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Analysis

To shut down or to shift: Multinationals and environmental regulation

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ABSTRACT

According to the pollution haven effect mobile capital responds to environmental regulation by moving from countries with high regulation to countries with low regulation. Previous tests of the pollution haven effect focus on host country regulation effect. This study also examines the effect of home country regulation on foreign direct investment (FDI). Using a panel of 28 OECD countries for 1990–2000 to estimate host and home country environmental regulations' effect on FDI, this study finds that host regulation decreases FDI. In contrast, home environmental regulation increases FDI at low levels of home regulation and decreases FDI at high levels of home regulation.

1. Introduction

The *pollution haven effect* predicts that foreign direct investment (FDI) responds to environmental regulation by moving from countries with high regulation to those with low regulation. Previous literature has sometimes failed to adequately distinguish between the *pollution haven hypothesis* and the *pollution haven effect* (Taylor, 2004). The pollution haven hypothesis predicts that removal of trade barriers between high-income and low-income countries results in pollution-intensive production moving to low-income countries with relatively lax environmental regulation. A necessary condition for the pollution haven hypothesis is a strong pollution haven effect (Taylor, 2004). The pollution haven effect may be triggered by changes in either home country or host country regulation. Existing literature focuses on the host country effects, while the effect of home country environmental regulation on FDI has been virtually ignored. This paper considers both host and home country environmental regulation effects on FDI.

Host country regulation and home regulation have different effects on a multinational firm. Fig. 1 presents the effects of host regulation, which I separate into the pollution haven effect and the shutdown effect. In this paper, the pollution haven effect refers to the gradual shift of investment away from the host country in response to higher host regulation whereas the shutdown effect corresponds to levels of host regulation at which the multinational would shut down its affiliate in the host country. Assuming that the headquarters of the multinational are mobile and would only locate in countries with production facilities, a firm's responses to home country regulation are presented in Fig. 2. If home country regulation increases, then initially FDI will increase as more investment shifts abroad, i.e. the pollution haven effect. After home regulation gets high enough firms would shut down their production and headquarters at home so that all production takes place abroad, i.e. the shutdown effect.

I estimate home and host country environmental regulation effects on FDI using bilateral FDI data between 1990 and 2000 for 28 member countries of the Organisation for Economic Co-operation and Development (OECD). In accord with existing work, I find that host country regulation discourages FDI. However, FDI and home regulation have a quadratic relationship. At low levels of home regulation, an increase in home regulation increases foreign investment until the shutdown effect begins to dominate; then increasing home regulation decreases FDI.

2. Literature

Many studies have determined the effect of the host jurisdiction's environmental regulation on FDI.[1] In a literature review of environmental regulation and industry location, Brunnermeier and Levinson (2004) find that statistically significant pollution haven effects are prevalent among more recent studies using panel data techniques or instruments to control for endogeneity. Despite the extent of attention

[1] These studies include Bartik (1989, 1998), McConnell and Schwab (1990), Friedman et al. (1992), Henderson (1996), Levinson (1996), Mani et al. (1996), Becker and Henderson (2000), List and Co (2000), Keller and Levinson (2002), Xing and Kolstad (2002), Jeppesen et al. (2002), Frederiksson et al. (2003), List et al. (2003), Eskeland and Harrison (2003), Javorcik and Wei (2004), Dean et al. (2005), Henderson and Millimet (2007).

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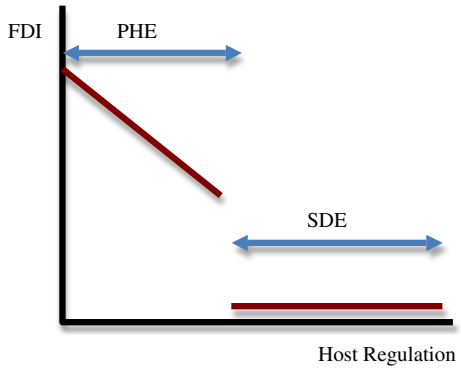

Fig. 1. Host regulation effects for an individual firm.

host regulation has received, no previous study has explicitly examined home jurisdiction's environmental regulation effects on outbound FDI in a cross-country setting.

A handful of studies have considered home country environmental regulation effects on foreign investment. In a theoretical study with simulated results Markusen (1997) analyzes the effects of environmental regulation on firms' location decisions. The firms can either be national (foreign or domestic) or multinational. He finds that, in general, higher environmental regulation tends to reduce the number of multinationals and increase the number of national firms. Markusen's main finding is related to the shutdown effect identified in this study. Eskeland and Harrison's (2003) theoretical model outlines why the effect of home country regulation on outbound FDI is ambiguous. In contrast to Eskeland and Harrison, Section 3 provides a simple framework that gives rise to a quadratic relationship between home country regulation and FDI.

Existing empirical literature on home country effects has used variation in industry-level regulation. Eskeland and Harrison's empirical results suggest that industry pollution abatement costs have no impact or a weak positive impact on U.S. outbound FDI into four developing countries. In a related study, when Cole and Elliott (2005) control for capital intensity alongside industry pollution abatement costs, they find that industries with higher pollution abatement costs have higher investment levels in Mexico and Brazil. This is evidence of the pollution haven effect in response to home regulation. Rather than relying on U.S. industry-level activity, I exploit variation in country-level environmental regulation for home and host countries by using bilateral FDI data.

Several studies have used firm-level analysis to determine home country environmental regulation effects. Employing U.S. firm-level data for 1966–1999, Hanna (2010) finds that the Clean Air Act Amendments increased foreign assets and foreign output, but that the more heavily regulated U.S. firms did not disproportionately increase foreign investment in developing countries. Her study focuses on U.S. firms alone and does not control for host country regulation. Evidence from China by Dean et al. (2005) suggests that FDI from OECD countries is attracted to provinces with higher environmental regulation, regardless of the dirtiness of the industry. However, highly-polluting industries from Hong Kong, Macao and Taiwan invest more in provinces with lower environmental regulation. This is further evidence that both host country regulation and home regulation should be explicitly considered. Closely matching Dean's result, Clark et al. (2000) find that U.S. firms in dirty industries are less likely to conduct offshore assembly in developing countries. Finally, Javorcik and Wei (2004) estimate a model explaining location decisions of 143 multinational firms in 25 transition economies. Allowing the effect of host country environmental regulation to vary with the dirtiness of the firm's industry, they find that host country environmental regulation does not impact location decisions. On the other hand, firms in cleaner industries are more likely to invest in these transition economies, consistent with the idea that home regulation affects investment decisions. In contrast to previous empirical literature, my study explicitly estimates both home country environmental regulation effect and the host country regulation effect on FDI.

3. Conceptual Framework

In the simplest models of multinational firms, each firm has a choice to be a domestic firm by only investing at home, a foreign firm by only investing abroad or a multinational firm by investing at home and abroad. Increasing environmental regulation in a country increases the operational costs in that country and multinationals can shift some or all of their production to another country. If operational costs abroad increase as a result of tighter environmental regulation then multinationals may shift some of their investment away from the host country but remain multinational—the pollution haven effect. Other multinationals may shut down foreign plants altogether and become a domestic firm—the shutdown effect. The pollution haven effect and the shutdown effect reduce FDI in response to higher regulation in the host country as shown on Fig. 1. For home country environmental regulation these two effects work in opposite directions as shown on Fig. 2. With increased home regulation, the pollution haven effect implies multinationals shift more of their investment abroad but remain multinational, thereby increasing FDI. Assuming that headquarters are mobile, some multinationals may shut down domestic plants and become foreign firms resulting in a decrease in FDI—the shutdown effect. If high home country environmental regulation causes the firm to only afford one plant, it may choose to build a domestic plant instead because of ties to the home country. In either case, the impact of shutdown effect on FDI would be negative for home regulation. The sign of home environmental regulation effect on FDI depends on the level of home country regulation. In aggregate, this implies a quadratic relationship between home regulation and FDI depicted on Fig. 3. This simple framework yields two

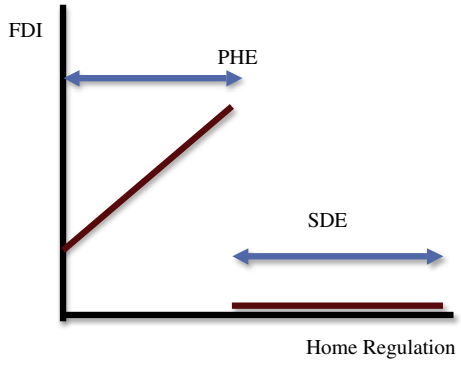

Fig. 2. Home regulation effects for an individual firm.

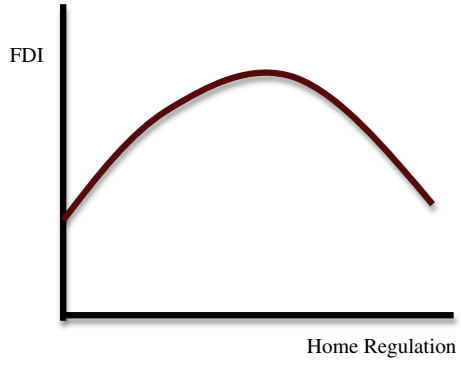

Fig. 3. Home regulation effects in aggregate.