Full Length Article

Pollution control and foreign firms' exit behavior in China

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A B S T R A C T

China faces a common dilemma of how to maintain rapid economic growth while also reducing the pollution that has accompanied growth. Will stricter pollution controls drive away the foreign firms that have helped spur growth in China? This paper studies the effects of the Two-Control-Zone (TCZ) pollution control policy on foreign firms' exit behavior in China. Based on firm-level data from 1998 to 2009, we find that foreign firms' responses are not significantly different from domestic firms on average once environmental regulations impose an added cost of business. However, foreign firms' responses to stricter pollution controls tend to differ based on various firm characteristics. Our estimation indicates that larger size, higher productivity and exporting all make foreign firms less likely to exit than similar domestic firms in regions with stricter pollution control.

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1. Introduction

The potential relationship between foreign direct investment (FDI) and environmental deterioration has garnered a lot of research attention due to conflicting hypotheses and their conflicting policy implications. Much of the debate centers on the "pollution haven" hypothesis which argues that weak environmental regulations in developing countries attract foreign investors from industrial countries with more restrictive regulations. Theoretical studies have developed this hypothesis and some empirical studieshave found support for it by showing thatcapitaltends to move from higher tolower regulation countries.[1] However, other studies have foundthatforeign companies tend to use better management practices and more advanced technologies than host developing country firms, thereby contributing to cleaner environmental outcomes. These results fit the "pollution halo" hypothesis.[2]

As the largest developing country and the most attractive FDI destination, China presents a unique case for testing the FDI—pollution relationship. Government officials and the general public in China recognize that FDI firms have made important contributions to China's economic development, butthey also criticize China's serious pollution problems due to years of rapid, unregulated growth. Due to pollution haven effects, foreign firms may have been attracted by the previously weak pollution controls within China, and therefore they face criticism for damaging the local environment.[3] In addition to

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aggregate environmental impacts, FDI firms may have exacerbated regional disparities in environmental quality since the geographic distribution of FDI in China is highly uneven.[4] Regional environmental inequality in terms of residents' access to clean air and/or clean water has been evaluated somewhat by public health economists but is still an underexplored aspect of inequality.[5] We contribute to this broad topic area by examining the firm-level impacts of China's recent regional environmental protection laws.

TheChinese government has recently announced a series of laws to better regulate and reduce pollution. Observers now worry that the Chinese government's efforts to improve pollution control may drive away FDI firms and impede the development of local economies. For the government's policies to have their desired effects, they must induce movements towards cleaner technologies within industries and/or the exit of the most polluting firms or industries if production technologies cannot be improved. Our data allows us to analyze the latter issue; that is: howhave the government's regional pollution controls affectedexisting firms, both foreign and domestic, in different regions? Are foreign firms more mobile than domestic firms, and therefore more likely to exit a region in China due to a change in the environmental regulations? Alternatively, are foreign firms less likely to exit a region in China once environmental regulations impose an added cost of business on domestic rivalsthat use more pollution-intensive technologies?

To address these research questions, we conduct a cross-firmstudy on firms' relocation or exit behavior, comparing domestic and foreign-owned firms in Two Control Zones (TCZs) or non-TCZs. The TCZ policy was initially adopted in 1998 by the State Council of China. The major target of TCZ policy is to control the output of sulfur dioxide (SO_2). The majority of the sulfur dioxide output can be measured accurately and inexpensively through acid rain analysis in southern China, while in northern China it is measured directly by SO_2 emissionsdata collection due to climate differences. Therefore, controlling the SO_2 air pollution in northern China and controlling acid rain in southern China are the so-called "Two Controls." According to the State Council documents (1998, 2002), there are five major aspects in the TCZ policy[6]: 1) Based on the records before 1998, cities with particularly high output of SO_2 are designated as SO_2emission control zones or acid rain zones, the so-called TCZs. The list of TCZs has not been changed since 1998. In total, the TCZs include 11.4% of China's land area (175 prefecture cities),and they produce 67% of its GDP and 66% of its SO_2 emissions in 2000. 2) The policy sets targets on total SO_2output and geographic density of SO_2output for each TCZ. 3) The policy requires specific higher SO_2-related standardson fuel quality for all firms in TCZs and higher standards of SO_2emission control for firms in pollution-intensive industries in TCZs. Some high-pollution coal-related producers are required to shut down or upgrade. 4) TCZs must change their industry structure to become more environmentally friendly; and 5) the management of emission fees in TCZs must be stricter and more efficient. Therefore,for firms following low standards of SO_2emission control previously and/or with SO_2-related fuel-intensive production, the implementation of TCZ policies increases their production cost and may even drive these firms to exit the market. This effect can be especially strong for FDI firms if the pollution haven hypothesis holds. Otherwise, if the pollution halo hypothesis dominates, the relocation effect of TCZ policies should be weaker for FDI firms than domestic firms. In this paper, we investigate the effects of TCZ policies on the exit behavior of manufacturing firms in China based on 1998–2009 firm-level data.

This paper contributes to the existing literature in two respects. First, we investigate the impact of pollution control policies on the exit behavior of foreign firms in the manufacturing sector of China, the largest FDI recipient among developing countries. Second, based on abundant firm-level data, we find supporting evidence for boththe pollution halo and pollution haven hypotheses. The exit behavior of foreign firms is found to depend on their size, productivity, exporter status and SO_2-related industrial and regional characteristics. Our results indicate that larger size, higher productivity and exporting all make foreign firms less likely to exit than similar domestic firms in regions with stricter pollution control.

The rest of this paper is organized as follows. Section 2 reviews related literature and introducestheempirical strategies. Section 3 describes the data. Section 4 reports the estimation results and conducts various robustness tests. Concluding remarks are presented in Section 5.

2. Literature review and methodology

There is a large body of theoretical and empirical literature devoted to the effect of pollution controls on FDI firms. However, empirical studies fail to provide a consensus conclusion on this relationship. Some researchers document significant evidence supporting the pollution haven hypothesis (e.g., Becker & Henderson, 2000; Chung, 2014; Henderson, 1996; Keller & Levinson, 2002), but other studies find no significant supporting evidence (e.g., Eskeland & Harrison, 2003; Friedman, Gerlowski, & Silberman, 1992; Javorcik & Wei, 2003; Levinson, 1996). As Levinson and Taylor (2008) suggested, unobserved heterogeneity between firmsmight be an important cause of the conflicting results among these empirical studies.

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[4] Regional disparities in the impacts of FDI on China's economy are documented in Tseng and Zebregs (2002).

[5] For example, the Journal of Economic Perspectives' Spring 2016 edition features a symposium entitled "Inequality Beyond Income" which covers inequalities in consumption, mortality, health insurance, marriage and childbearing, and crime and criminal justice, but no coverage of environmental quality inequality.

[6] For more details, please see Hering and Poncet (2011).