How Can Environmental Regulation Impact Markets and Trade Patterns? Part 1

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The Pollution Haven Hypothesis is a theoretical framework developed to examine how differing levels of stringency of environmental regulation among countries can impact trade and investment patterns. This EBOT is the first in a series that reviews literature on environmental protection and trade. This note describes the Pollution Haven Hypothesis and examines research on this hypothesis.

What is the Pollution Haven Hypothesis?

Since the U.S. National Environmental Policy Act entered into force in 1970, economists have been concerned that environmental protection (EP) adversely affects U.S. industrial competitiveness. The Pollution Haven Hypothesis (PHH) theorizes that, given relatively low trade barriers, local firms in pollution-intensive industries will relocate production to regions with less stringent EP to take advantage of the implicit competitive advantage.[1] The PHH suggests production relocation occurs through the Pollution Haven Effect (PHE), which is a reversal of comparative advantage that can occur when capital-intensive economies increase EP stringency driving up production costs and eliminating their competitive advantage. Consequently, the PHH seeks to explain how different EP stringency levels between regions affect production and trade patterns.

U.S. Industry Response to Environmental Regulations

Qualitative research on the PHH suggests that increasingly stringent environmental regulations have led certain pollution-intensive industries to offshore production and increase imports, shifting emissions abroad. For example, in the U.S. Census Bureau's Pollution Abatement Costs and Expenditures survey, running from 1973 to 1994 and resuming in 2005, Arik Levinson from Georgetown University found that U.S. imports of goods produced by industries with the highest environmental abatement costs rose by 10 percent or more with new environmental regulations as production plants offshored. Michael Greenstone found that, between 1972 and 1987, counties that did not meet the national air quality standard of the Clean Air Act[2] or nonattainment counties held approximately 590,000 fewer jobs, lost $37 billion in capital stock, and $75 billion of output in pollution-intensive industries relative to attainment counties, due to the abatement costs to meet the standard or offshoring of production.[3] When examining sectoral foreign direct investment, Levinson appears to find that foreign investment flows into manufacturing support the PHH.

Global Offshoring Greenhouse Gas Emissions

Since 1970, the United States and various advanced industrial economies have reduced emissions of greenhouse gases such as CO_2 through offshoring certain manufactured industries. In 2015, 13 percent of China's emissions and 20 percent of India's emissions could be attributed to the production of exported goods. A 2018 study found that if the United States adjusted for trade and accounted for all CO_2 emissions

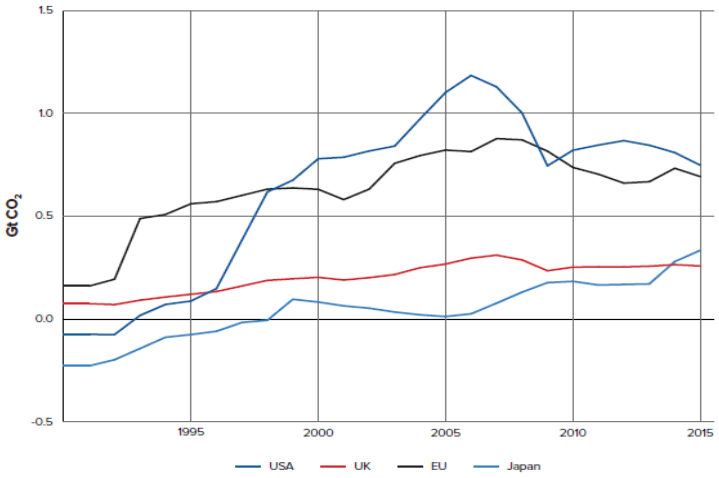
[1] For example, lead-battery recycling relocated from the U.S. to Mexico. Yale School of the Environment, "Getting the Lead Out: Why Battery Recycling Is a Global Health Hazard," 2020.

[2] The Clean Air Act mandates that every U.S. county achieve the same minimum level of ambient air quality. Congress established the structure of the Clean Air Act in 1970 with revisions in 1977 and 1990.

[3] Michael Greenstone, "The Impacts of Environmental Regulations on Industrial Activity: Evidence from the 1970 and 1977 Clean Air Act Amendments and the Census of Manufactures," *The University of Chicago.* 2002.

resulting from the foreign manufacture of imported goods, total U.S. emissions would have been 14 percent higher than domestic emissions alone between 1990 and 2010.[4] Since 2010, U.S. imports of emissions-intensive goods leveled off after hitting a peak between 2006 and 2007 (figure 1).[5] The 2008 financial crisis played a role in slowing import growth and global CO_2 emissions growth from fossil fuels and industry.

Figure 1: U.S. Net CO2 from Top Importers (1990-2015)



Sources: KGM & Associates and ClimateWorks

Empirical Work and Remaining Questions

Even though there is some qualitative support for the PHE or PHH, the empirical PHH literature yields mixed results. For example, Cherniwchan et al. (2017) failed to find evidence of offshoring production abroad due to environmental regulation. [6] Similarly, Dechezleprêtre et al. (2017) found small adverse effects of EP stringency; however, they found that these regulatory costs may not be as important as other fundamental factors of comparative advantage. [7] In addition, Aldy et al. (2015) estimated that the average annual decline in all manufacturing due to EP stringency would be 1.5 percent while energy-intensive industries see production declines of 4.5—6.5 percent over the near-term.[8] Their analysis suggested that only one-sixth of this decline can be attributed to rising imports of competing goods. Alternatively, Tang (2015) looked at certain toxic chemical emissions from different industry sectors and finds a shift in production from countries with tougher EP to those with laxer regulations. The impact of EP on global industry competitiveness is complex, and EP stringency is difficult to capture and interpret in a single measure.[9] For example, Brunel and Levinson (2016) argued that causation can be difficult to determine because emission and EP changes tend to occur simultaneously. Some authors have even found a positive relationship between EP and competitiveness. Copeland and Taylor (2004) found a positive relationship between abatement costs and levels of competitiveness, the opposite relationship than what the PHH hypothesizes, consistent with what is known as the Porter Hypothesis, the topic of the second paper in this series.

Sources: Currie, Janet and Walker, Reed. "What Do…?" Xu, Yan, Dietzenbacher, Erik, and Los, Bart. "International trade…." Levinson, Arik and Taylor, Scott. "Unmasking the…." Doytch, Nadia and Uctum, Merih. "Globalization and… ." Cherniwchan, Jevan et al. "Trade and…." Dechezleprêtre, Antoine et al. "The Impacts…." Aldy, Joseph et al. "The Competitiveness… ." Tang, John P. "Pollution Havens… ." Brunel, Claire and Levinson, Arik. "Measuring the.." Brian R. and Taylor, M. Scott. "Trade, Growth…." EPA. "Pollution Abatement…" 2005.

[4] Hasanbeigi, Ali and Springer, Cecilia, "The Carbon Loophole in Climate Change Policy," 2018.
[5] In figure 1, Net CO_2 imports refers to imported emissions through energy intensive goods from other countries.
[6] The authors suggested the little evidence of PHH exist due to data limitations and identification problems.
[7] The authors found the scale of EP impacts was small compared with other determinants of trade and investment location choices such as transport costs, proximity to demand, quality of local workers, availability of raw materials, sunk capital costs, and agglomeration.
[8] Energy intensive industries referred to are steel, aluminum, pulp and paper, cement, glass and industrial chemicals.
[9] For example, Tang (2015) uses per capita income but Aldy and Pizer (2015) use energy prices as proxy for EP stringency.