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# Incentives for China's urban mayors to mitigate pollution externalities: The role of the central government and public environmentalism<sup>☆</sup>

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## ABSTRACT

China's extremely high levels of urban air, water and greenhouse gas emission levels pose local and global environmental challenges. China's urban leaders have substantial influence and discretion over the evolution of economic activity that generates such externalities. This paper examines the political economy of urban leaders' incentives to tackle pollution issues. We present evidence consistent with the hypothesis that both the central government and the public are placing pressure on China's urban leaders to mitigate externalities. Such "pro-green" incentives suggest that many of China's cities could enjoy significant environmental progress in the near future.

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## 1. Introduction

China's pollution challenges are well documented. Many cities in China have extremely high air pollution levels. In early 2013, the terrible smog haze pollution in North China caught the world's attention.<sup>1</sup> The PM<sub>2.5</sub> concentration in those cities has been two, three, or even four times the emergency threshold of 250  $\mu\text{g}/\text{m}^3$  (and up to 40 times levels the WHO considers healthy).<sup>2</sup> Based on an ambient particulate concentration criterion of PM<sub>10</sub>, twelve of the twenty most polluted cities in the world are located in China (World Bank, 2007). This pollution has mainly been caused by emissions from the heating and electricity sector (based on coal), and the industrial and transportation sectors.

As China surpassed Japan as the second largest economy in the world at the end of 2009, China's energy consumption and electricity

demand have also been soaring. The nation's electricity consumption reached roughly 4.5 trillion kilowatt hours in 2011.<sup>3</sup> Given that 80% of China's electricity is produced by coal fired power plants this has led to a huge increase in greenhouse gas emissions.

If China's central and local governments stepped in and mandated credible regulations, then pollution externalities across China's cities could be mitigated. Environmental economists have argued based on cross-national evidence that there is a "J" curve for regulation such that poor nations implement none and middle income nations start to implement such regulation which grows more intense as these nations develop from being middle income to being rich (Selden and Song, 1995). As China becomes one of the world's leading economies, it is possible that a similar dynamic could play out there.

Such an optimistic, and deterministic, vision of regulatory adoption as a function of only national per-capita income abstracts away from institutions and incentives as important determinants of whether government officials are "up to the job" of combatting pollution. Yet, leading studies in growth economics have emphasized the fundamental role that institutions play in economic development (Acemoglu and Robinson, 2012).

Until recently, neither China's national government officials nor local urban officials prioritized environmental protection. The Chinese central government creates a "tournament competition" among local mayors by promoting or demoting them on the basis of relative performance (Bo, 1996; Wu, 2010). The central government had been focusing on economic growth with an emphasis on GDP as the key evaluation criterion for local officials' performance (Chen et al., 2005; Li and

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<sup>1</sup> See [http://www.chinadaily.com.cn/china/2013-01/14/content\\_16115953.htm](http://www.chinadaily.com.cn/china/2013-01/14/content_16115953.htm) for more background information.

<sup>2</sup> See <http://www.chinafile.com/airpocalypse-now-china-tipping-point>. Particles 2.5  $\mu\text{m}$  or less in diameter (PM<sub>2.5</sub>) are referred to as "fine" particles and are believed to pose greater health risks than larger particles because they can embed deep in people's lungs.

<sup>3</sup> See: <http://www.bloomberg.com/news/2011-01-28/china-s-power-demand-growth-may-slow-to-9-this-year-nea-says.html>.

Zhou, 2005) for a long time. Local officials thus sought to boost their local economy through attracting dirty industries, but had little incentive to reduce energy consumption or protect the environment in their own jurisdictions since such actions did not help their political career (Wu et al., 2013).

Such a tournament raises the possibility that the central government can incentivize urban officials to devote more attention to environmental challenges. In recent years the central government has been changing the performance evaluation criteria for local officials from purely output-based to including more “greenness” in the performance vector (Landry, 2008). Below we discuss why the central government changed its focus on *GDP* growth to an objective function that also includes environmental goals. The driving forces were both a desire to improve the people’s quality of life and a desire to establish legitimacy in the public’s mind to help retain political power (Wang, forthcoming).

Local residents provide a second source of pressure on urban mayors. In democracies, voters have the ability to hold elected officials accountable for their policy choices (Hårsman and Quigley, 2010; List and Sturm, 2006). While China’s urbanites do not directly vote, they have alternative strategies for expressing their views. As the new urban cohorts become richer and more educated, they are likely to value safety and greenness. An educated public will seek out more information about environmental threats. Recent trends that reduce the cost of information acquisition, such as the rise of the Internet media, micro blogs (*weibo*, the Chinese version of Twitter),<sup>4</sup> instant phone messages, and more liberated local newspapers have increased the public’s awareness of pollution challenges. The salience of this news allows them to overcome potential free rider issues and to unite to express their concerns and displeasure with current urban quality of life. Since social stability is an important target when the State evaluates local officials, local officials are keen to address their people’s demand for a cleaner environment.

This paper uses unique city level panel data to test several predictions related to how a city’s environmental performance influences a mayor’s career prospects. We also study how quality of life conditions is associated with the public’s interest in environmental issues. Our study exploits cross-regional and within city variation in economic and environmental conditions to generate new facts about the causes and consequences of pollution on city leader’s priorities. We hypothesize that relative to the past, urban mayors in China now face political pressure from the central government and the local public who are each demanding environmental progress. In a metaphorical sense, the mayors are “sandwiched” by these two different pressure groups and thus have less discretion than they had in the recent past.

We create several new data sets including information on the promotion propensities and demographics of prefecture-level city mayors, and their city’s industrial energy intensity and ambient particulate matter (*PM10*) levels of 86 Chinese cities during the years 2004 to 2009. We use these data to test whether there is an association between environmental performance and an urban leader’s probability of being promoted. We also test whether objective measures of urban residents’ environmentalism are associated with environmental progress. We present evidence consistent with the hypothesis that both the central government’s regime shift and urban households’ rising demand for greenness are contributing to local politicians’ accountability for their city’s energy and environmental performance.

This paper contributes to a nascent empirical literature on the role that political leadership plays in determining government priorities over public good provision. Jones and Olken (2005) document the role that national leaders play in affecting macroeconomic growth. List and Sturm (2006) find that U.S. governors’ environmental policy priorities change when they are restricted by term limits from remaining in office. Ferreira and Gyourko (2009) document differentials in U.S. mayor

policies over taxes, spending and public sector employment. Jia (2012) develops a model of politicians with career concerns making choices over the use of clean and dirty technologies. She exploits a unique data set identifying social networks between Chinese local governors and key central government officials, and concludes that politicians are motivated by strong promotion incentives which promote growth, regardless of its social costs.

The rest of the paper is organized in five sections. Section 2 describes the political economy of environmental regulation in China, especially the role of promotion criteria, and also the green nudge from the public. Section 3 discusses our empirical hypotheses and data creation as we construct several unique data sets, including the energy–environmental quality and mayor promotion data by city/year, and two indices reflecting Chinese urbanites’ concern intensity over pollution. Section 4 presents the empirical equations and results. Section 5 concludes.

## 2. Background on the central government’s promotion rules and the recent emphasis of environmental goals

### 2.1. The evolution of the promotion rules

China has a strong one-party central government, but hundreds of local governments act as competing enterprises. The State Council appoints the governors of provinces, municipalities, and some major cities (so-called “provincial-level” and “vice-provincial” cities) directly. Provincial governments appoint the governors of prefecture-level cities. How to select and reward subordinate officials is central to the effective governance of every large organization. The selection and promotion process is performed by the upper-level CCP (China’s Communist Party) Committee’s personnel department, which is a key sector in the upper-level government.<sup>5</sup>

In the past, local *GDP* growth was the main criterion used by upper-level governments in evaluating the performance of lower-level officials’ performance and deciding whether to promote them to higher positions. Recently, sustainability and social stability are included in the promotion criteria.

The Chinese State has established a number of notable targets for energy efficiency and pollution reduction. Specific energy efficiency and pollution reduction targets were clearly set and included in the tenth, eleventh and twelfth “Five-Year Plan” (2001–2005, 2006–2010, 2011–2015 FYP, respectively). In the tenth FYP, the target was set that major water and air pollutants should decrease by 10% over the five-year period. In the eleventh FYP, the target was that major pollutants such as COD (Chemical Oxygen Demand) and  $\text{SO}_2$  to decrease by 10% each year from the 2005 level; energy consumption per unit of *GDP* to decline by about 20% from the 2005 level. At the Copenhagen Climate Summit in 2009, China pledged to achieve a carbon intensity reduction of 40–45% by 2020 (Department of Climate Change, NDRC, 2010).

There are several motivations behind the Chinese central government’s ambitious shift to emphasize pollution reduction and climate change mitigation goals. First, domestic energy security concerns have risen on the central government’s agenda as a result of electricity shortages and rapidly rising energy consumption. Second, the central government believes that the rest of the world is embracing the low-carbon energy agenda which has created a market imperative for China to become a technological and economic leader in this nascent field (Boyd, 2012). Third, the central government may be concerned about the direct productivity loss and the disamenity effects caused by pollution exposure. Another possible explanation is that the central government seeks “legitimacy” with the Chinese people and also in the international arena, and making a commitment to pursuing environmental goals

<sup>4</sup> The micro blog, as a nascent web application emerged in 2009, had 331 million users by June, 2013.

<sup>5</sup> This process is quite complicated, including performance evaluation with objective and quantitative targets, individual interview, and qualitative assessment of capacity and potential. Therefore, the promotion rule cannot be written out as a simple function.

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