



Does central supervision enhance local environmental enforcement? Quasi-experimental evidence from China



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ABSTRACT

This paper draws on a natural experiment generated by the National Specially Monitored Firms (NSMF) program in China to evaluate the effectiveness of central supervision at improving local environmental enforcement. We explore a unique firm-level Chinese Environmental Statistics dataset and utilize a regression discontinuity design to assess the impact of central supervision through the NSMF program on an industrial firm's chemical oxygen demand (COD) emissions. The results suggest that central supervision significantly reduces industrial COD emissions by at least 26.8%. These results highlight the substantial room for improvement in Chinese environmental regulations via central supervision. A more flexible environmental decentralization regime and comprehensive central supervision are thus recommended for future reforms.

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1. Introduction

Countries with multiple levels of government face the important question of which level of government should undertake specific regulatory responsibilities (Oates, 2001). In this paper, we propose a new model of decentralized environmental regulation whereby the national government plays a key role in information collection and supervision to complement local environmental regulation. We provide strong empirical evidence by evaluating the National Specially Monitored Firms pilot program (hereafter called the NSMF program), which aimed to reform environmental decentralization in China.

Although decentralization is a mainstream political arrangement for the provision and governance of public goods in most countries (WorldBank, 2000), the decentralization of environmental regulation remains a topic of debate among researchers and policymakers.

Many economists advocate decentralization as a more efficient method of providing local public goods. For instance, Tiebout (1956) argues that in a decentralized context, interjurisdictional competition arises and improves the allocation of local public services because voters can choose their preferred localities by “voting with their feet.” Oates (1972) further proposes a theoretical framework of interjurisdictional competition and proffers the Decentralization Theorem (Oates, 1972, p.54). In the context of environmental management, a decentralized administration system for environmental regulation is known as environmental federalism (Anderson and Hill, 1997). Critical opinions posit that environmental federalism loses efficiency due to a number of externalities such as free-riding behavior and cross-boundary environmental pollution (Engel, 1996), competition between localities for mobile and polluting capital (Kunce and Shogren, 2005; Levinson, 1997; Markusen et al., 1995; McAusland, 2003), misestimated environmental costs and benefits at the local level (Revesz, 1997), and corruption (Fan et al., 2009).

Empirical evidence on environmental federalism has primarily been based on the experiences of developed countries. On the one hand, an abundance of studies suggest that competition between

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localities may lead to a “race to the top” in environmental standards rather than a “race to the bottom” (Fredriksson and Millimet, 2002; Konisky, 2007; Levinson, 2003; List and Gerking, 2000). On the other hand, numerous studies provide evidence for interjurisdictional externalities and freeriding behavior (Fredriksson et al., 2006; Gray and Shadbegian, 2004; Konisky and Woods, 2012; Sigman, 2001, 2005). More recently, beyond the debates on the pros and cons of environmental federalism, increasing attention has been paid to alternative policy designs to improve the performance of environmental federalism (see Millimet, 2014 for a review).

China has adopted a different environmental regulation regime from most developed countries. While constitutionally organized as a unitary sovereign, China has a complex system of formal and informal divisions of authority between the central government and various levels of local and regional governments. A number of studies on Chinese central-local relations recognize that the decentralization resulting from economic reforms starting in 1978 has endowed China’s local governments with substantial authority over local economic development (Huang, 1996; Jin et al., 2005; White and Landry, 2010). Following this national decentralization trend, China’s environmental regulation framework was elaborated at the beginning of the reform era. Although the central government maintains its political authority over environmental planning, most fundamental enforcement decision making and responsibilities have been allocated to local and regional governments. This pragmatic regime is thus characterized by *de facto* environmental decentralization, i.e., a combination of the central design and local enforcement of environmental regulations (Zheng, 2007).

Previous studies suggest that in the framework of environmental decentralization, local enforcement remains far from adequate and effective in China (Lo et al., 2006; Van Rooij, 2006; Wang et al., 2003). This failure is primarily because local governments can take advantage of enforcement discretion to protect polluting firms (Jia and Nie, 2017; Wang et al., 2003), which may compromise environmental protection in favor of local economic interests (Dasgupta et al., 1997). Moreover, the severe lack of resources and the limited monitoring and inspection capacity of local regulators hamper the effectiveness of local environmental enforcement (Van Rooij, 2006). Ongoing reforms to environmental decentralization have sought to remedy these perverse incentives and enhance local environmental enforcement. Although the issue of environmental decentralization has garnered growing interest, few studies to date have investigated the impact of these reforms.

To bridge this gap in the literature, we study the reform of environmental decentralization in China under the NSMF program. The program’s essence is to enhance the central government’s role in information collection and supervision by means of automatic real-time monitoring and frequent inspections while maintaining environmental enforcement at the local level. It thus entails a combination of central supervision and environmental decentralization to assess the extent to which the former can enhance local environmental enforcement. In a framework consisting of a principal-agent model with asymmetric information, we first demonstrate that given environmental enforcement at the local level, direct central supervision reduces asymmetric information at both central and local levels and thus reduce firms’ optimal pollution emissions by increasing local environmental enforcement. As empirical evidence, we collect detailed water pollution data for 20,607 industrial polluting firms from an administrative dataset of Chinese Environmental Statistics (CES) and set a threshold of 65% of total water pollution emissions, which determines the designation of NSM firms, to conduct a regression discontinuity (RD) assessment design.

Given the alarming extent of environmental destruction in China, our study is urgently needed to clarify the role of the central government and to enlighten future reforms of the country’s environmental decentralization. Moreover, China’s case is globally relevant as it

broadens the geographic scope of the literature on environmental federalism beyond the US and EU models (Vogel et al., 2010). Unlike previous macro-level studies (Fredriksson and Wollscheid, 2014; Sigman, 2007; Sjöberg, 2016), our study is the first to use firm-level data to provide microeconomic evidence on environmental decentralization outcomes. In terms of its methodological contribution, our research uses quasi-experimental methods to address concerns regarding endogenous environmental regulation and provides robust empirical evidence in response. We build on the growing literature on environmental policy evaluation taking an experimental or quasi-experimental approach, which offers credible evidence that can be used in novel policy designs for the effective implementation of environmental regulations in developing countries (Duflo et al., 2013, 2014; Hanna and Oliva, 2010).

Our results show that direct central supervision has had a substantial environmental impact in the short-term by reducing industrial water pollution by at least 26.8%. This reduction is primarily achieved through end-of-pipe treatment at the firm level without affecting production. Our results highlight the role of central supervision in enhancing local environmental enforcement and suggest that more flexible environmental decentralization whereby comprehensive central supervision complements local environmental regulation should be at the core of future reforms of environmental decentralization in China.

The rest of the paper is organized as follows. Section 2 provides background information on China’s decentralized system of environmental regulation and the reforms in the NSMF program. Section 3 introduces our theoretical model. Section 4 discusses the RD design of our evaluation. Section 5 introduces the dataset, and Section 6 presents the main results. Finally, Section 7 discusses policy implications and concludes the paper.

2. Background

2.1. Decentralized system of environmental regulation in China

China first elaborated an environmental regulation system at the beginning of the reform era (OECD, 2006). In 1978, the National People’s Congress (NPC) added Article 11, Section 1 to the Chinese constitution, stating that “the state protects and improves the living environment and the ecological environment and prevents and controls pollution and other public hazards.” On the ground, the Environmental Protection Law (EPL) was passed the same year, requiring the central government as well as local and regional governments at all levels (provincial, prefectural, county and township) to establish environmental institutions. The EPL (1989) stipulated that “the local people’s governments at various levels shall be responsible for the environment quality of areas under their jurisdiction and take measures to improve the environment quality.”¹ This fundamental environmental legislation thereby provides a legal framework for the decentralized system of environmental regulation in China.

Since the reform era, as environmental damage has become increasingly severe, Chinese environmental institutions have undergone significant expansion. At the central level, the Environmental Protection Leadership Group (EPLG) of the State Council was upgraded from a department within a ministry to the State Environmental Protection Administration (SEPA) in 1998 and finally to the Ministry of Environmental Protection (MEP) in 2008. This gradual increase in ministerial status endowed greater powers

¹ See Article 16, Chapter 3 of the EPL (1989) for more details. <http://www.lawinfochina.com/display.aspx?id=1208&lib=law&SearchKeyword=Environmental%20Protection%252%20Law&SearchCkeyword=>. (Last consulted 29 Feb 2016).

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