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Analysis

The effect of ISO 14001 on environmental regulatory compliance in China

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ABSTRACT

Certification to the ISO 14001 environmental management standard is analyzed using data drawn from a survey of manufacturing firms in China. The analysis proceeds by first identifying predictors of ISO 14001 certification and then estimating the relationship between ISO 14001 certification and compliance with environmental regulations. Potential endogeneity between ISO 14001 certification and regulatory compliance is addressed by modeling certification and compliance simultaneously using the SURBP estimator. Results indicate that ISO 14001 certification increases compliance with environmental regulations, and this effect persists after implementing the appropriate controls for endogeneity.

1. Introduction

Worsening environmental conditions have earned China a reputation for putting economic growth ahead of sustainability. China is the largest emitter of greenhouse gasses in the world (New York Times, 2007), and home to 20 of the 30 most polluted cities in the world (World Bank, 2010). Given the strong potential cross-border effects of these problems, China's environmental crisis has become a subject of global concern. A central element of China's development strategy has been increased integration with world markets. China's accession to the WTO in 2001 sparked concerns that it would become a participant in the global "race to the bottom": the competitive lowering of environmental or other production standards to increase competitiveness on export markets and attract foreign direct investment (FDI) (Porter, 1999). However, careful analysis has shown that WTO accession had a significant positive effect on China's environmental quality. Vennemo et al. (2008) use a computable general equilibrium (CGE) model to decompose changes in key emissions categories in China along the lines of scale, composition and technique effects as described in Copeland and Taylor (2004). They find WTO accession had a net positive effect on environmental performance in China, driven in large part by the reallocation of resources away from pollution-intensive sectors. These results largely concur with the industry case studies presented in a report by the International Institute for Sustainable Development (IISD, 2004).

Vennemo et al. (2008) also find evidence of reductions in certain emissions categories due to the adoption of cleaner production techniques. According to Copeland and Taylor (2004), increased openness to trade can lead to the use of "cleaner" technologies as policymakers respond to increased domestic demand for environmental amenities driven by rising incomes. As incomes rise, domestic consumers demand greater environmental quality, and policy makers respond by tightening emissions regulations. This type of endogenous policy response seems unlikely in China, a country known for poor enforcement of its regulatory standards (Beyer, 2006). But at the same time that it was lowering trade barriers to comply with WTO rules, China experienced a dramatic increase in the adoption of the ISO 14001 environmental management standard. The number of ISO 14001 certified firms in China increased from 222 in 1999 to over 90,000 in 2012, making China the largest adopter of ISO 14001 in the world (ISO, 2013). Could this rapid adoption of ISO 14001 explain some part of the technique effects observed in Vennemo et al. (2008)?

Certifying to the ISO 14001 standard is an internationally recognized signal that a firm has implemented a system to mitigate and continuously improve its environmental impact. Previous studies of ISO 14001 adoption outside of China have produced mixed evidence regarding its effectiveness (for example, see Potoski and Prakash, 2005 vs. King et al., 2005), but how ISO 14001 adoption has affected environmental performance in China remains an open question. What follows is an empirical analysis of certification to the ISO 14001 standard in China using a unique firm-level dataset on Corporate Social Responsibility (CSR) among Chinese manufacturers. The analysis identifies several predictors of ISO 14001 certification in China and provides evidence that certification to the ISO 14001 standard improved environmental regulatory compliance among certified firms.

The paper proceeds as follows: additional background on environmental regulation in China is presented in Section 2. The existing

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literature on the ISO 14001 standard is presented in Section 3. The data and empirical methodology are presented in Section 4. Estimation results are presented in Section 5. Discussion and conclusions are presented in Section 6.

2. Environmental Regulation in China

China's first environmental regulations were written in the 1980s and 1990s, beginning with standards on water pollution in 1984, air pollution in 1987 and solid waste in 1995.[1] Complementary laws relating to soil and water conservation as well as biodiversity were passed in the 1990s and early 2000s (Beyer, 2006). Regulatory standards established by these laws were initially set at the national level by the State Environmental Protection Agency (SEPA). SEPA was elevated to a ministerial-level agency in 2008, now called the Ministry of Environmental Protection (MEP), to signal the central government's new focus on sustainable development.

The MEP is tasked with administering environmental policies handed down by the National People's Congress (NPC) and coordinating with local Environmental Protection Bureaus (EPB). EPB's are vested with the power to monitor emissions, perform site inspections and levy fees according to national regulatory standards. Polluters are required to submit declarations of their total emissions to their local EPB, which then determines if they are consistent with applicable environmental laws. Firms are granted licenses for emissions that do not violate legal standards. Polluters are faced with fees to acquire these licenses as well as “excess discharge fees” for emissions above the licensed level. Firms that commit gross violations of the standard are faced with escalating penalties and serious offenders could be forced to shut down.

Official statements from the MEP tend to emphasize the progress that China has made in reducing emissions of key pollutants (see e.g. MEP, 2009), but regulators are also keenly aware of the “enforcement gaps” limiting the effectiveness of the current regulatory system (Stokoe and Gasne, 2008). The general consensus is that the system is undermined by weak local enforcement. Beyer (2006) points out that no effective oversight mechanism exists to ensure policy set at the national level is actually enforced at the local level. Excess discharge fees are often subject to individual negotiation and local regulators may be more inclined to please local business interests than a distant national authority. This problem is compounded by the fact that many of the biggest polluting enterprises are state-owned (Lo et al., 2006).

The result is widespread under-enforcement of environmental regulations. Winalski (2009) found that, while the number of discharge permits issued doubled between 1996 and 2000, it still lagged far behind the number of known polluting enterprises. In some areas, only 20% of polluting enterprises applied for discharge licenses at all. Beyer (2006) also reports collected fees are sometimes made available to local polluters in the form of “grants” for investments in cleaner technology, but without adequate supervision over how the funds are used. Even when fines are levied appropriately, Stokoe and Gasne (2008) report maximum penalties are often set well below the cost of compliance.

The MEP has recently tried to address these “enforcement gaps” by developing new regimes that do not adhere so closely to the standard-and-penalty model. Zhang and Wen (2008) describe the government's recent steps toward promoting the adoption of cleaner production technologies instead of focusing exclusively on end-of-the pipe treatment and control. The government has also introduced new regional standards for total concentrations of certain air and water pollutants, though it is not clear how these total control targets are allocated into individual permits (Winalski, 2009). Certain municipalities have also experimented with emissions permit trading schemes, though these have not yet been scaled up to the national level.

Despite these innovations, environmental regulation in China still relies heavily on the discharge permit system. The conflicting incentives faced by local EPBs lead to systemic under-enforcement of environmental regulations and contribute to environmental degradation as China continues to grow.

The results of a recent survey on CSR in China highlight how ineffective these command and control structures seem to be. Managers were asked to rate the effectiveness of several different ways they are encouraged to raise production standards. As shown in Fig. 1, respondents rated traditional regulatory instruments, such as inspections and fines, as the least effective means of raising production standards. At the same time, they rated certifications, demand from customers, and competitive pressure as the most effective. These responses suggest that institutions providing market-based incentives for raising production standards might be an important tool for addressing China's environmental crisis.

3. Previous Literature

3.1. The ISO 14001 Environmental Management Standard

Voluntary standards such as ISO 14001 were developed to overcome weaknesses in traditional regulatory instruments. The United States, for example, has experienced a great deal of success with its 33/50 program, a voluntary emissions reduction program introduced in 1991 to complement existing environmental regulations (Innes and Sam, 2008; Khanna and Damon, 1999). Such programs are seen as cost-effective alternatives to command-and-control regulation. Firms voluntarily over-comply with regulations in order to tap into “green” price premiums from environmentally conscious consumers (Eriksson, 2004) or to strategically preempt future tightening of environmental regulations (Lyon and Maxwell, 2003). In either case, voluntary standards provide incentives for firms to lower emissions while reducing the administrative and monitoring costs associated with traditional regulation.

ISO 14001 is one of the most popular voluntary environmental standards in the world. In 2012, there were 285,844 ISO 14001 certified firms worldwide (ISO, 2013). ISO 14001 was established in 1996 by the International Organization for Standardization (ISO) to provide an internationally-recognized gold standard for environmental management systems (EMS), and to prevent the proliferation of mutually incompatible national standards. The existing literature often uses

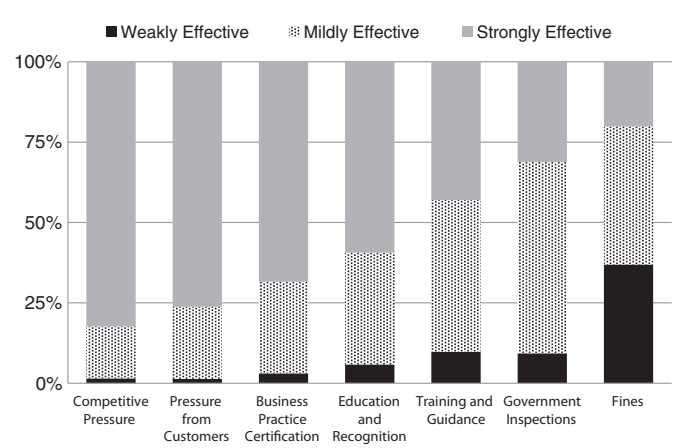

Fig. 1. Reported effectiveness of various policies or programs for raising firm standards in China. Data are taken from the Industrial Enterprise Survey conducted by China's NBS. Columns represent the cumulative percentages of respondents who identified a given policy or program as either weakly effective, mildly effective or strongly effective.

[1] China's first environmental regulation, the Environmental Protection Law, was passed provisionally in 1979. It established that enterprises would have to pay a fee for discharges exceeding prescribed emissions standards.