



# Club membership and transboundary pollution: Evidence from the European Union enlargement



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## ABSTRACT

We set up a theoretical model in which a less developed country (the LDC) undertakes an activity that imposes negative transboundary pollution effects on a more developed country (the MDC). The MDC can effectively make a Coasian payment in the form of direct environmental assistance, but can also encourage good “environmental citizenship” through its influence over the prospect that the LDC will gain the benefits of membership into a particular international club. We examine the strategic interactions between the LDC and the MDC in this regional environmental game, and our comparative statics analysis explores how a change in the membership “payoff” will affect the environmental efforts and outcome of both countries. Our theoretical model also addresses the issue of the economic growth in the LDC as well as its environmental impacts in the region. We also conduct empirical study and examine the evidence in the thirteen Central and Eastern European (CEE) countries that joined the European Union (EU) in the 21st century and investigate the impacts of EU membership on their environmental performance. We find that there is a robust correlation between the degree of EU integration and pollution abatement from the LDC, and we also observe that emissions of selected pollutants seem to follow a concave pattern relative to the national income, both of which coincide with our theoretical discussions.

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## 1. Introduction

A classical problem of negative externality, pollution is difficult to control. Within almost every modern economy with a strong central government, however, this issue can be rather effectively addressed through a complex system of legislations, regulations, and transfer payments. Yet pollutants do not always respect political boundaries when traveling, and the problem of such international transboundary pollution is that there exists no higher authority to regulate or tax the externality-causing activity or to enforce a potential remedy that takes world-wide social costs into account; nor is there a court system that can help to adjudicate these issues. It creates a need for effective coordination and cooperation, but that is not always easy to achieve among politically autonomous nations.

The existing international protocols and conventions rarely if ever contain effective enforcement mechanisms. Consider, for example, the following editorial comment by Ågren (2006), regarding a review conducted by the implementation committee of the United Nation's Convention on Long-range Transboundary Air Pollution (CLRTAP) and discussed at the convention's Executive Body (EB) meeting in December 2005: “Despite the sharp reprimands that were issued in 2004 by the

convention's EB (which includes representatives from all the member countries), three countries – Greece, Norway and Spain – have still not reduced their emissions as required by the protocols. ... As to the obligation to report on emission data, the committee noted that despite a general improvement there are still several parties that have not reported final and complete emission data.”

The famous Coase Theorem (1960) argues that, when property rights are well defined and transaction costs are low, the economic inefficiencies of an externality will tend to be bargained away and an efficient equilibrium will emerge through voluntary exchange. In the case of transboundary effects, property rights are in fact well defined. There are few if any effective legal actions that can be taken by the victims of a transboundary externality to force a sovereign country to stop its damaging activity, and in effect that means that the property rights belong to the polluter, not the victim. The Coasian insight thus suggests that, barring less costly remedies, a country that is the victim of a damaging externality could voluntarily pay the emitting country to reduce the offending activity. This Coasian-type behavior is in fact occurring throughout the world. There are many examples of direct country-to-country aid earmarked for specific environmental projects, but perhaps the best example is the efforts of Japan's Overseas Economic Cooperation Fund (OECF) that subsidizes pollution abatement efforts in China in order to reduce sulfur dioxide emissions from Chinese power plants that contribute to acid rain in Japan. It should be noted however that

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such “payment” from the victim to the polluter does not always take a monetary form, as will soon be elaborated on in the paragraphs that follow.

A second phenomenon that has been occurring in recent years is the increasing economic interdependency among nations, and one manifestation of this increased interdependency is the tendency for nations to form coalitions or “clubs” in order to enhance the members’ economic well-being. The proliferation of trade blocs and free-trade agreements such as North American Free Trade Agreement (NAFTA), the South Asian Free Trade Agreement (SAFTA), the European Union (EU), and the World Trade Organization (WTO) are examples of these kinds of clubs. For many developing countries membership in one of these clubs is a highly desirable prize to achieve the objective of allocating resources more efficiently through specialization and exchange, reaping productivity gains and higher growth through widening the geographic range of markets and increasing exposure to world-class competition and technology transfer, among other things (Sally, 1999). The US–Vietnam Bilateral Trade Agreement (BTA), for example, formed a partnership that has been a tremendous boon to Vietnam’s economy. As part of the BTA, the US extended to Vietnam conditional most favored nation (MFN) trade status in 2001, now known as normal trade relations (NTR) that considerably enhance Vietnam’s market access in the United States. Bilateral trade has consequently grown from about \$220 million in 1994 to \$29.6 billion in 2013, transforming Vietnam into the 27th-largest trading partner for the US and the second-largest source of US clothing imports (after China), and a major source for footwear, furniture, and electrical machinery (Martin, 2014). Probably because of this partnership with the US, Vietnam also won membership into the WTO in 2006 (John, 2006).

Membership in these regional or international clubs does not usually come without strings attached, and often those strings can be requirements to improve efforts in particular areas of environmental protection. For example, NAFTA would not have been signed without the lesser known North American Agreement on Environmental Cooperation (NAAEC), which makes clear that membership in the NAFTA club requires adherence to certain environmental standards.<sup>1</sup> In a way, the prospect of membership in a prestigious “club” can effectively act as the side payment from the developed nations – often the victims of transboundary pollution too – and motivate the developing nations to cut back on their pollution.

We are particularly interested in the case of EU enlargements in the 21st century to include the thirteen Central and Eastern European (CEE) countries, a series of processes involving EU regularly demanding that CEE countries improve their environmental efforts in order to increase their chances of joining the EU, for example, as in Carmin and Vandever (2004) who have the following descriptions regarding the challenge facing the first ten CEE countries in their efforts: “As laid out in the so-called Copenhagen criteria, membership in the EU requires the adoption, implementation and enforcement of the *acquis communautaire*—the body of EU law and regulations. The *acquis* consists of 31 thematic chapters, each detailing laws, regulations, norms, and standards. Environmental law and regulations constitute one such chapter. Transposing the environmental chapter of the *acquis* requires that candidate countries adopt framework legislation, measures on international conventions, biodiversity protection, product standards, and provisions to ensure reductions in national, transboundary and global pollution.” Also, Romania’s January 1, 2007 accession to the EU occurred after more than a decade of negotiation with the European Council, which included a wide range of environmental issues (European Commission, 2007). Kramer (2004) finds that: “In the accession process, the imperative to enter the EU as quickly as possible, ..., has been the overriding motivator compelling the applicant countries

to fulfill whatever demands the EU has made regarding the environmental *acquis*.” Kramer further claims that full compliance with environmental *acquis* is expected to substantially reduce transboundary air pollution originated in the accession countries and bring an estimated annually lowest benefit of 6.5 billion euro to EU member states.

There is of course a large academic literature that examines the relationship between trade, economic growth and the environment. Some have argued that trade and growth cause environmental damage (Daly, 1987), while others find a “turning point” income level represented by the renowned “environmental Kuznets curve” (EKC).<sup>2</sup> In Copeland and Taylor (1995) pollution spillovers create market failures that result in low-income pollution havens benefiting at the expense of wealthier nations. Lapan and Sikdar (2011) investigate the effects of trade liberalization on environmental policies in a strategic setting when there is transboundary pollution. Fujiwara (2010) examine the effects of bilateral tariff reductions on the equilibrium pollution tax and welfare using a reciprocal market model of international duopoly with transboundary pollution. Chambers and Jensen (2002) argue that environmental aid not tied to abatement performance will induce recipient countries to misrepresent their “type” in order to receive more aid. Chao and Yu (1999) examine the welfare effect of tying aid to environmental clean-up. Barrett (1994) discusses self-enforcing international environmental agreements (IEAs) and holds a rather pessimistic view; on the contrary, Karp and Simon (2013) challenge the robustness of this conventional wisdom. Umanskaya et al. (2006) model a downstream country that penalizes the upstream polluter by imposing import tariffs on the polluter’s goods while the polluter lobbies to have those tariffs reduced. Finally, Copeland and Taylor (2004) review some of the major results from the large literature on the political economy of transboundary pollution.

This paper considers the behavior of a more developed country (MDC) and a less developed country (LDC) in a setting in which the LDC undertakes an economic activity that harms the MDC. The MDC can effectively make a Coasian payment in the form of direct environmental aid, but can also encourage good “environmental citizenship” through its influence over the prospect that the LDC will gain the benefits of membership into a particular international club. This theoretical model is presented in the next section. In Section 3, we conduct comparative statics analysis and examine the strategic interaction between the LDC and the MDC in this regional environmental game, and examine the environmental effects of evolving international relationship as well as those of economic growth in the LDC. Our empirical analysis in Section 4 examines the environmental effects of accession into European Union (EU) in thirteen Central and Eastern European (CEE) countries that joined the EU in 21st century. Concluding remarks are presented in Section 5.

## 2. The theoretical model

In this model, we consider two politically autonomous countries. The upwind country is denoted as Country 1, a less developed country (LDC), and the downwind country, Country 2, is a more developed country (MDC). Each country produces and consumes energy, for simplicity, we call it “electricity” at  $y_j$  ( $j = 1, 2$ ) units. The energy industry in the LDC would generate the same amount of (raw) pollutant, and we call it “emission” in this model; we also assume that the MDC is endowed with more advanced technology and as a result, its energy industry generates no pollution.<sup>3</sup> In a way, the LDC’s energy production is responsible for the total (raw) emissions in the region.

<sup>1</sup> NAAEC oversight is carried out by the Commission for Environmental Cooperation (CEC), which is jointly funded by the governments of the Canada, Mexico and the United States.

<sup>2</sup> Grossman and Krueger (1991), World Bank (1992), Selden and Song (1994), Grossman and Krueger (1995) and Onafowora and Owoye (2014) are examples of empirical works on EKC issues. Theoretical support for the EKC can be found in Lopez (1994), Arrow et al. (1995), Selden and Song (1995), and Andreoni and Levinson (2001).

<sup>3</sup> Hatzipanayotou et al. (2002) and Hirazawa and Yakita (2005) have made similar assumptions that no pollution is generated by the developed country in their models.

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