



# Impacts of ISO 14001 adoption on firm performance: Evidence from China



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## ABSTRACT

This paper investigates the impacts of ISO 14001 adoption on the performance of firms using a sample of Chinese firms. The results show that adopting ISO 14001 has insignificant impacts on the financial performance of Chinese firms. A further investigation shows that the adoption of ISO 14001 increases sales and costs of firms in similar magnitudes, thus causes insignificant net effects on the financial performance. Despite negligible financial gains, the adoption of ISO 14001 provides implicit non-financial benefits, such as promoting export and relieving coercive environmental inspections from the government.

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## 1. Introduction

With the urgent need for environmental protection, governments in many countries have formulated command-and-control policies, such as setting energy conservation targets and emission abatement mandates. However, such command-and-control policies are often criticized as being inflexible, heavy-handed, cost-ineffective, and providing fewer incentives for induced technology changes. Based on the limitations of the command-and-control policies, governments in many countries have begun to encourage certain market-oriented instruments or voluntary approaches that are typically viewed as more flexible, cost-effective and acceptable to the private sectors (Arimura, Darnall, & Katayama, 2011). Since the mid-1990s, various voluntary actions in environmental management have been adopted by firms around the world, and the most notable practice is the adoption of ISO 14001 standard.

As the standard environmental management system certified by the International Organization for Standardization (ISO), ISO 14001 has been widely adopted across the world (Ambec & Lanoie, 2008). To understand the fast expansion of the ISO 14001 standard, scholars have been interested in two questions: (1) What motivate firms to adopt the ISO 14001 standard? (2) What are the impacts of ISO 14001 adoption on firm performance? To date, the majority of the literature has focused on ISO 14001 adoption in developed economies. Some representative studies in this area include Babakri, Bennett, and Franchetti (2003) and Delmas (2000), who studied the expansion of ISO

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14001 among U.S. firms, Canon-de-Francia and Garces-Ayerbe (2009) and Morrow and Rondinelli (2002), who studied the adoption of ISO 14001 in European countries, and Arimura et al. (2011), who studied the adoption of ISO 14001 by Japanese firms.

With the rapid development of industrial economy in recent decades, the pollution in China has aroused wide concern around the world; of particular concern is the frequent haze that comprised high concentrated PM<sub>2.5</sub> in urban China. With the heightened awareness of corporate social responsibility, an increasing number of Chinese firms are actively pursuing various certifications on environmental management, and ISO 14001 is the most popular one. According to the Certification and Accreditation Administration of China (CAAC), the number of Chinese firms that adopted ISO 14001 reached 72,124 at the end of 2011, and China has outpaced Japan and the United States to become the world's largest country for ISO 14001 adoption. This paper intends to evaluate impacts of ISO 14001 adoption on performance of Chinese firms.

Although the extant literature has examined the effect (and extent) of ISO 14001 adoption on firm performance, findings are not conclusive (for a review, see Berchicci and King (2007)). Some studies have found that the adoption of ISO 14001 standard would improve a firm's performance in terms of Tobin's Q, return on assets (ROA), return on sales (ROS), and return on equity (ROE) (Dowell, Hart, & Yeung, 2000; Jacobs, Singhal, & Subramanian, 2010; Morrow & Rondinelli, 2002; Nishitani, 2011), whereas others have found neutral or even negative effects of ISO 14001 adoption on a firm's performance (Gilley, Worrell, Davidson, & El-Jelly, 2000; King & Lenox, 2001). Specifically, firms adopting the ISO 14001 standard are labeled as environment-friendly; therefore, they can gain differential advantages in their product sales, which could lead to larger market shares and higher profitability (Nishitani, 2011). Moreover, firms adopting the ISO 14001 standard may develop more efficient production processes that reduce operational and waste-disposal costs (Hart & Ahuja, 1996). However, the adoption of the ISO 14001 standard may not be able to boost firms' sales or enhance their stock market evaluation; in such situations, the benefits would fail to offset increased costs of initial adoption and subsequent maintenance fees, especially in the short run (Babakri et al., 2003; Bansal & Bogner, 2002). Therefore, it is still unclear whether ISO 14001 adoption enhances financial performance of firms or it is merely a placebo for firm managers who want to obtain membership in the 'green club'.

The difficulty of reaching consistent findings about impacts of ISO 14001 adoption on firm performance may be incurred by the potential endogeneity problem (Potoski & Prakash, 2005), and divergent research settings (King & Lenox, 2001). For example, Yang, Hong, and Modi (2011) found that positive and significant impacts of environmental management on firm performance were more likely to be observed in developed countries, whereas such an outcome did not occur in developing countries. Elsayed and Paton (2005) indicated that such distinct effects might also exist across developing countries, such as in China, Argentina, and Turkey. In addition, the adoption of ISO 14001 may exert distinct effects across different industries, and the aggregated net effect might depend on the industry distribution of sampled firms.

In this paper, we generate a unique dataset by matching a survey of Chinese firms with the annual census data of Chinese industrial firms. We first examine whether the adoption of ISO 14001 standard affects firm performance approximated by several financial indicators, including ROA, ROE and ROS. We find statistically insignificant effects of ISO 14001 adoption on these financial performance indicators. To determine mechanisms underlying the findings, we study the impacts of ISO 14001 adoption on sales and costs of firms. We find that the ISO 14001 adoption simultaneously increases a firm's sales and costs in similar magnitudes. The increase of sales and costs may offset each other and lead to insignificant impacts on firm's financial performance. Furthermore, we divide industries into three subgroups according to their pollution levels, namely heavy-, mid- and light-pollution industries. Results show that ISO 14001 adoption significantly affects sales and costs of firms in heavy-pollution industries, but does not affect firms in the mid- or light-pollution industries.

Given the insignificant impacts of the ISO 14001 adoption on firm performance, the question remains why so many Chinese firms have adopted ISO 14001 standard. Therefore, we further examine several implicit benefits of ISO 14001 adoption. Firstly, because a large number of Chinese firms have made considerable headway in their implementation of "going-out" strategies, we consider firm exporting. The findings show that Chinese firms with ISO 14001 certification tend to export a larger percentage of their total sales, suggesting that ISO 14001 adoption provides Chinese firms with better access to the global market. Secondly, the Chinese government has strengthened environmental inspections against manufacturing firms as a control measure against deterioration of environmental pollution. Therefore, we also investigate how ISO 14001 adoption, as a substitute for command-and-control policies, helps firms relieve the pressure of government environmental inspections. Results show that firms with ISO 14001 certification receive less frequent inspections than their counterparts without ISO 14001 certification. In sum, although ISO 14001 adoption does not improve financial performance of Chinese firms, there are implicit benefits associated with the certification that may explain why Chinese firms actively adopt the ISO 14001 standard.

This paper is organized as follows: in Section 2, we give a brief introduction of the data and empirical methods; in Section 3, we present the primary results and robustness tests; and in Section 4, we reach the conclusion.

## 2. Data and methods

### 2.1. Data

To examine the impacts of ISO 14001 adoption on firm performance, we combined a firm-level survey that was conducted by the China Center for Economic Research (CCER) in 2006 with Chinese industrial firm census data that were compiled annually by the National Bureau of Statistics. This CCER survey includes 1268 manufacturing firms randomly selected from 12 cities based on China's industrial firm census data. The 12 sampled cities represent Chinese regions with different development levels.<sup>1</sup> In each

<sup>1</sup> The 12 sampled cities were distributed among coastal, central and western regions. According to the per-capita GDP of 2005, these 12 cities were grouped into three categories: high, middle and low income. The income gap was roughly twofold between any two neighboring groups.

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