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ENVIRONMENTAL REGULATIONS AND FOREIGN DIRECT INVESTMENT

I. Introduction

I am writing a literature review of whether stronger environmental regulations affects foreign direct investment (FDI). Logic would tell you that the FDI would go to those countries that have lower environmental regulations because this results in lower costs to the corporation overall. I am a firm believer that corporations meet the definition of a sociopath: “a person...whose behavior is antisocial and who lacks a sense of moral responsibility or social conscience.”¹ Therefore, my belief is that these sociopathic corporations, which are deemed to be people pursuant to *Santa Clara County v. Southern Pacific Railroad Company*,² will continue this behavior in order to make more money, rather than looking at the greater good. I wanted to utilize this paper to test this theory through a review of the existing literature on this topic.³

It is argued relatively low environmental standards in developing countries compared to industrialized nations will lead "dirty" industries to shift operations to lesser developed countries (LDCs) (the industrial flight hypothesis). In addition, LDCs may purposely undervalue the environment in order to attract new investment (the pollution haven hypothesis).⁴ In 1992, research found no evidence of either industrial flight or pollution havens.⁵ However, the key to this is *it was 1992*. The world was much less interested in global warming, environmentalism and the planet's health. So, while it is an interesting article, I would argue that times have

¹ Dictionary.com.

² *Santa Clara County v. Southern Pacific Railroad Co.* (1886) 118 U.S. 394.

³ And perhaps to restore some of my faith in humanity.

⁴ Dean, J. (1992) *Trade and environment: a survey of the literature*. World Bank Policy Research Working Paper World Development Report. No. 966.

⁵ Id.

dramatically changed since then. Given my assumption, I will focus on articles written since 2000 if possible.

A third, related, hypothesis is “capital-labor hypothesis.” This theory holds that comparative advantages are determined by differences in both factor endowments and environmental regulations, and that countries with lax environmental regulations do not have the necessary capital stock to attract capital- and pollution-intensive FDI.⁶ The authors felt that this was the missing piece for why any evidence of pollution havens was inconsistent at best.

In my overview, I think that the literature tries to speak about these topics as if they were not wholly interrelated, and thus, in almost every case, the end results are inconclusive at best. I will tackle this in three separate, but related, pieces and then bring it together.

II. Industrial Flight Hypothesis

Industrial Flight is related to costs. In essence, if it costs too much to produce a good, particularly in those industries which pollute more, they will move to another country with lower standards in order to keep their expenses low and profits high. In other words, they will move somewhere they can gain comparative advantage. Much of the literature concludes that a country with lenient environmental regulations will specialize in pollution-intensive industries or at least have a comparative advantage in such industries. This implies that polluting industries should to move their production facilities to the “pollution haven” to acquire this comparative advantage.⁷

The statistical evidence suggests that there exists a significant negative relationship between FDI of the US chemical and metal industries and the stringency of environmental regulation in a foreign host country. In general, lax environmental policy tends to attract more capital inflow from the US for pollution intensive industries. This finding also provides indirect support to the “pollution haven” hypothesis, discussed below. This result is strengthened by an inability to

⁶ Cole, Matthew A.; Elliott, Robert J. R., *FDI and the Capital Intensity of 'Dirty' Sectors: A Missing Piece of the Pollution Haven Puzzle*, Review of Development Economics, November 2005, v. 9, iss. 4, pp. 530-48.

⁷ Baumol, W. J. and W. E. Oates (1988), Theory of Environmental Policy, Cambridge University Press; Carraro, C. and D. Siniscalco (1992), *Environmental Innovation Policy and International Competition*, Environmental and Resource Economics 1(2), 183–200.

replicate this effect in other, less polluting, industries such as electrical and non-electrical machinery, transportation equipment and food products.⁸

Let us discuss the costs. Expenses in this context include direct costs related to the capital and operating expenses of installing the control or abatement technologies mandated by the country's regulations and laws. However, total costs include indirect compliance costs associated with the implementation, monitoring, and sanctioning of environmental regulations, such as permit applications, preparing environmental assessments, assessing and proving compliance, and resolving disputes. It also includes the opportunity costs of delays and red tape, the diversion of managerial time, litigation, lobbying, insurance, legal, consulting and certification costs, and other costs arising from legal unpredictability.⁹

There are also defacto costs based on the probability that noncompliance will be detected and sanctioned. Sanctions can include legal penalties, adverse publicity, and damage to a corporate reputation.¹⁰ These, as I will discuss later, are not insignificant and are becoming more powerful in the age of global warming.

When controlling for other things, it was determined, that, at least from outgoing FDI from the United States, the biggest factor in decision-making was the total compliance costs, including legal and regulatory factors.¹¹

If the fixed costs of locating in a new host country are substantial or if firms perceive regulations to be only temporary, very few firms are likely to be attracted because of those high initial costs. However, if a firm were already producing in a country, you would expect the firm to step up its activity in response to a stringent regulation at home.¹² This is a logical assessment. But, costs

⁸ Xing, Yuqing, Kolstad, Charles D, *Do Lax Environmental Regulations Attract Foreign Investment?*, Environmental and Resource Economics 21: 1–22, 2002.

⁹ Anderson, C. Leigh, Kagan Robert A. *Adversarial legalism and transaction costs: The industrial-flight hypothesis revisited*, International Review of Law and Economics Volume 20, Issue 1 (March 2000) pp. 1-19.

¹⁰ Id.

¹¹ Id.

¹² Mulatu, Abay, *The Structure of UK Outbound FDI and Environmental Regulation*, Environmental and Resource Economics, September 2017, v. 68, iss. 1, pp. 65-96.

are not the only consideration. In fact, it may be a pretty minor consideration.

This topic is very closely related to the other two topics, pollution havens and capital-labor, and often the discussion is intermixed.

III. Pollution Haven Hypothesis

Again, with this topic the evidence of whether there is a pollution haven in order to attract foreign investment is inconclusive from the literature. However, the most recent article says that if it does exist, it is minimal.

The 2019 research came to the conclusion that stringency in environmental enforcement decreases the probability of receiving pollution-intensive FDI for only very low levels of stringency. Their opinion was that the pollution haven hypothesis may exist only when environmental regulations are very lax or unenforced. There is a turning point beyond which enforcement of environmental regulations has a positive effect on the probability of having a positive FDI coefficient.¹³ The caveat being that it is very difficult to evaluate the stringency of enforcement.¹⁴

This particular study did overcome some of the flaws of the testing modalities of some of the earlier pieces of literature on the topic. The existing literature has mostly focused on advanced economies, especially on the USA, because of the availability of environmental regulation data. Research on developing countries had been limited to specific regions.

We overcome this limitation by utilizing the environmental performance index (EPI) as the indicator to represent a country's degree of environmental regulation stringency. Thus, the current study examines the most comprehensive available data. In addition, this article differs from the existing literature in that, while previous studies analyze firm-level data for specific

¹³ Gredeg, Thomas Jobert, Karanfil, Fatih, Gredeg, Anna Tykhonenko, Degree of Stringency Matters: Revisiting the Pollution Haven Hypothesis Based on Heterogeneous Panels and Aggregate Data. *Macroeconomic Dynamics*, 23 (2019) pp. 2675–2697.

¹⁴ Hanna, Rema, *US Environmental Regulation and FDI: Evidence from a Panel of US-Based Multinational Firms* *American Economic Journal: Applied Economics*, Vol. 2, No. 3 (July 2010), pp. 158-189.

countries and regions, this study employ country level aggregate data, instead of firm-level data. By doing so, this study also fills in the gaps in the existing literature.¹⁵

It should be noted that other studies do support the “green haven effect” or “race to the top.” European multinational firms tend to enter countries with more stringent environmental regulations and that the tendency is greater in relatively cleaner industries.¹⁶ Also, firms emphasizing reputations for sustainable management and corporate social responsibility may invest in countries with stricter and better environmental regulations.¹⁷ But in both of these cases, they are focusing on a very specific target for their research, in generally European countries or companies that already focus on social responsibility, so of course, their research would demonstrate more hopeful data points.

Related to this, a second 2019 study found that stringent environmental regulations *attract* FDI, leading to a "race to the top." However, an admitted flaw is that it focus only on the effects of environmental policy on FDI using country-level aggregate data. It does not study why the individual firms might choose to invest there.¹⁸

However, some research finds the opposite. In contrast to the above, attracting FDI in polluting sectors through lower environmental regulations has been adopted by less developed and developing economies to boost the economy. Developed countries with strict environmental regulations produce relatively less polluting goods than developing countries with lax environmental regulations.¹⁹ Environmental policy laxity is found to induce FDI into the country.²⁰ One study covered 2002–2006 and found that laxity in developing countries increased by about 4%. This translated into 0.13 standard deviation unit. By that, they predicted that a one

¹⁵ Id.

¹⁶ Rivera, Jorge; Oh, Chang Hoon, *Environmental Regulations and Multinational Corporations' Foreign Market Entry Investments*, Policy Studies Journal, May 2013, v. 41, iss. 2, pp. 243-72.

¹⁷ Poelhekke, Steven; van der Ploeg, Frederick, *Green Havens and Pollution Havens*, World Economy, July 2015, v. 38, iss. 7, pp. 1159-78.

¹⁸ Kim, Yeseul; Rhee, Dong-Eun, *Do Stringent Environmental Regulations Attract Foreign Direct Investment in Developing Countries? Evidence on the 'Race to the Top' from Cross-Country Panel Data*, Emerging Markets Finance and Trade, September 2019, v. 55, iss. 12, pp. 2796-2808.

¹⁹ Copeland B, Taylor M (2004) *Trade, growth, and the environment*. J Econ Lit 42(1):7–71.

²⁰ Kellenberg DK (2009) *An empirical investigation of the pollution haven effect with strategic environment and trade policy*, J Int Econ 78(2):242–255; Wagner U, Timmins C (2009) *Agglomerati on effects in foreign direct investment and the pollution haven hypothesis*, Environmental and Resource Economics 43(2):231–256.

standard deviation increase in laxity results in 28% increase in FDI.²¹

As discussed above, these studies had inherent flaws as they utilized data from only advanced countries. The Gredeg 2019 study discussed above is a broader study utilizing data from many different countries, making it a much more representative sample overall.

Other studies by various researchers, List, McHone, and Millimet (2004), Eskeland and Harrison (2003) and Globerman and Shapiro (2002) provide support for a pollution haven, i.e., a race to the bottom.²² However, in each of those studies, the data utilized was from pre-2000. As I stated above, I am discounting anything prior to 2000 because of the change in societal priorities globally. In addition, the data sources used were a small section of the developed world, rather than the broader study by Gredeg et al. in 2019.

My discounting pre-2000 data is supported by several studies indicating that multinational firms' ethical reputations have become increasingly important especially regarding environmental issues.²³ This dramatically increases the "costs" of seeking out pollution havens. However, it should be noted, that by the time this data was collected, businesses so inclined may have already established themselves in the pollution havens and thus were not collected in the sample.²⁴ The pressures to lower environmental standards may be rather strong.²⁵ Even so, the *race-to-the-bottom* in attracting FDI is not inevitable when the government invests in public

²¹ Mulatu, Abay, *The Structure of UK Outbound FDI and Environmental Regulation*, Environmental and Resource Economics, September 2017, v. 68, iss. 1, pp. 65-96.

²² List, John, McHone, W. Warren, Millimet, Daniel, *Effects of environmental regulation on foreign and domestic plant births: is there a home field advantage?*, Journal of Urban Economics, 2004, vol. 56, issue 2, 303-326; Eskeland, G. S. and A. E. Harrison, *Moving to Greener Pastures? Multinationals and the Pollution Haven Hypothesis*, Journal of Development Economics 70 (2003):1-23; Globerman, Steven and Shapiro, Daniel, *Global Foreign Direct Investment Flows: The Role of Governance Infrastructure*, World Development, 2002, vol. 30, issue 11, 1899-1919; List, John, McHone, W. Warren, Millimet, Daniel, *Effects of environmental regulation on foreign and domestic plant births: is there a home field advantage?*, Journal of Urban Economics, 2004, vol. 56, issue 2, 303-326.

²³ Christmann, Petra, *Multinational Companies and the Natural Environment: Determinants of Global Environmental Policy Standardization*, The Academy of Management Journal 47(5):747-760 · October 2004.

²⁴ Gredeg, Thomas Jobert, Karanfil, Fatih, Gredeg, Anna Tykhonenko, Degree of Stringency Matters: Revisiting the Pollution Haven Hypothesis Based on Heterogeneous Panels and Aggregate Data, Macroeconomic Dynamics, 23 (2019) pp. 2675-2697.

²⁵ Erdogan, Ayse M., *Foreign Direct Investment and Environmental Regulations: A Survey*, Journal of Economic Surveys, December 2014, v. 28, iss. 5, pp. 943-55.

infrastructure that can support the growth of all sectors in the economy.²⁶ And there is evidence that the pollution haven is definitely not in effect in China, as they are increasing standards.²⁷

IV. Capital-Labor Hypothesis

Pollution intensive sectors have two key characteristics: (i) they face high pollution abatement costs; and (ii) they use capital-intensive, rather than labor intensive, production processes. When deciding whether to invest abroad, a US firm in a pollution-intensive sector is therefore likely to have, all things equal, a preference for a host country with a relatively high capital–labor ratio and a relatively low level of environmental regulations. However, these characteristics are not often found within the same country.²⁸

According to the capital–labor and pollution haven hypotheses (combined), the countries which are most likely to become pollution havens are developing countries with reasonably high capital–labor ratios, but with environmental regulations that are typically lower than in the majority of developing countries.²⁹ Countries with less capital are unsuitable as pollution havens.³⁰ The conclusion was that the countries that are likely to become pollution havens because they meet these standards are Brazil and Mexico.³¹

In addition, both have large domestic markets and are reasonably close to the donor country in question (the US)—two commonly identified determinants of FDI.³² In fact, throughout the 1990s, Mexico and Brazil received the second and third highest shares of FDI among developing countries (with China receiving the highest share).³³

²⁶ Zhao, X., Galinato, G.I. & Graciano, T.A. *The Welfare Effects of Opening to Foreign Direct Investment in Polluting Sectors*, Environmental and Resource Economics 74, 243–269 (2019).

²⁷ Zhonghua Cheng, Lianshui Li, Jun Liu, *The spatial correlation and interaction between environmental regulation and foreign direct investment*, Journal of Regulatory Economics (2018) 54:124–146.

²⁸ Cole, Matthew A.; Elliott, Robert J. R., *FDI and the Capital Intensity of 'Dirty' Sectors: A Missing Piece of the Pollution Haven Puzzle*, Review of Development Economics, November 2005, v. 9, iss. 4, pp. 530-48.

²⁹ Id.

³⁰ Id.

³¹ Id.

³² Singh, H. and K. W. Jun, *Some New Evidence on Determinants of Foreign Direct Investment in Developing Countries*, World Bank Policy Research Working Paper No. 1531 (1995).

³³ Jenkins, R. O., *Pollution, Trade and Investment: Case Studies of Mexico and Malaysia*, Report to the ESRC Global Environmental Change Program, SPRU (1998).

The analysis is that the cost of capital can outweigh any benefit from lower environmental regulations.³⁴

V. Analysis

The cost of environmental regulations for firms is just one of many factors to consider.³⁵ In fact, costs and even the stringency of environmental regulations may be less important to a firm's location decision than other factors such as a host country's overall technology level, labor quality, stable governmental structures, and infrastructure.

1. Costs

One explanation is that the costs of compliance are relatively small compared to labor, transportation, and other cost considerations, and compliance costs are often unnecessary because the regulations are not enforced.

FDI in the agriculture and manufacturing sector largely appears to be motivated by market access motives rather than factor cost reasons.³⁶ However, in general, environmental costs represent only a small fraction of internal costs of industries (around 1% to 3% of GDP) even in heavy industries such as chemicals, metals, paper, etc.³⁷ So, I believe this has little overall effect.

2. Lack of Efficacy

There is an argument that firms install similar technologies and standards across all facilities to meet the requirements of their home country, so does not result in greater expense. They may decide to use the more environmentally-friendly technology for a variety of reasons including concern about effects of their reputation, potential legal repercussions, and the cost effectiveness having common operating and production processes.³⁸ The upshot is that they already have the

³⁴ W. Antweiler, B.R. Copeland, M.S. Taylor, *Is free trade good for the environment?* Amer. Econom. Rev. 91 (2001), pp. 877-908.

³⁵ Hanna, Rema, *US Environmental Regulation and FDI: Evidence from a Panel of US-Based Multinational Firms* American Economic Journal: Applied Economics, Vol. 2, No. 3 (July 2010), pp. 158-189.

³⁶ Palangkaraya, Alfons and Waldkirch, Andreas, *Relative factor abundance and FDI factor intensity in developed countries*, International Economic Journal Vol. 22, No. 4, December 2008, 489-508.

³⁷ Albrecht, Johan (1998) *Environmental policy and the inward investment position of US "dirty" industries*, Intereconomics 33, 186-194.

³⁸ Anderson, C. Leigh, Kagan Robert A. *Adversarial legalism and transaction costs: The industrial-flight hypothesis revisited*, International Review of Law and Economics Volume 20, Issue 1 (March 2000) pp. 1-19.

technology, it makes sense to use it for non-monetary reasons.

3. Market Size

Research suggests that that firms tend to locate where the market size is large.³⁹ When the market size of a country is large, increasing stringency of environmental regulations does not cause firms to relocate to countries with more lax environmental regulations.⁴⁰

4. Infrastructure

Firms are more likely to invest if infrastructure quality is high.⁴¹ If infrastructure is low, then it makes it difficult to produce and distribute a product. Proper roads for transportation are paramount. Internet and communications are imperative. So, even with potential costs of investing FDI in countries with lower environmental standards, that saved money will be spent overcoming infrastructure issues, making the saving illusory at best.

5. Government Corruption

The corruption of a government can have a substantial effect on whether a company will invest. First, as we saw in all its glory in the last few weeks, businesses do not like uncertainty. Government corruption creates huge uncertainty. In addition, businesses need to worry about nationalization of their business potentially with unstable/corrupt governments. Studies found that that greater trade openness leads to stricter environmental policies where government corruption is relatively low, and the opposite when corruption is high.⁴²

³⁹ Wilson, John, Otsuki, Tsunehiro, Sewadeh, Mirvat. (2002) *Dirty Exports and Environmental Regulation: Do Standards Matter to Trade?* The World Bank, Policy Research Working Paper Series: 2806.

⁴⁰ Sanna-Randaccio, Francesca; Sestini, Roberta, *The Impact of Unilateral Climate Policy with Endogenous Plant Location and Market Size Asymmetry*, *Review of International Economics*, August 2012, v. 20, iss. 3, pp. 580-99.

⁴¹ Goodspeed, Timothy, Martinez-Vasquez, Jorge, Zhang, Li, *Public Policies and FDI Location: Differences between Developing and Developed Countries*, *FinanzArchiv / Public Finance Analysis* Vol. 67, No. 2 (June 2011), pp. 171-191.

⁴² Damania, Richard, Fredriksson, Per G., List, John A, *Trade liberalization, corruption, and environmental policy formation: theory and evidence*, *Journal of Environmental Economics and Management* Vol. 46, Iss. 3, November, 2003, pp. 490-512.

6. Regional Differences

The influential effect of environmental regulation on the introduction of FDI has obvious regional differences.⁴³ In China, the level of environmental regulation in the eastern region is positively correlated with FDI introduction, while in the central and western regions environmental regulation poses a hindrance to the introduction of FDI.⁴⁴ This same study again showed that labor cost and skills had a great effect on FDI regionally. The effects of environmental regulations is not even consistent within a country. This demonstrates again, that other factors are more important in making FDI decisions.

VI. Conclusion

I started this project with an attempt to restore my faith in humanity, or more specifically, in corporations. My philosophy is that they are sociopaths with no concern for the greater good. In general, I feel unsatisfied. I wanted to see clearly that lax environmental impacts did not relate to increased FDI. I did not find that.

On the other hand, I found pretty minimal evidence in recent times where of a race to the bottom of environmental regulations either. I found that many other factors are at play when a corporation makes a decision to invest FDI. While environmental regulations (or lack thereof) may play a role, I believe that this role is one of the more insignificant ones. There are far more important decisions such as cost of capital, labor costs, infrastructure, stability of government, market size, and most hopeful to me, effect on the corporate reputation. Damage to a corporate reputation for failing to adhere to higher environmental standards seemed to be a common trend throughout the more recent literature. This made me more hopeful. I do continue to think that corporations are sociopathic, but reputations and the population's view of them based on this topic seems to be a making a difference.

⁴³ Cheng, Zhonghua; Li, Lianshui; Liu, Jun, *The Spatial Correlation and Interaction between Environmental Regulation and Foreign Direct Investment*, Journal of Regulatory Economics, October 2018, v. 54, iss. 2, pp. 124-46.

⁴⁴ Yang, Yuanhua, Niu, Guohua, Tang, Dengli, Zhu, Mengjue, *Does Environmental Regulation Affect the Introduction of Foreign Direct Investment in China? --Empirical Research Based on the Spatial Durbin Model.*, Polish Journal of Environmental Studies. 2019, Vol. 28 Issue 1, p415-424.

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