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**Environmentalists' Behaviour
and Environmental Policies**

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Summary

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Keywords: Environmentalism, Lobby Groups, Positive Environmental Economics, Strategic Environmental Policy

JEL Classification: H23, D72

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Environmentalists' behaviour and environmental policies

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Abstract

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Abbreviations: PE (passive environmentalism) and AE (active environmentalism)

1 Introduction

In the political economy of environmental policies, recent contributions have emphasized one specific characteristic of environmentalists, namely that they are negatively affected by pollution abroad (Aidt 2005, Canton 2008). In an international context, this literature has notably been able to demonstrate that the presence of environmentalists is not necessarily synonymous with less pollution or more stringent environmental policies. In those models, environmentalists are lobbying domestic government. However, the explicit influence of environmentalists via the domestic welfare function or the opportunity to directly lobby the foreign government remain unanswered questions. This article is an attempt to fill this gap.

In developed countries, surveys and polls regularly demonstrate that the environment is among the top priorities. For instance, a poll conducted in 2008 in Canada by the Environics Institute showed that Canadians see the environment as the most pressing problem facing today's world. Meanwhile, Eurobarometer indicates that 62% of European citizens consider global warming as one of the most serious issues now facing the planet. These opinion surveys, as indicative as they are, do not necessarily guarantee a direct involvement from citizens. This can take the form of belonging to an environmental organization. List & Sturm (2005) report that the number of members in the three largest environmental NGOs in U.S. states (Greenpeace, the Sierra Club and the National Wildlife Federation) between 1987 and 2000 varies from 0.25 percent of the population in Mississippi to just over 2 percent in Vermont.

Therefore, studying the influence of environmentalism clearly supposes to differentiate two specific cases. First, *passive environmentalism* (PE) is defined as situations where environmentalists only influence the political decisions through their preferences. For instance, a government maximizing social welfare must consider the impact of its decisions on foreign pollution if some of the citizens are environmentalists. Second, domestic environmentalists may lobby a foreign government. It is defined as *active environmentalism* (AE) and can take the form of donating to an environmental NGO trying to influence environmental policies in developing countries. Studying the influence of passive or active environmentalism and how they differ forms the core of the paper.

This article builds on two strands of the literature. First, the article considers two countries, Home and Foreign, that choose simultaneously an environmental policy. They compete strategically for the production of one good sold on a third market (Spencer & Brander 1983, Brander & Spencer 1985). The production process creates a by-product, pollution, that results in an environmental damage. Cases of local and global pollution are considered. A regulator maximizing local welfare tends to use environmental policies so as to give a competitive advantage to local polluting firms. Most of the time, this gives rise to lower levels of taxation than without strategic incentives (Barrett 1994, Ulph 1996). Our approach is the first to consider the presence of environmentalists in Home. In addition to the environmental damage created to each citizen by local pollution, environmentalists' utility decreases when foreign pollution increases. We present how a change in

passive environmentalism affects environmental policies and the impact of environmentalists on welfare.

The second part of the article presents the influence of active environmentalism on the choice of a politically optimal environmental tax. An incumbent government is considered, maximizing its chances of being re-elected. In this context, its objective function encompasses both social welfare and political contributions. Political contributions are proposed by an environmental group in a two-stage game. Environmentalists move first and simultaneously offer the government contribution schedules that specify the payment to be made to the government as a function of the pollution tax. Taking the contribution schedules and the economic behavior of the private sector as given, the government moves second and implements the politically optimal pollution tax. This standard game was first applied to environmental policies by Fredriksson (1997) and Aidt (1998). More recently, in an open economy context, Conconi (2003) and Aidt (2005) discuss cases where environmentalists are in favour of a decrease in environmental taxation. Pollution leakage in the first analysis and a direct interest in foreign pollution in the second explain these unintuitive results. Canton (2008) extends their approach in the presence of an eco-industry¹ and looks at potential coalitions between different lobby groups. However, none of the previous contributions has considered the possibility for the green lobby to influence the Foreign government.

Even though such countries as Canada (The Canada Elections Act), Russia or the U.K. prohibit candidates and parties from receiving campaign contributions from abroad, there exists a large number of justifications to

the possibility of cross-border political donations (Endoh 2005). According to Austin & Tjernström (2003), “among 111 countries which are categorized as “free” and “partly free” concerning political rights and civil liberties in the 2002 Freedom House Index, and whose data are reported, only about one third (40 countries) have regulations totally banning political donations from foreign sources.” Furthermore, foreign lobbies do have an impact on trade regulation, at least in the US (Gawande et al. 2004). In the theoretical literature, Grossman & Helpman (1995) are the only ones to discuss foreign lobbying activities. As far as environmental policies are concerned, no specific contribution has been made.

The following insights can be derived from the model. First, the way environmentalists act is paramount to understand their influence. More passive or active environmentalism can have significantly different effects on countries’ policies and welfares. Second, lobbying activities can be counter-productive for environmentalists. They may lobby for a more stringent environmental policy abroad, the result being a decrease in the foreign pollution tax. So, in contrast with the conventional wisdom on lobbies, an interest group can be hurt by its own power. Finally, we characterize cases where the presence of environmentalists has a non-ambiguous positive impact on one country’s welfare, whether it is Foreign, or rather surprisingly, Home. There is usually a trade-off between the environment and polluting firms’ profits. However, we predict that in some cases, more environmentalism can lead to a win-win situation for a country, as both the environment and its firm’s profits improve.

The paper unfolds as follows. Section 2 presents the economic model

and notably firms' decisions and their impact on welfare. In section 3, environmental taxes are determined when both countries act non-cooperatively. Section 5 adds the possibility for environmentalists to lobby the foreign government. Section 6 concludes.

2 The economic model

There are two countries in the economy, Home and Foreign, the superscript * standing for foreign variables. Both countries are perfectly similar, except for the presence of environmentalists in Home.

2.1 Firms' decisions

As in Barrett (1994), there exists a polluting sector where two polluting firms (one in Home, one in Foreign) compete strategically on a world market. Both polluting firms produce a given commodity $X = x + x^*$ at a world price P . The world inverse demand function $P(X)$ is such that $P(X) = A - \beta X$. For convenience, it is assumed that production costs are linear, i.e. $c'(x) = c'(x^*) = c$, where c is a constant. This activity generates some pollution which is summarized by an emission function $\epsilon(x)$. One unit of production creates one unit of pollution. Each unit of pollution is taxed at a common rate t at home and at a rate t^* abroad. From this point of view, the local polluting firm maximizes the following profit function over x :

$$\max_x \pi = P(x + x^*)x - cx - tx \tag{1}$$

The first-order condition of profit maximization is such that $A - \beta x^* - 2\beta x - c - t = 0$. Symmetrically, the foreign firm chooses its production level such that $A - \beta x - 2\beta x^* - c - t^* = 0$. Second order conditions are always satisfied, i.e. $-2\beta < 0$. Thus, the implicit optimal levels of production for the local and the foreign firms are, respectively:

$$x = \frac{P(X) - c - t}{\beta}$$

$$x^* = \frac{P(X) - c - t^*}{\beta}$$

Our analysis is focused on interior equilibria and it is therefore always assumed that the demand function is such that $P(X) - c - t > 0$ and $P(X) - c - t^* > 0$. From these optimal levels of production, comparative statics is derived by totally differentiating first-order conditions.

$$-\beta dx^* - 2\beta dx - dt = 0$$

$$-\beta dx - 2\beta dx^* = 0$$

So, $dx^* = -1/2dx$. Therefore, $\frac{dx}{dt} = \frac{-2\beta}{3}$ and $\frac{dx^*}{dt} = \frac{\beta}{3}$. Symmetrically: $\frac{dx^*}{dt^*} = \frac{-2\beta}{3}$ and $\frac{dx}{dt^*} = \frac{\beta}{3}$.

2.2 Welfare

It is standard in the strategic policy literature (Spencer & Brander 1983, Brander & Spencer 1985) to ignore the impact of the policy on consumers. Therefore, the good is not consumed domestically. There is no consumer

surplus and in addition to firms' profits, the only other elements of the welfare function are the environmental damage and some lump-sum transfers.² The environmental damage in Home is composed of two parts. First, the damage suffered by local citizens. Second, their perception of the damage for foreign citizens. Therefore, we have:

$$D(E) = -\nu E(X) - \gamma E^*(X) \quad (2)$$

where $E(X) = (1 - \theta)x + \theta x^*$ stands for the amount of local pollution and $E^*(X) = (1 - \theta)x^* + \theta x$ is the overall pollution in the foreign country. Following Conconi (2003) and Canton (2008), domestic citizens are affected by foreign emissions through a parameter $\theta \in [0; 1/2]$. If $\theta = 0$, pollution is purely local whereas if $\theta = 1/2$, pollution is purely global. ν is the marginal environmental damage of each unit of pollution, strictly positive and constant. γ is the disutility incurred to environmentalists by each unit of pollution abroad. All citizens are assumed to be environmentalists, so a change in γ is equivalent to a change in the marginal disutility.³ Citizens receive a lump-sum transfer $R(\cdot)$, financed from the revenue of the pollution tax. Then, welfare in Home is:

$$W(t, t^*) = \pi(x(t, t^*), x^*(t, t^*)) - \nu E(X(t, t^*)) - \gamma E^*(X(t, t^*)) + R(t) \quad (3)$$

$$W(t, t^*) = (P(X) - c - \nu(1 - \theta) - \gamma\theta)x - (\nu\theta + \gamma(1 - \theta))x^* \quad (4)$$

The foreign country is symmetric to the domestic one, except that its citizens only care about local pollution. In other words, they are not negatively

affected by pollution abroad.⁴ So, Foreign welfare is:

$$W^*(t, t^*) = \pi^*(x(t, t^*), x^*(t, t^*)) - \nu E^*(X(t, t^*)) + R^*(t^*) \quad (5)$$

$$W^*(t, t^*) = (P(X) - c - \nu(1 - \theta))x^* - \nu\theta x \quad (6)$$

2.3 Benchmark: no strategic competition

As a benchmark, the decision of an international agency is presented. Only overall profits and global pollution matter, and so all strategic interactions disappear.⁵ Overall welfare is:

$$\begin{aligned} W_G &= W + W^* \\ &= \pi(x, x^*) + \pi^*(x, x^*) - \nu X - \gamma(\theta x + (1 - \theta)x^*) + R(\cdot) + R^*(\cdot) \end{aligned}$$

To keep things comparable, the international agency is allowed to discriminate between countries and to choose a different tax in Home and in Foreign. Maximizing the overall welfare with regard to t and t^* yields the following implicit optimal taxes:

$$\begin{aligned} t_G &= \beta x^* + \nu + \gamma(3\theta - 1) \\ t_G^* &= \beta x + \nu + \gamma(2 - 3\theta) \end{aligned}$$

Three effects influence the choice of the optimal taxes in both countries. First, a positive substitute strategic effect, that considers the impact of the tax on foreign production. Second, a positive impact related to the marginal

damage of pollution, identical in both countries. Finally, the influence of environmentalists. Notice that taxes in both countries are identical if pollution is global. When pollution is local, the direct effect is to induce a reduction in the domestic tax and an increase in the foreign tax. However, this has an impact on production levels as well and indirectly affects the environmental policy stringency.

Let us present some comparative statics, based on a change in γ and a change in ν .

$$\begin{array}{ll}
 \frac{dt_G}{d\gamma} = \frac{3(1 - \beta^2(\theta - 1) - 3\theta)}{-3 + 2\beta^2 + \beta^4} & \frac{dt_G}{d\nu} = \frac{3}{3 + \beta^2} \\
 \frac{dt_G^*}{d\gamma} = \frac{-6 + 3\theta(3 + \beta^2)}{-3 + 2\beta^2 + \beta^4} & \frac{dt_G^*}{d\nu} = \frac{3}{3 + \beta^2} \\
 \frac{dx}{d\gamma} = \frac{-\beta(1 - \beta^2(\theta - 1) - 3\theta)}{-3 + 2\beta^2 + \beta^4} & \frac{dx}{d\nu} = \frac{-\beta}{3 + \beta^2} \\
 \frac{dx^*}{d\gamma} = \frac{-\beta(-5 + 9\theta + \beta^2(3\theta - 1))}{-3 + 2\beta^2 + \beta^4} & \frac{dx^*}{d\nu} = \frac{-\beta}{3 + \beta^2} \\
 \frac{dX}{d\gamma} = \frac{-2\beta(-2 + \theta(3 + \beta^2))}{-3 + 2\beta^2 + \beta^4} & \frac{dX}{d\nu} = \frac{-2\beta}{3 + \beta^2}
 \end{array}$$

The impact of ν is straightforward. When it increases, it results in more stringent environmental policies and lower pollution. However, the impact of a change in environmentalists' disutility is less clear. First, this depends on the kind of pollution considered but above all, this is influenced by the demand for the polluting good. In fact, $-3 + 2\beta^2 + \beta^4$ is positive when $\beta^2 > 1$ and negative otherwise. Table 1 summarizes the comparative statics based on the slope of the demand function:

<INSERT TABLE 1>

The slope has no impact on the results when pollution is global but comparative statics can change when pollution is local. The intuitive result, where more environmentalists' disutility induces an increase in the foreign tax and a decrease in the domestic one, only happens when demand is flat, with $\beta < 1$. On the contrary, when the demand curve is steeper, the indirect effect of more environmentalists' disutility dominates, and it becomes more profitable to increase the domestic tax and decrease the foreign one. Notice that in this case, overall emissions would increase.

The non-cooperative case is now presented, where both countries choose simultaneously their own optimal environmental tax. The cooperative case is used as a benchmark.

3 Strategic environmental policies with passive environmentalists

In Home, the strategic environmental tax rate is given by the following condition:⁶

$$\begin{aligned} \frac{dW}{dt} = 0 \quad \Leftrightarrow \quad & \frac{\partial \pi}{\partial x} \frac{dx}{dt} + \frac{\partial \pi}{\partial x^*} \frac{dx^*}{dt} - \nu \frac{dE}{dx} \frac{dx}{dt} - \gamma \frac{dE^*}{dx} \frac{dx}{dt} \\ & - \nu \frac{dE}{dx^*} \frac{dx^*}{dt} - \gamma \frac{dE^*}{dx^*} \frac{dx^*}{dt} + \frac{dR}{dt} = 0 \end{aligned} \quad (7)$$

In Foreign, the strategic environmental tax rate is given by the following condition:

$$\begin{aligned} \frac{dW^*}{dt^*} = 0 \Leftrightarrow & \frac{\partial \pi^*}{\partial x^*} \frac{dx^*}{dt^*} + \frac{\partial \pi^*}{\partial x} \frac{dx}{dt^*} \\ & - \nu \frac{dE^*}{dx^*} \frac{dx^*}{dt^*} - \nu \frac{dE^*}{dx} \frac{dx}{dt^*} + \frac{dR^*}{dt^*} = 0 \end{aligned} \quad (8)$$

Using the envelope theorem and optimal values of production in both countries, Home and Foreign's reaction functions are, respectively:

$$t_{so} = \frac{-\beta x}{2} + \nu \left(1 - \frac{3\theta}{2}\right) + \gamma \frac{3\theta - 1}{2} \quad (9)$$

$$t_{so}^* = \frac{-\beta x^*}{2} + \nu \left(1 - \frac{3\theta}{2}\right) \quad (10)$$

Two important changes appear compared to the benchmark case. First, the tax is not identical anymore between countries when pollution is global. Second, the substitute strategic effect is now being replaced by a pure rent-seeking effect, where an increase in the domestic tax negatively affects local firm's profits through a lower production level. It is this effect that is now present in the implicit expression of both environmental taxes. As long as the demand function is not specified, the explicit form of environmental policies cannot be deduced. However, comparative statics can be performed.

All results are presented below:

$$\begin{array}{ll}
\frac{dt}{d\gamma} = \frac{2(\beta^2 - 3)(1 - 3\theta)}{12 - 8\beta^2 + \beta^4} & \frac{dt}{d\nu} = \frac{-6 + 9\theta}{\beta^2 - 6} \\
\frac{dt^*}{d\gamma} = \frac{\beta^2(1 - 3\theta)}{12 - 8\beta^2 + \beta^4} & \frac{dt^*}{d\nu} = \frac{-6 + 9\theta}{\beta^2 - 6} \\
\frac{dx}{d\gamma} = \frac{-\beta(\beta^2 - 4)(1 - 3\theta)}{12 - 8\beta^2 + \beta^4} & \frac{dx}{d\nu} = \frac{-\beta}{3} \frac{9\theta - 6}{\beta^2 - 6} \\
\frac{dx^*}{d\gamma} = \frac{-6\beta(1 - 3\theta)}{12 - 8\beta^2 + \beta^4} & \frac{dx^*}{d\nu} = \frac{-\beta}{3} \frac{9\theta - 6}{\beta^2 - 6} \\
\frac{dX}{d\gamma} = \frac{-\beta(1 - 3\theta)(\beta^2 + 2)}{\beta^2 - 6} & \frac{dX}{d\nu} = \frac{-2\beta}{3} \frac{9\theta - 6}{\beta^2 - 6}
\end{array}$$

The impact of ν on the choice of environmental policies is relatively straightforward. An increase in the marginal damage involves more (less) stringent environmental policies as long as $\beta^2 < 6$ ($\beta^2 > 6$). Strategic competition implies that as demand tends to be elastic enough, more environmental damage can lead to an increase in overall emissions. It is more profitable to decrease taxes in this context, as this has an important positive impact on firms' profits, even though this means more pollution.⁷ The analysis of the impact of a change in passive environmentalism is more complex and necessitates to differentiate between local and global pollution.

3.1 Strategic taxes and local pollution

Table 2 summarizes the impact of a change in passive environmentalism on pollution taxes and production patterns in both countries. Comparative statics is directly influenced by the slope of the demand curve.

<INSERT TABLE 2>

The two-case scenario of an international agency leads room to a multiple-case scenario, where it becomes more complicated to predict the influence of passive environmentalism. A few remarks can nevertheless be added. First, the intuitive solution, where more PE means a higher foreign tax and a lower domestic tax still remains true when the demand curve is relatively flat ($\beta^2 < 2$). As demand becomes steeper, other scenarios are possible, including more or less pollution in both countries. Notice that the worst-case scenario for the environment when considering an increase in the marginal environmental damage ($\beta^2 > 6$) is now the most favourable scenario with more PE. What was initially a race-to-the-bottom due to a symmetric increase in the marginal damage is now transformed to a race towards more stringent environmental policies.

3.2 Strategic taxes and global pollution

Table 3 summarizes the consequences of a change in PE when pollution is global.

<INSERT TABLE 3>

Compared to local pollution, the signs of the comparative statics are reversed when presenting the consequences of a change in PE. Two interesting results can be isolated. First, the influence of more passive environmentalism is more similar to the case of a variation in ν , especially when we consider the impact on overall emissions. As long as $\beta^2 < 6$, pollution decreases.

There is no tradeoff for the regulator between emissions in Home and in Foreign as they both have a transboundary impact. Second, it is now possible to characterize situations where Home or Foreign can unambiguously benefit from the presence of environmentalists. The following proposition summarizes the results.

Proposition 1 *(i) Contrary to the decision made by an international agency, when pollution is global and countries compete strategically, taxes are not identical anymore. (ii) When $\beta^2 < 2$ (resp. $\beta^2 \in]2; 4[$), the domestic (resp. foreign) tax is higher than the foreign (resp. domestic) one, but global pollution decreases, which results in an unambiguous increase in Foreign (resp. Home) welfare.*

The influence of PE on welfare is interesting to discuss. It is usually considered that environmentalism supposes a trade-off between protecting the environment and defending the polluting industry's profits. What this proposition shows is that when pollution is global, in some cases, strategic interactions between the two countries can imply a win-win situation, either for Home or for Foreign. It is expected that the environment should improve in Foreign with more PE, but when firms' profits increase as well, this shows that Foreign can now rely on another country to internalize its externality, meanwhile focusing on increasing the competitive advantage of its industry.

Furthermore, more local citizens negatively affected by the environment abroad may actually mean an increase in Home welfare. This can be seen as another form of transfer paradox introduced in development economics. Bhagwati et al. (1983), among others, have shown that a donor country

may benefit from its interests in a foreign country's welfare by giving some foreign aid to this recipient country. Here, a country benefits from caring about the environment abroad as it can result in lower global emissions and a more competitive local polluting industry, selling more products on world markets.

This analysis of passive environmentalism was only a first step in our analysis of environmentalists' behaviour. In order to perform a more comprehensive analysis of environmentalism, a more active behaviour is now considered. As far as we know, this is the first attempt to consider the impact of a domestic green lobby on a foreign country.

4 Politically optimal taxes with active environmentalists

In this section the choice of the foreign pollution tax may deviate from the social welfare maximization policy. Environmentalists offer contributions to the foreign government trying to maximize its chances of being reelected (Grossman & Helpman 1994). Let $M(t^*)$ be the contribution of environmentalists if the policy chosen is t^* . The payoff function v^p of the politician becomes:

$$v^p = \lambda W(t^*) + M(t^*) \tag{11}$$

where λ is the political weight given to the economy's welfare. Following Schulze & Ursprung (2001), λ can be interpreted as the weight given by the

government to aggregate social welfare relative to bribes. This is a useful measure of government corruptibility.

The way environmentalists form a lobby group and overpass the free-riding problem is not considered. Environmentalists are functionally specialized.⁸

4.1 The political game

Environmentalists move first and offer the government a contribution schedule that specifies the payment to be made to the government as a function of the pollution tax. Environmentalists make contributions up to the point where the benefit on their pay-off function of the resulting change in economic policies is offset exactly by the marginal cost of the contributions. Taking the contribution schedule and the economic behaviour of the private sector as given, the government moves second and implements the politically optimal pollution tax.

Bernheim & Winston (1986) characterize the equilibrium for a menu auction problem with a finite set of actions. Fredriksson (1997) precises the conditions ensuring the existence of a truthful equilibrium. It is notably shown that the shapes of the lobbies' contribution schedules reveal the true preferences in the neighborhood of the equilibrium. This notion of truthfulness is extended to define a truthful contribution schedule, that everywhere reflects the true preferences of the lobby. Players bear essentially no cost from playing truthful strategies, because the set of best responses to any strategies played by one's opponents includes a strategy that is truthful.

4.2 Environmentalists' contribution to the pollution tax

The proportion of organized environmentalists belonging to the lobby group is $\alpha \leq 1$. The menu auctions of environmentalists depend on the impact of a change in the foreign tax on pollution, including pollution at home. Their gross payoff function v^E is:

$$v^E = B - \alpha V^E = B - \alpha[(\nu(1 - \theta) + \gamma\theta)x + (\nu\theta + \gamma(1 - \theta))x^*] \quad (12)$$

where B is the budget constraint of the lobby. The policy preference of the environmental group is determined by the sign of the derivative:

$$\frac{dv^E}{dt^*} = -\alpha[(\nu(1 - \theta) + \gamma\theta)\frac{dx}{dt^*} + (\nu\theta + \gamma(1 - \theta))\frac{dx^*}{dt^*}] \quad (13)$$

Using the optimal values presented in the previous section yields:

$$\frac{dv^E}{dt^*} > 0 \Leftrightarrow \gamma > \nu \frac{1 - 3\theta}{2 - 3\theta} \quad (14)$$

Proposition 2 (i) *When pollution is global, environmentalists always push for an increase in the foreign pollution tax. (ii) When pollution is local, environmentalists only push for an increase in the foreign pollution tax if $\gamma > \frac{\nu}{2}$*

When pollution is global, it is always in the interest of environmentalists to push for more stringent environmental policies, as it is the only way to reduce the environmental damage. However, when pollution is local, environmentalists consider both the impact on Foreign pollution and on Home

pollution. An increase in the foreign tax rises local pollution. Thus, they have to value enough foreign pollution to push for an increase in environmental standards in that country.

4.3 The politically optimal environmental tax

In this model, the incumbent government maximizes its own political payoff function. Thus, the socially optimal policy is balanced according to the auctions menu proposed by lobby groups to maximize the following payoff function:

$$v^p = \lambda W(t^*) + M(t^*) \quad (15)$$

So, the government actually determines the politically optimal pollution tax as follows:

$$\frac{dv^g}{dt^*} = 0 \Leftrightarrow \lambda \frac{dW^*}{dt^*} - \alpha \frac{dV^E}{dt^*} = 0 \quad (16)$$

Developing this expression and rewriting it in the same way than the socially optimal environmental tax yields:

$$t_{po}^* = \frac{-\beta x^*}{2} + \nu \left(1 - \frac{3\theta}{2}\right) + \frac{\alpha}{2\lambda} (\nu(3\theta - 1) + \gamma(2 - 3\theta)) \quad (17)$$

The implicit expression of the optimal tax in Home does not change compared to the case with no lobbying. However, through strategic interactions between the two countries, the presence of lobbying activities has an impact on its reaction function.

4.3.1 Impact of a change in AE when PE remains constant

First, the impact of a change in the lobby size is studied, maintaining constant the influence of passive environmentalism, i.e. the disutility incurred by environmentalists from Foreign pollution.

$$\frac{dt}{d\alpha} = \frac{\beta^2 (\nu(1 - 3\theta) + \gamma(3\theta - 2))}{\lambda(12 - 8\beta^2 + \beta^4)} \quad (18)$$

$$\frac{dt^*}{d\alpha} = \frac{2(\beta^2 - 3) (\nu(1 - 3\theta) + \gamma(3\theta - 2))}{\lambda(12 - 8\beta^2 + \beta^4)} \quad (19)$$

Local pollution The previous sub-section has demonstrated that when pollution is local, environmentalists' behaviour differs according to marginal damage and disutility. Tables 4 and 5 summarize the comparative statics given the value of γ and ν :

<INSERT Table 4>

<INSERT Table 5>

In scenario 1, environmentalists push for a decrease in the foreign tax whereas in scenario 2, they push for an increase in the Foreign tax. Therefore, it is not surprising that the comparative statics is the exact opposite from one scenario to another.

Global pollution When pollution is global, environmentalists always push for an increase in the foreign pollution tax and we find the same results than in Table 5.

Two interesting insights must be considered based on this comparative statics. The first one is the object of the following proposition.

Proposition 3 *When $\beta^2 \in]2; 3[\cup]6; +\infty[$, an increase in the size of environmentalists is counter-productive as the foreign environmental policy varies against environmentalists' interests.*

This proposition underlines that in some cases, the foreign tax does not vary according to the way environmentalists lobby. The current literature focuses on cases where environmentalists do not necessarily push for more stringent environmental policies (Conconi 2003, Aidt 2005, Canton 2008). We also characterize similar cases in Proposition 2, but our analysis goes beyond that as it is demonstrated that environmentalists can be hurt by their own power. Strategic interaction between the two countries may mean that an increase in active environmentalism can hurt their interests by decreasing (resp. increasing) the tax they would have otherwise liked to see increase (resp. decrease).

The second important element of this analysis is that the way environmentalists can act is paramount to study the consequences of their action. In fact, the impact of more AE with constant PE is significantly different on environmental policies than what it is with more PE without AE. For instance, when pollution is global or $\gamma > \frac{\nu}{2}$, the impact on world emissions is exactly the opposite. These results could be used to make a distinction between PE and AE when environmentalists' influence is measured empirically.

4.3.2 The influence of more PE when AE is constant

Studying the impact of a change in γ for a given α yields:

$$\frac{dt_{po}}{d\gamma} = \frac{2(\beta^2 - 3)(1 - 3\theta)}{12 - 8\beta^2 + \beta^4} + \frac{\alpha}{\lambda} \frac{(3\theta - 2)\beta^2}{12 - 8\beta^2 + \beta^4} \quad (20)$$

$$\frac{dt_{po}^*}{d\gamma} = \frac{\beta^2(1 - 3\theta)}{12 - 8\beta^2 + \beta^4} + \frac{2\alpha}{\lambda} \frac{(\beta^2 - 3)(3\theta - 2)}{12 - 8\beta^2 + \beta^4} \quad (21)$$

The following proposition summarizes the impact of the presence of AE on a change in PE.

Proposition 4 *If active environmentalism is strong enough, the impact of a change in PE can be reversed compared to the no-lobby situation. When pollution is local, a necessary condition is $\beta^2 > 3$ and when pollution is global, a necessary condition is $\beta^2 < 3$.*

Proof: Table 6 summarizes the necessary and sufficient conditions.

<INSERT TABLE 6>

This proposition illustrates again that how environmentalists behave is important to study the consequences of their actions. The consequences of a rise in environmental consciousness in one country will be different whether or not there exists a small group in that population already taking active behaviors by lobbying the foreign government.

5 Concluding remarks

The aim of the paper is to refine the theoretical analysis of environmentalism, when environmentalists are defined as negatively affected by pollution

abroad. Their influence is illustrated considering both passive and active environmentalism. Passive behaviour is considered by studying the impact on optimal taxation of environmentalists' disutility in one of the country's welfare function when two countries compete strategically. Active environmentalism consists in the environmentalists' ability to overpass the free-riding problem and to create a lobby offering political contributions to the foreign government. This is the first attempt to analyze the lobbying of a foreign government and to compare these results to the implication of a passive behavior.

This approach notably emphasizes that the way environmentalists behave matters, as results are significantly different given the case studied. It has also been shown that lobbying activities can be counter-productive for environmentalists. In fact, a stronger green lobby can induce an environmental policy chosen in the foreign country that has adverse effects on environmentalists' utility. Finally, we are able to characterize cases in which the presence of environmentalists has a non-ambiguous positive impact on welfare. Foreign, and more surprisingly Home, can unambiguously benefit from environmentalism as in some cases, it will result in less pollution and more polluting industry's profits.

This analysis could be refined in various ways. First, one might try and answer the traditional question with regard to how and why environmentalists manage to form lobbies. Second, it would be interesting to present a case where environmentalists can both lobby at home and abroad. In particular, it is not clear how they would split their political contributions between the two governments. Prat & Rustichini (2003) offer the theoretic-

cal conditions to find an equilibrium in a multi-principal multi-agent game but how this can be applied to the simultaneous choice of environmental policies remains an unanswered question. Finally, one important question concerns environmentalists' motivations. They could care about pollution abroad because they are paternalist or because they are aware of an inefficient political system abroad and they want to try and compensate this inefficiency. Investigating this question would definitely help to understand the consequences of their actions.

Notes

¹The eco-industry consists of activities that measure, prevent, limit, minimize or correct environmental damages (OECD 1999)

²The presence of consumers would only add one more incentive for regulators not to tax too much polluters as the polluting oligopoly is already producing less than what is optimal for consumers (Barnett 1980). Adding consumers in the model does not modify the main results.

³If environmentalists do not form the entire population, then a change in γ can either be interpreted as a variation in the marginal utility or in the percentage of the population affected by foreign population.

⁴The fact that two otherwise perfectly identical countries differ only due to the presence of environmentalists in one of them can be seen as an ad-hoc assumption. Understanding the emergence and motivations of environmentalists is not the object of the paper though, and is left as a possible extension of the model.

⁵We ignore again the impact on consumers not so much because we do not think that an international agency would not consider consumer surplus but because it is the way to emphasize the role played by the slope of the demand curve in the model, even without strategic interactions. See below.

⁶Our specification of the different functions of the model ensures that both welfare functions are quasi-concave.

⁷We find qualitatively similar results when we introduce consumers in the model.

⁸See Olson (1965) for a discussion on the logic of collective action. “While examples of lobby groups with multiple goals can be found, empirical studies seem to show that pressure groups are highly specialized” (Aidt 2005).

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	$\beta^2 > 1$		$\beta^2 < 1$	
	$\theta = 0$	$\theta = 1/2$	$\theta = 0$	$\theta = 1/2$
$\frac{dt}{d\gamma}$	+	+	-	+
$\frac{dt^*}{d\gamma}$	-	+	+	+
$\frac{dx}{d\gamma}$	-	-	+	-
$\frac{dx^*}{d\gamma}$	+	-	-	-
$\frac{dX}{d\gamma}$	+	-	-	-

Table 1: Comparative statics with an international environmental agency

	$\beta^2 < 2$	$\beta^2 \in]2, 3[$	$\beta^2 \in]3, 4[$	$\beta^2 \in]4, 6[$	$\beta^2 > 6$
$\frac{dt}{d\gamma}$	-	+	-	-	+
$\frac{dt^*}{d\gamma}$	+	-	-	-	+
$\frac{dx}{d\gamma}$	+	-	-	+	-
$\frac{dx^*}{d\gamma}$	-	+	+	+	-
$\frac{dX}{d\gamma}$	+	+	+	+	-

Table 2: Local pollution

	$\beta^2 < 2$	$\beta^2 \in]2, 3[$	$\beta^2 \in]3, 4[$	$\beta^2 \in]4, 6[$	$\beta^2 > 6$
$\frac{dt}{d\gamma}$	+	-	+	+	-
$\frac{dt^*}{d\gamma}$	-	+	+	+	-
$\frac{dx}{d\gamma}$	-	+	+	-	+
$\frac{dx^*}{d\gamma}$	+	-	-	-	+
$\frac{dX}{d\gamma}$	-	-	-	-	+

Table 3: Global pollution

	$\beta^2 < 2$	$\beta^2 \in]2, 3[$	$\beta^2 \in]3, 4[$	$\beta^2 \in]4, 6[$	$\beta^2 > 6$
$\frac{dt}{d\alpha}$	+	-	-	-	+
$\frac{dt^*}{d\alpha}$	-	+	-	-	+
$\frac{dx}{d\alpha}$	-	+	+	+	-
$\frac{dx^*}{d\alpha}$	+	-	-	+	-
$\frac{dX}{d\alpha}$	+	+	+	+	-

Table 4: Scenario 1: $\gamma < \nu/2$

	$\beta^2 < 2$	$\beta^2 \in]2, 3[$	$\beta^2 \in]3, 4[$	$\beta^2 \in]4, 6[$	$\beta^2 > 6$
$\frac{dt}{d\alpha}$	-	+	+	+	-
$\frac{dt^*}{d\alpha}$	+	-	+	+	-
$\frac{dx}{d\alpha}$	+	-	-	-	+
$\frac{dx^*}{d\alpha}$	-	+	+	-	+
$\frac{dX}{d\alpha}$	-	-	-	-	+

Table 5: Scenario 2: $\gamma > \nu/2$

	$\theta = 0$	$\theta = 1/2$
$\frac{dt}{d\gamma}$	$\beta^2 > 3$ and $\alpha > \frac{\lambda(\beta^2-3)}{\beta^2}$	$\beta^2 < 3$ and $\alpha > \frac{2\lambda(3-\beta^2)}{\beta^2}$
$\frac{dt^*}{d\gamma}$	$\beta^2 > 3$ and $\alpha > \frac{\lambda\beta^2}{4(\beta^2-3)}$	$\beta^2 < 3$ and $\alpha > \frac{\lambda\beta^2}{2(3-\beta^2)}$
$\frac{dx}{d\gamma}$	$\beta^2 > 4$ and $\alpha > \frac{\lambda(\beta^2-4)}{4}$	$\beta^2 < 4$ and $\alpha > \frac{\lambda(4-\beta^2)}{2}$
$\frac{dx^*}{d\gamma}$	$\beta^2 > 4$ and $\alpha > \frac{\lambda}{\beta^2-4}$	$\beta^2 < 4$ and $\alpha > \frac{2\lambda}{4-\beta^2}$
$\frac{dX}{d\gamma}$	$\alpha > \frac{\lambda}{2}$	never

Table 6: Reversed results for a change in PE in case of AE

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