crackdown, the proportion of Level I water quality in the treatment group increased dramatically from 0 % to 45.59 %. This proportion then dropped sharply to 28.45 % after the campaign. During the same time period, the water quality of the control group did not exhibit any significant fluctuation. This simple comparison indicates that the crackdown led to some improvement of water quality in the treatment group. We calculated the average weekly water quality values of the treatment and control groups and constructed a

chronological scatter plot (Figure 4). The left side of the vertical dotted line in Figure 4 is the precrackdown period; the right side is the crackdown period. Figure 4 shows no significant difference in the average water quality of the treatment and control groups before the crackdown. However, the average water quality level of the treatment group declined during the crackdown, indicating an improvement of surface water quality, while the water quality of the control group remained unchanged.

Insert Figure 4 Here

To more accurately estimate the effect of the crackdown, we employed econometric models to control more variables and analyze the relationship between the crackdown and surface water quality. Equation (1) presents the basic regression model.

$$Quality_{ijt} = \alpha_0 + \alpha_1 * During\_CC_t + \alpha_2 * Treat_i + \alpha_3 * During\_CC_t * Treat_i + \alpha_4 * Water_i + \lambda_i + \mu_j + \varepsilon_{ijt} \quad (1)$$

where $Quality_{ijt}$ represents surface water quality for observation site i in the jth week of year t. Quality takes values of 1, 2, or 3 according to the water quality (e.g., Level I = 1). Lower values indicate higher-quality surface water. $During\_CC_t$ is a dummy variable that equals 1 when the water quality data are from the crackdown period (i.e., 1 January to 30 April 2010) and 0 otherwise. $Treat_i$ is also a dummy variable; it equals 1 when the observation site belongs to the treatment group and 0 otherwise. α_3 is the coefficient of interaction, used to estimate the treatment effect of the crackdown on crime on water quality. $Water_i$ is a dummy variable for controlling the effect of drinking water sources on surface water quality, because sources of drinking water tend to offer superior water quality and local governments may impose higher environmental standards for drinking water sources and stricter regulations on nearby industry.[18] λ_i is an individual fixed effect of each observation site for controlling potential missing variables linked with observation locations. μ_j is a week fixed effect for controlling the effect of potential meteorological factors on surface water quality. Major indices of meteorological conditions revealed that the average temperature, rainfall, relative humidity, and air pressure in

[18]For example, in 2004, the authorities of Chongqing published *the Policy for Prevention and Management of Pollution of Drinking Water Sources*, in order to strengthen management of drinking water sources.

Chongqing followed similar monthly trends from January to April in 2009 and 2010 (Figure 5).

Insert Figure 5 Here

Because the dependent variable of surface water quality is ordinal, an ordered probit (Oprobit) model should be used to run the regression. However, in a nonlinear model, the value of the coefficient of the interaction term does not imply the marginal effect of that item, and the sign of the interaction term could also be opposite (Ai and Norton 2003). This means that if we were to adopt the Oprobit model to estimate Equation (1), the estimator of α_3 does not necessarily represent the treatment effect of the campaign, and the sign of α_3 may not characterize the direction of the campaign effect either. Therefore, we first treated Quality as a continuous variable and used the least squares method to estimate α_3, and then employed the Oprobit model to conduct a robustness check and calculate the marginal effects of the crackdown on surface water quality.

4. Empirical Results and Analysis

4.1 Regression Results and Robustness Check

Table 3 presents the estimation results of Equation (1). Column (1) shows the results of the baseline model. The coefficient of interaction is –0.378 achieving statistical significance at the 1 % level, suggesting that surface water quality improved during the crackdown. This result verifies our hypothesis: Massive bureaucratic and personnel changes resulting from the crackdown altered the existing institutional disincentives of environmental protection, disrupted informal government–enterprise connections, and forced enterprises to reduce their pollution.

Insert Table 3 Here

A key assumption of the DID approach is that the control and treatment groups exhibit parallel trends. In our sample, the seven observation sites belonged to four rivers, whose monthly changing patterns may differ. We resolved this problem in three ways. First, Column (2) shows results obtained by controlling heterogeneous trends of the rivers by adding a river fixed effect. Second, Column (3) illustrates results obtained by limiting our

test to the subsample of all the observation sites in the Yangtze River to eliminate the potential differences of other rivers. Third, we designed a placebo test. Presumably, causes other than the crackdown, such as seasonal trends, making the estimator of α_3 significantly negative may indicate that the water quality of the treatment group in the first 3 months of 2012 was at higher levels than that of the same period in 2011. Column (4) lists results obtained by conducting this placebo test by using 2011–2012 data in Equation (1). The dummy variable March_2012 equals 1 when the data are from the first 3 months of 2012 and 0 otherwise.[19] The interaction of March_2012 * Treat is nonsignificant, indicating that the surface water quality did not improve significantly in the first quarter of 2012. Overall, the results shown in Columns (2)–(4) suggest that different trends between the control and treatment groups, if any, did not meaningfully affect the surface water quality. Finally, the results of the Oprobit model in Column (5) are consistent with those of the previous models. Thus, in general, all the models confirm our hypothesis that the crackdown changed the regular disincentives of environmental protection and constrained illegal industrial water pollution, improving surface water quality in Chongqing.

4.2 Long-Term Effects of Crime Crackdown on Surface Water Quality

Did the surface water quality remain higher after the crackdown? What is the long-term net effect of the crackdown on water quality? Did the disruption of institutional disincentives for environmental protection persist in the long term? To answer these questions, we replaced During_CC in Equation (1) with Post_CC. The dummy variable Post_CC equals 1 when the water quality data are from the period after 1 May 2010 and 0 otherwise. The interaction term between Post_CC and Treat estimates how surface water quality changed after the crackdown.

Columns (1)–(3) in Table 4 present the regression results of the postcrackdown period according to the surface water data of 2010. Column (1) lists the basic regression results, Column (2) shows results obtained

[19] Using the first 3 months of 2011 and 2012 is to make the results comparable to the Pre_CC period of 2009. We also conduct the placebo test using the first 4 months of 2011 and 2012, results are similar.

using a subsample of Yangtze river data, and Column (3) illustrates results obtained using the Oprobit model. Regardless of the model used, the coefficients of Post_CC * Treat are always positive and significant at 1 %, suggesting that the surface water quality deteriorated after the crackdown was complete, relative to that during the crackdown.[20]

To examine the net effect of the campaign on water quality, we included data from the first 3 months of 2009 and all of 2010 and interactions of both During_CC * Treat and Post_CC * Treat in the econometric model. The baseline reference was the precrackdown water quality. Column (4) in Table 4 presents the basic regression results. Column (5) lists the results obtained using the Yangtze River data subsample, and Column (6) illustrates the Oprobit estimation results. Again, regardless of the model used, the coefficients of During_CC * Treat are always significantly negative and the coefficients of Post_CC * Treat are always nonsignificant. This result indicates that although the water quality improved during the crackdown, it declined afterward, rendering no significant net improvement of surface water quality compared with the water quality before the crackdown. In other words, in the long run, the temporary exogenous political turmoil did not change the water quality substantially.

We also report the marginal impact of the crackdown on surface water quality in Table 5 based on the Oprobit models in previous regressions. During the crackdown, the probabilities of Level I or II water quality increased by 44.6 % and 50.9 %, respectively. This high probability again indicates how a tense political environment benefits environmental protection. By contrast, after the crackdown, the probabilities of Level I and II water quality decreased by 30.1 % and 45.7 %, respectively, and the probability of Level III water quality increased by 15.6 %. Overall, the net effect of the crackdown significantly increased only the probability of Level I water quality, which increased by 9.4 %, causing no significant changes in the probability of other water

[20]We also use the data of air pollution index in 2010 to estimate the model. The results suggest that air quality also became worse as the campaign finished. Results are available upon request. Unfortunately data of air quality before the crackdown is unavailable, rendering us unable to do complete robustness check using air quality.

quality levels.

Insert Table 5 Here

Furthermore, we examined how long the effect of the crackdown persisted and when surface water quality began to decline after the campaign. We used the data for 2010 and treated surface water quality of the first 4 months of 2010 as a baseline reference, and included a series of new interactions, $Treat_i$ * $Week_n$, in the regression. $Week_n$ are a series of dummy variables, referring to the nth week after the crackdown. $Week_n$ equals 1 when the surface water data are from a specific nth week. For example, $Week_1$ equals 1 only if the water data are for the week of 3 May 2010, the first week after the crackdown ended, and is 0 for all other weeks. The results are illustrated in Figure 6, with the black line indicating the coefficients of each interaction term and the dotted lines representing their 95 % confidence interval. When both the upper and lower bounds of the confidence interval are above zero, the coefficient is positive and significant, indicating declining surface water quality. As Figure 6 shows, the surface water quality deteriorated in the eighth week after the campaign. In other words, the positive effect of the crackdown on surface water quality continued for only 2 months after the campaign finished. At the end of the campaign, the institutional disincentives of environmental protection again influenced the major actors, including the government, firms, and civil society. Local government became more tolerant and even protective of illegal industrial pollution, while firms became opportunistic again and civil society's supervisory power was diminished.

Insert Figure 6 Here

In general, the long-term results demonstrate that sudden political events, such as the crackdown on crime, could only change major actors' incentives in the short term by temporarily affecting the macro political environment. Such political turmoil in the form of a campaign cannot sustainably strengthen the environmental restraints imposed upon local government officials and enterprises, nor can it fundamentally undermine

systematic government–enterprise collusion.

5. Conclusion

Despite an emerging environmentalist movement, institutional disincentives have discouraged state actors, enterprises, and civil society from taking the necessary steps to improving and protecting the environment in China. Although the institutional disincentives keep many people pessimistic about the future, we found that the political campaign against organized crime in Chongqing unintentionally improved surface water quality in the targeted districts for a short term. This is because the large-scale personnel turnovers in local government and mobilization of the public during the campaign weakened and disrupted government–corporate connections. To seek survival during the political turmoil, officials and enterprises proactively adjusted their regular policy preferences. As an unintended outcome, the intense political atmosphere compelled enterprises to reduce illegal industrial sewage discharge, leading to a temporary improvement in Chongqing surface water quality.

Our findings have major policy and theoretical importance. Although existing studies have emphasized the effects on environmental protection of economic factors, government policies, political institutions, and civil society, few studies have examined the changing macro political atmosphere. However, in an authoritarian country such as China, the political atmosphere may change quickly with major national or local events, and even according to the aims of leadership. This research empirically shows that including the macro political environment in analysis can deepen the understanding of the varied outcomes of policy implementation. The seemingly fundamental disincentives hindering environmental protection are not unalterable in the context of a changing political environment. Policy makers can refer to situations during special political events to design effective incentive mechanisms that can motivate officials to enforce environmental protection regulations strictly and impartially, and to encourage environmentally friendly behavior by firms and civil society. Compared with democracies, whose governance is often limited by complicated procedures and multiple policy

players with veto power, the authoritarian regime in China, with a greater concentration of power and fewer restrictions, may be able to more easily change the political atmosphere and priorities of the major actors responsible for the quality of the environment.

Our research also sheds light on campaign-style governance. Many countries stage various enforcement campaigns, from road safety campaigns to the war on drugs and anticorruption drives (Liu et al 2015). All levels of the Chinese government tend to rely on campaigns to achieve pressing policy goals or correct deviations in routine bureaucratic procedures (Zhou 2011). Whereas most studies have focused on the impact of campaigns on their individual targets (e.g., Wedeman 2005; Liu et al 2015), our research shows how the impact of a campaign can extend from its targeted area to other government departments and social sectors, and how it can generate unintended outcomes. These findings indicate that despite the greater efficiency and effectiveness of campaigns compared with formal procedures, they also have the danger of spreading disruption throughout the entire government. Frequent reliance on campaigns may undermine formal institution building in the country. In addition, the positive outcomes generated by the campaigns may not endure without reinforcement from effective formal institutions. In our study, by utilizing the data from different time periods, we revealed both the short- and long-term effects of the changing political atmosphere on environmental quality. We observed that after the movement ended, water quality returned to a relatively low level. In the long run, the campaign did not significantly change the surface water quality in Chongqing. Although the crackdown was not aimed at improving the environment, the fact that water quality decreased soon after the campaign was completed warns policy makers that in the long run, campaign-style governance may not be an effective means of protecting the environment.

Finally, most of the research indicating that protective business–government relations hinder environmental protection in China has employed case studies and lacked systematic empirical data. Our research fills this gap

and aids in examining how much these business–government connections can cost social welfare in terms of environmental protection. Methodologically, our research investigated corporate–political connections to avoid the endogeneity problem encountered by previous studies. If political connections protect and benefit businesses, the political connections observed may have been actively established by the businesses themselves. Thus, studies would have overestimated the effect of these political connections. Our research avoids this problem because the crackdown provides an excellent natural means of examining the external effect of variations of political connections on polluting behavior by businesses. Instead of relying on the professional backgrounds of company executives to assess business–government relations, the larger backdrop of political turbulence during the crackdown changed the business–government relations variable.

We are also aware of the limitations of our research. First, without firm-level data, such as individual enterprises' monthly or quarterly industrial outputs, we were unable to completely determine whether the reduced pollution was caused by the interruption of the overall economic activity in Chongqing by the crime crackdown campaign or the weakened ability of officials to protect polluting firms, or both. As mentioned previously, the campaign targeted private firms, which unavoidably led to production downturn or even the shutdown of some firms. However, according to macro-level data, the growth rate of the gross domestic product (GDP) of Chongqing in 2009 and 2010, rather than declining, actually continued climbing and reached 17.1%, a climax in the period 2005 to 2013 (Appendix A). Chongqing's GDP growth rate was also ranked high nationwide, being the third highest in 2009 and the second highest in 2010.[21] The city's industrial output monthly growth rate also increased and remained at a high level between June 2009 and April 2010 (Appendix B). In addition, local government claimed that the campaign benefited the economy by providing a healthier investment environment. For instance, Wang Hongju, the mayor of Chongqing, told the media that Chongqing's

[21] *The Statistics Yearbook 2014 and 2010*, published by the Statistics Bureau of People's Republic of China.

GDP growth rate from January to September 2009 ranked the highest in the country, reaching 13.4%. The foreign direct investment was 2.7 billion US dollars in 2008 and was expected to exceed 3.6 billion dollars in 2009.[22] Thus, the trend of economic slowdown did not seem to be strong during the campaign. Nevertheless, obtaining firm-level data in future research would facilitate detecting more clearly the causal mechanism of reduced pollution during the campaign, especially regarding whether firms can reduce pollution without reducing production in the short run. Second, we were unable to randomly assign observation sites to control and treatment groups in a natural experiment, raising a challenge in group selection, and grouping can have crucial implications in the DID approach. Ideal candidates for the control group are observation sites immediately outside the border of Chongqing. However, only data on observations sites within Chongqing are available. We therefore assigned observation sites located upriver to the control group. However, Hechuan district, where the two borderline observation sites Matou and Jinzi are situated, experienced large-scale personnel change during the campaign. Thus, we assigned these two observation sites to the treatment group to prevent them from inflating the comparison baseline. We also excluded the two cases from the treatment group and observed that the interaction terms remained significant during the campaign, evidencing the robustness of our general findings.[23]

In general, the mismatch between the central government's policy making and the persistent reality of environmental deterioration reflects the weak law enforcement and lax compliance with the law in China. This research adopted the DID approach and used extensive data to empirically show that a sudden change in the macro political atmosphere can alter the fundamental institutional disincentives of law enforcement. Policy makers may refer to major actors' behavior during sensitive political periods to construct a superior incentive system to maintain the progress already achieved and to induce more effective implementation of environmental

[22] "Wang Hongju accepted interviews from more than 30 TV stations", *Chongqing Daily*, 7 November 2009, page 2.
[23] Regression results are available upon request.

policies.

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Figure 1: Causal Diagram: from Crackdown to Less Illegal Wastewater Discharge

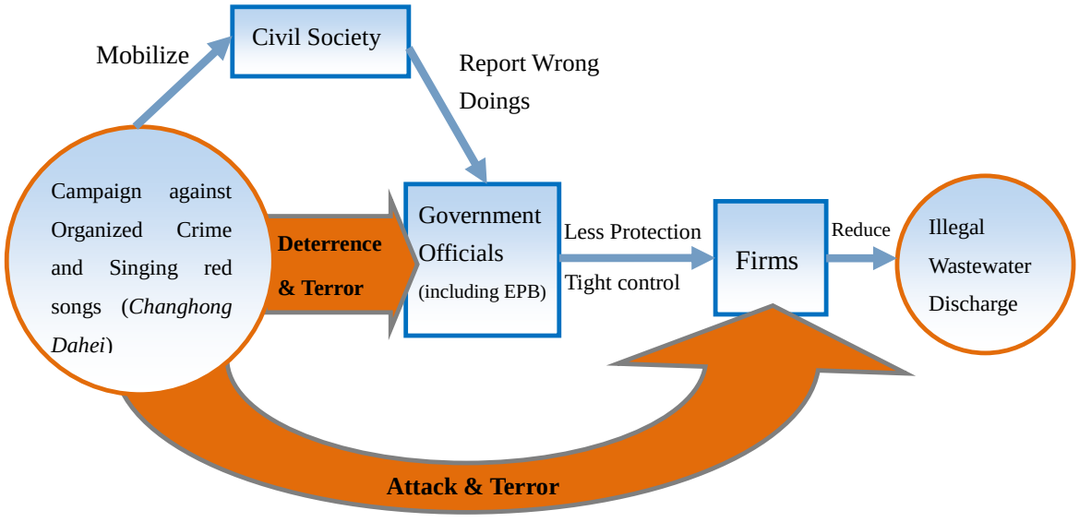
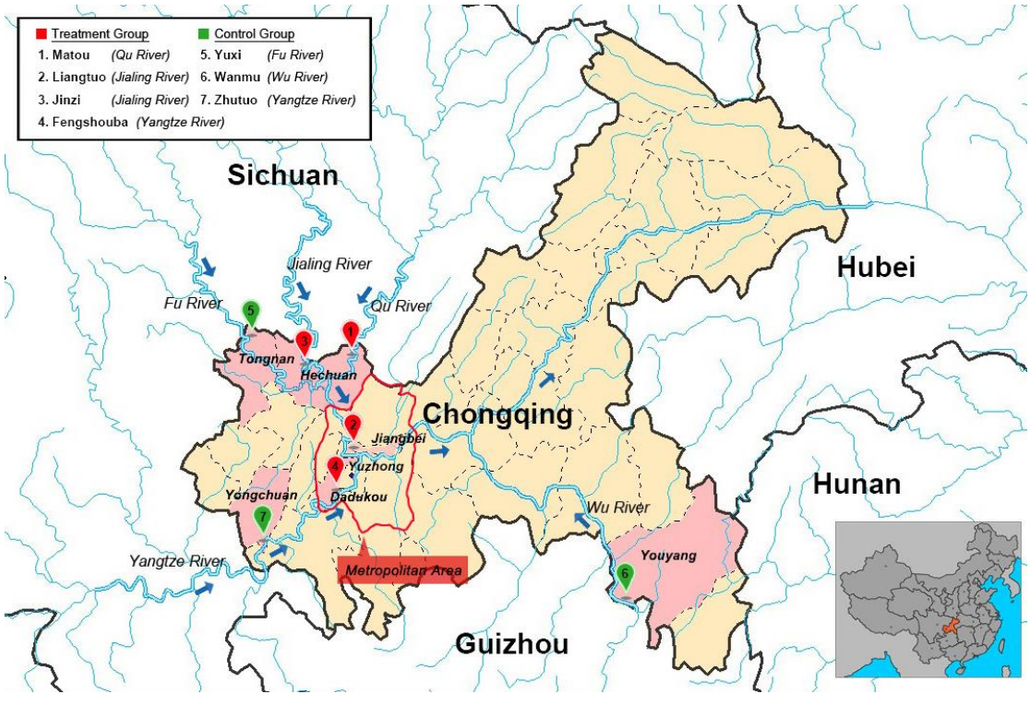


Figure 2: Geographic Distribution of the Treatment and Control Groups



Note: Arrows indicate the direction of river flow. The metropolitan area consists of the major districts of Chongqing, including Yuzhong (where Chongqing municipal government is located), Shapingba, Jiulongpo, Yubei, Jiangbei, Nan'an, Dadukou, Banan, Beipei.

Figure 3: Timeline of Crackdown Events

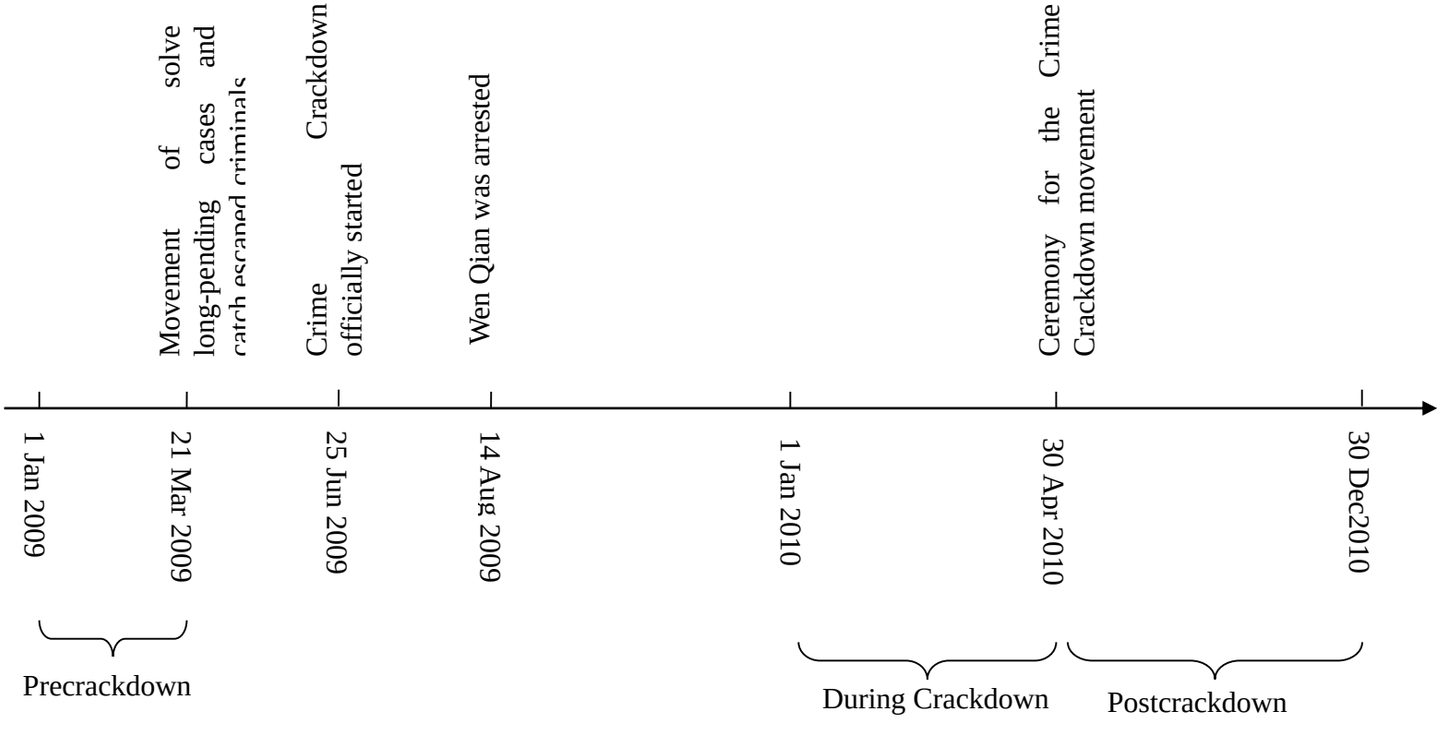


Figure 4: Crackdown and Surface Water Quality Scatter Plot

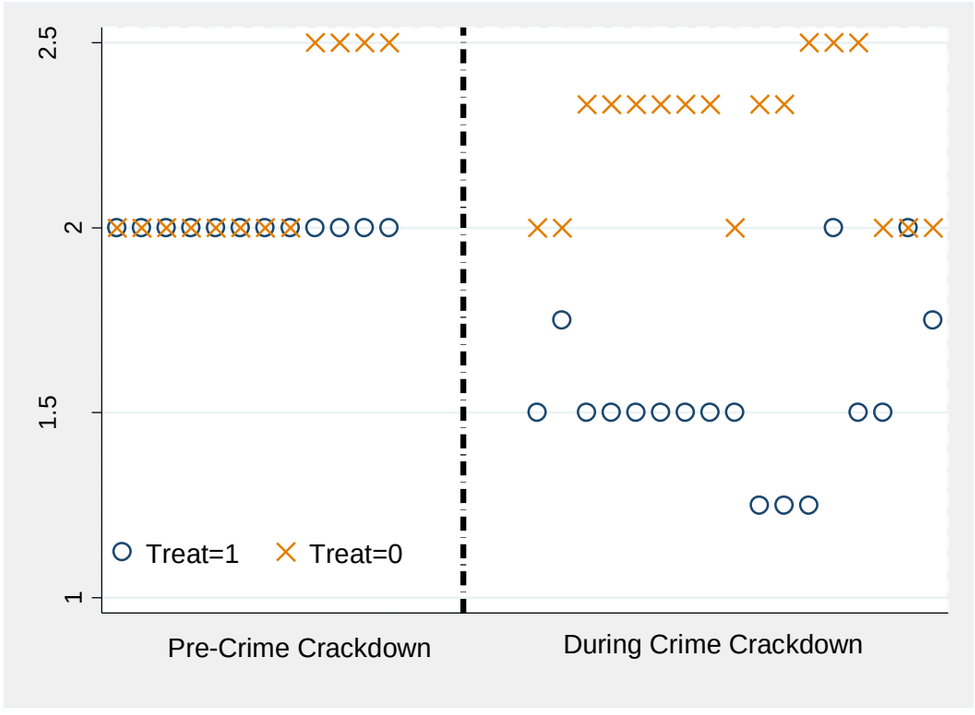
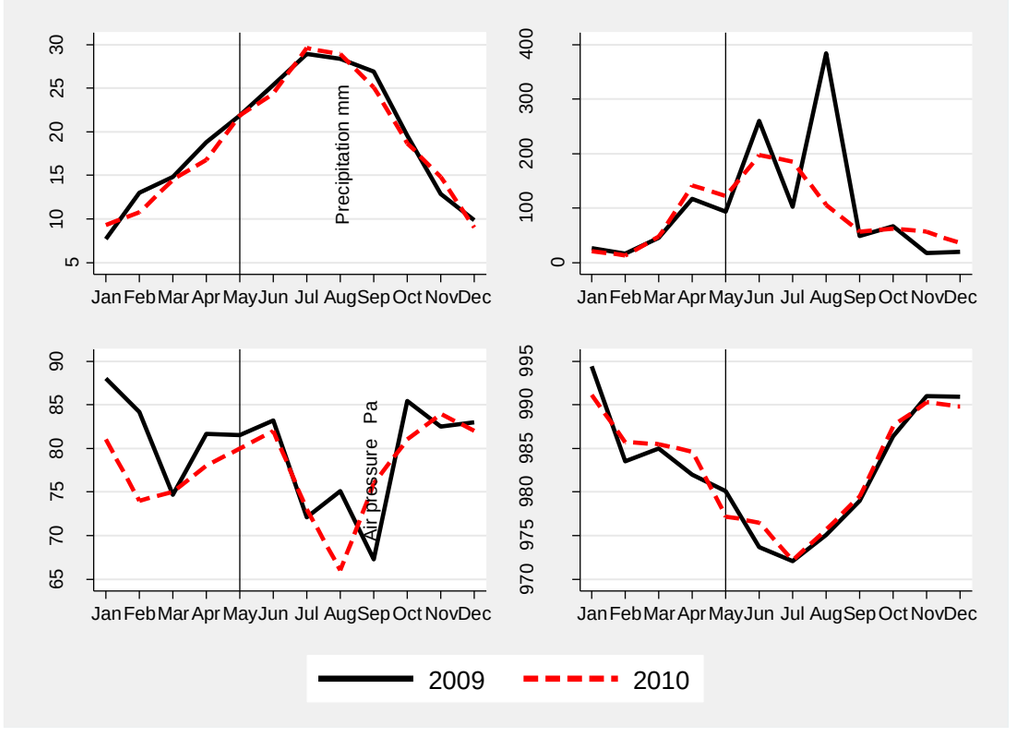


Figure 5: Chongqing Meteorological Conditions in 2009–2010



Source: Chongqing Statistical Yearbooks

Figure 6: Weekly Dynamics of Crackdown on Surface Water Quality in 2010

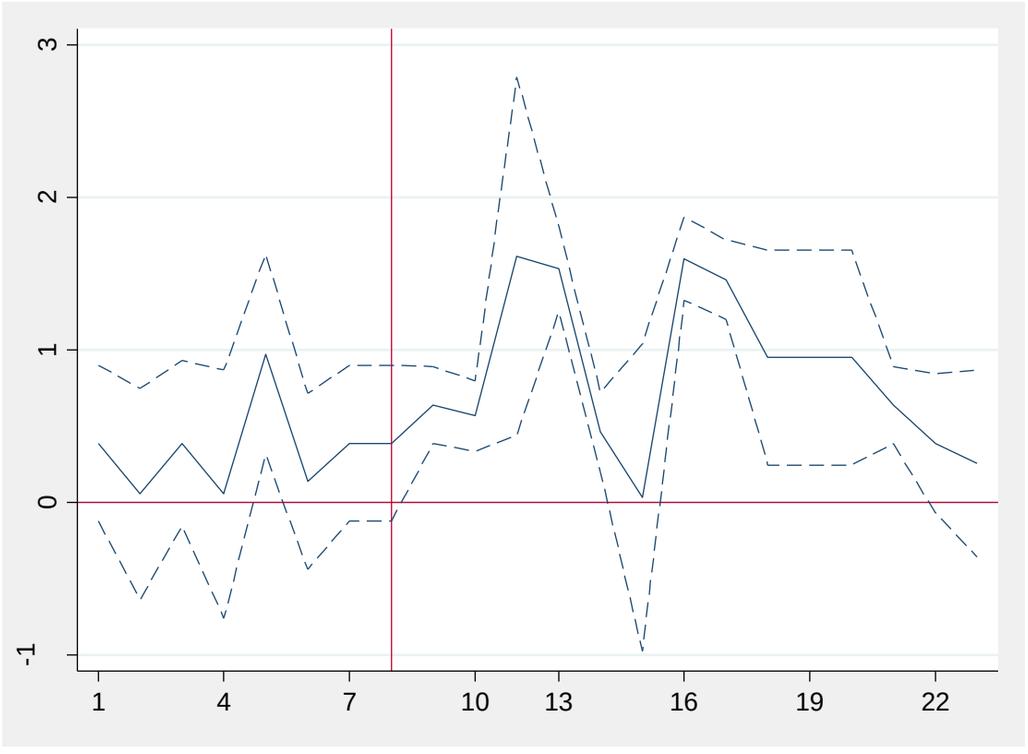


Table 1: Surface Water Observation Sites

Observation Sites	River	Located upriver	Drinking water source	Treatment group
Fengshouba	Yangtze River	No	Yes	Yes
Liangtuo	Jialing River	No	Yes	Yes
Jinzi	Jialing River	Yes	No	Yes
Matou	Qu River	Yes	No	Yes
Wanmu	Wu River	Yes	No	No
Yuxi	Fu River	Yes	Yes	No
Zhutuo	Yangtze River	Yes	No	No

Sources: Chongqing Environmental Protection Bureau website

Table 2: Surface Water Quality and Accumulative Frequency in Different Time Periods

	Precrackdown[a]		During crackdown			Postcrackdown		
	Level Ⅱ	Level III	Level I	Level II	Level III	Level I	Level II	Level III
Control group	20[b]	4	2	33	13	3	87	7
	(83%)	(17%)	(4.17%)	(68.75%)	(27.08%)	(3.09%)	(89.69%)	(7.22%)
Treatment group	48	0	31	37	0	33	71	12
	(100%)	(0%)	(45.59%)	(54.41%)	(0%)	(28.45%)	(61.21%)	(10.34%)

Notes: [a]In the precrackdown period, no Level I-quality surface water was detected at any observation site. [b]Absolute numbers are weekly frequencies in a specific time period. The percentages in parentheses indicate the proportion of each water quality level in the time period.

Table 3: Surface Water Quality: Precrackdown versus During Crackdown

	Linear model				Oprobit
	(1)	(2)	(3)	(4)	(5)
During CC * Treat	–0.378***	–0.378***	–0.721***		–6.015***
	(0.127)	(0.127)	(0.162)		(0.505)
During CC	–0.114	–0.114	–0.148		–0.530
	(0.111)	(0.111)	(0.094)		(0.404)
March_2012 * Treat				0.027	
				(0.118)	
March_2012				–0.028	
				(0.088)	
Treat	–0.454**	–0.210**	–0.000	–0.159*	5.267***
	(0.179)	(0.083)	(0.007)	(0.096)	(0.556)
Water	–0.192	0.051		0.188**	15.475***
	(0.164)	(0.074)		(0.075)	(0.603)
Individual Fixed effect	Yes	Yes		Yes	Yes
Week fixed effect	Yes	Yes	Yes	Yes	Yes
River fixed effect		Yes		Yes	Yes
Constant	2.597***	2.353***	2.868***	1.755***	
	(0.267)	(0.227)	(0.084)	(0.118)	
# of Obs	188	188	55	167	188
Pseudo/R-squared	0.514	0.514	0.685	0.201	0.563

Notes: Robust standard errors are reported in parentheses.

*, **, and *** denote significance levels 0.1, 0.05, and 0.01, respectively.

Table 4: Surface Water Quality: Postcrackdown and Net Effect

	Linear model		Oprobit	Linear model		Oprobit
	(1)	(2)	(3)	(4)	(5)	(6)
Post-CC * Treat	0.455***	0.683***	1.449***	0.015	-0.030	0.189
	(0.114)	(0.229)	(0.322)	(0.099)	(0.105)	(0.308)
Post-CC	–0.274	–0.714***	–0.903	–0.311	–0.868***	–1.282*
	(0.229)	(0.196)	(0.603)	(0.244)	(0.091)	(0.701)
During CC * Treat				–0.444***	–0.721***	–1.435***
				(0.126)	(0.176)	(0.388)
During CC				-0.050	–0.148	–0.238
				(0.108)	(0.101)	(0.351)
Treat	–0.652***	–0.714***	–2.007***	-0.206**	–0.000	–0.707**
	(0.109)	(0.196)	(0.379)	(0.083)	(0.007)	(0.297)
Water	0.109		0.449**	0.125**		0.676***
	(0.067)		(0.229)	(0.055)		(0.229)
Individual Fixed effect	Yes		Yes	Yes		Yes
Week fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
River fixed effect	Yes		Yes	Yes		Yes
Constant	2.142***	2.714***		2.195***	2.868***	
	(0.207)	(0.196)		(0.215)	(0.091)	
# of Obs.	329	97	329	408	123	408
Pseudo/R-squared	0.381	0.628	0.297	0.372	0.635	0.315

Notes: Robust standard errors are reported in parentheses.

*, **, and *** denote significance levels 0.1, 0.05, and 0.01, respectively.

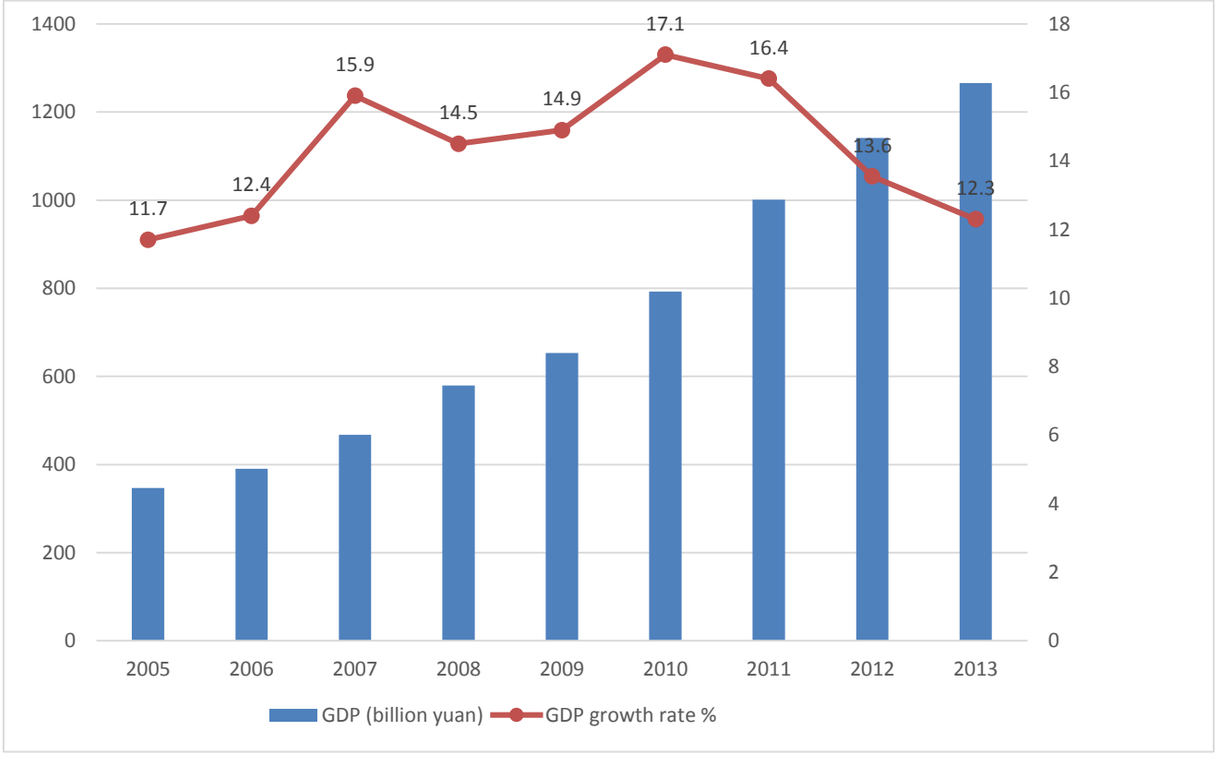
Table 5: Marginal Effect for Crime Crackdown

	Column (5) in Table 3	Column (3) in Table 4	Column (6) in Table 4	
	During CC * Treat	Post-CC * Treat	During CC * Treat	Post-CC * Treat
Quality = 1	0.446***	-0.301***	0.399***	0.094**
	(0.066)	(0.039)	(0.047)	(0.042)
Quality = 2	0.509***	-0.457***	0.509***	0.057
	(0.082)	(0.058)	(0.069)	(0.062)
Quality = 3	-0.063	0.156***	-0.110***	0.037
	(0.042)	(0.030)	(0.038)	(0.034)

Notes: Standard errors are reported in parentheses.

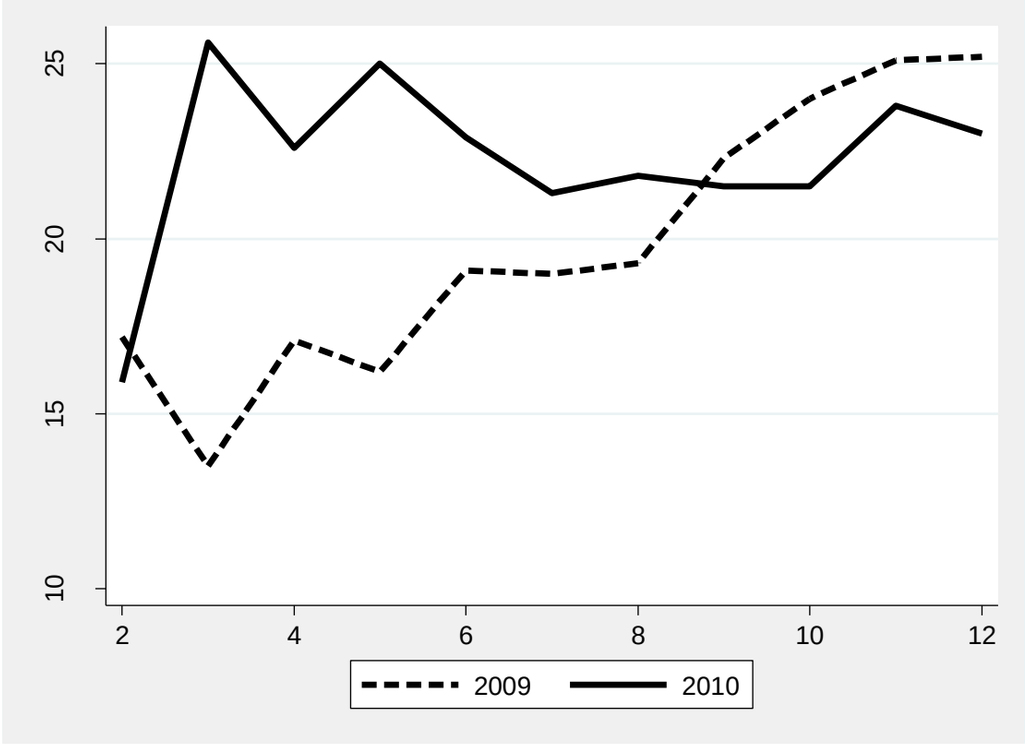
*, **, and *** denote significance levels 0.1, 0.05, and 0.01, respectively.

Appendix A Chongqing Local GDP and GDP Growth Rate, 2005-2013



Source: *China Statistical Year Book* 2010 and 2014.

Appendix B The Growth Rate of Industrial Output of Chongqing



Source: Development Research Center of the State Council, Industrial statistics Database, http://www.drcnet.com.cn/www/integrated/

Note: No data was collected in January 2010 due to the Spring Festival