Green and Producer Lobbies: Enemies or Allies?

Paola Conconi
CSGR, University of Warwick

CSGR Working Paper No. 78/01
July 2001

Abstract

We employ a common agency model to study the in‡uence of green and producer lobbies on the determination of trade and environmental policies. We focus on two large countries that are linked by trade ‡ows and transboundary pollution. We show that the nature of the relationship between the lobbies and the relative e¢ciency of unilateral and cooperative policy outcomes depend crucially whether governments use one or both policy instruments, whether they act in a unilateral or cooperative manner, and the size of the 'emission leakages' and the associated transboundary spillovers.

KEYWORDS: Transboundary Pollution, International Trade, Interest Groups.
JEL Classi…cation: D72, F13, Q20, Q28.

Address for correspondence:
Paola Conconi
Department of Economics
University of Warwick
Coventry, CV4 7AL, United Kingdom.
Tel: +44 (0)24 7657 2857.
Fax: +44 (0)24 7652 3032.
E-mail: P.Conconi@warwick.ac.uk.
Homepage: http://www.warwick.ac.uk/~ecren.

I wish to thank Brian Copeland, Carlo Perroni, John Whalley, Alistair Ulph, and Myrna Wooders for their comments and suggestions. Any errors are entirely my responsibility. This research was supported by the University of Warwick Graduate Award and the ESRC research studentship.

1 Introduction

The purpose of the analysis carried out in this paper is to understand how the presence of green and producer lobbies can a¤ect the political determination of trade and environmental policies.

Recent events in the United States have illustrated the extent to which citizen groups condition trade and environmental policies, both at the national and multilateral level. On the trade side, the creation of the North American Free Trade Agreement (NAFTA) initially encountered the resistance of business, labor and environmental groups (VanGrasstek, 1992). By pledging in an environmental side agreement[1], the White House was able to win the support of at least some environmental groups and obtain the fast track authority to negotiate the trade agreement without a line-by-line veto from Congress.[2] More recently, environmental groups have joined forces with protectionist industries and labor groups to launch a …erce campaign against further trade liberalization, which has caused the breakdown of the new round of GATT/WTO negotiations in Seattle.[3] Industry and green lobbies have been extremely in‡uential also on the environmental side. On some issues, such as multilateral emissions cuts, they have held di¤erent positions. For example, the strength of the producer lobby has caused the USA to abandon the Kyoto Protocol, after the assumption of o¢ce by President Bush. On others, such as the compliance of foreign legislation with American environmental standards, their objectives have often coincided.[4]

This paper attempts to shed some light on the relationship between green and

[1] The North American Agreement on Environmental Cooperation (NAAEC), could be characterized as being primarily concerned with safeguarding the sovereign rights of each party to establish its environmental standards while working towards the compatibility of standards.

[2] Opposition on the part of business and environmental groups has also undermined the project of a Free-Trade Area of the Americas (FTAA), which the United States, Canada and 34 American and Caribbean countries (all of them except Cuba) have agreed to establish by 2005.

[3] See The Economist, December 11, 1999.

[4] For example, both lobbies have demanded compliance of foreign legislation with American environmental standards on incidental catching of dolphins set out in the Marine Mammal Protection Act.

producer lobbies. In particular, we wish to address the following questions: when will their interests over trade and environmental polices be aligned and when will they diverge? What will be the unilateral and cooperative policies selected by politically minded governments? When will policy coordination be e¢ciency enhancing?

Understanding the nature of the relationship between lobby groups is important for two reasons. On the positive side, it can help us to explain observed trade and environmental policies. On the normative side, it can provide some guidance on how to construct e¢cient policy mechanisms in the presence of political distortions.

In Conconi (2000), we studied how green lobbying can in‡uence the determination of trade and environmental policies when countries are large and emissions are transboundary. Here we extend the analysis to a situation in which both producer and environmental interests are organized.

To examine the relationship between interest groups and policy-makers, we adopt the common agency model pioneered by Bernheim and Winston (1986) and applied to trade policy by Grossman and Helpman (1994, 1995a,b). A national or supranational government is the agent who sets trade and environmental policies. Green and producer lobbies act as principals and confront the government with contribution schedules, namely functions describing their political contributions contingent on the chosen economic policies. These can be interpreted, depending on the context, as legal campaign contributions, support demonstrations, or simply as bribes. The timing is that …rst lobbies simultaneously commit to contribution schedules, and then the government, having observed these schedules, sets trade and environmental policies. The implicit objective of incumbent politicians is to be re-elected. They trade o¤ the political support that comes from heeding interest groups' demands against the alienation of voters that may result from the implementation of socially costly policies.

A key feature of our model is that the countries considered are large, i.e. they are able to a¤ect world prices. This implies that a unilateral increase in domestic pollution taxes or decrease in import tari¤s generate emission leakages, i.e. they shift the terms of trade away from the implementing country, leading to an increase in emissions by its trading partners. If emissions cross borders, the increase in foreign pollution will have a negative environmental impact from the point of view of the domestic residents.

We characterize the policy outcomes and the relationship between lobbies in three alternative policy regime: one where governments control both trade and environmen-

tal policies; one in which they are restrained to the use of environmental policy by an existing free trade agreement; and one in which trade policy is the only available instrument. We …nd that, in the presence of emission leakages and transboundary spillovers, the relationship between green and producer interests over trade and environmental policy is ambiguous. If instead pollution is local and/or the emission leakages are eliminated through the combined use of trade and environmental policy instruments or through international policy cooperation, green and producer lobbies will unambiguously be enemies or allies.

Our paper also contributes to a growing literature which examines the in‡uence of interest groups on policy-making.[5] Most existing studies, however, focus on a single policy instrument.[6] To the best of our knowledge, ours is the only study looking at the role of green lobbies on the joint determination of trade and environmental policies in large open economies.

The issue of the link between the trade policy regime and stringency of environmental regulations has been recognized in number of papers. A study by Perroni and Wigle (1994) shows that, given the level of environmental regulations, trade policy has little impact on the quality of the environment. Husted and Logsdon (1997) …nd instead that the NAFTA agreement has lead Mexico to strengthen its environmental

[5] In this area, the political contributions approach developed by Grossman and Helpman (1994, 1995a,b) has become something of a work-horse model (see Cadot et al (1997), Rama and Tabellini (1998) and Mitra (1999), Gawande and Bandyopadhyay (2000) among many others). For an extensive review of this literature, see Persson and Tabellini (2000).

[6] Hillman and Ursprung (1992, 1994) investigate how environmental concerns might a¤ect international trade policy. Fredriksson (1997) and Aidt (1998) examine the e¤ect of lobbying by green and producer groups on the determination of environmental policy. Fredriksson (1997) incorporates into his model a pollution abatement subsidy, showing that pollution may be increasing in the pollution abatement subsidy rate. Aidt (1998) assumes that a production externality arises from the use of a factor input. His analysis generalizes Bhagwati's principle of targeting to distorted political markets: the most e¢cient instrument to internalize the externality is a tax on the polluting input factor, which aims directly at the source. Similarly to our analysis, Fredriksson (1997) and Aidt (1998) use a common agency model of lobbying. However, since they focus on local environmental problems in a small open economy, they do not consider emission leakages.

policies.[7] On the theoretical side, Fredriksson (1999) examines a scenario in which environmental and industry interest lobby groups in‡uence the determination of pollution taxes in sectors protected by tari¤s. The level of protectionism is exogenously determined.[8] The main result of his analysis is that the level of political con‡ict on environmental policy falls with trade liberalization. Schleigh (1999) studies the joint determination of trade and environmental policies. The government is assumed to have a single or a variety of domestic and trade policy instruments to address production or consumption externalities and to obtain political contributions from producer lobby groups. He shows that, in the presence of both trade and environmental distortions, ine¢cient trade policies can lead to higher environmental quality than more e¢cient domestic policies. Di¤erently from our analysis, both Fredriksson (1999) and Schleigh (1999) focus on a small economy and on local environmental problems, thus leaving aside the issue of the leakage e¤ects of trade and environmental policies.

The remainder of the paper is organized as follows. In Section 2, we describe the economic and political features of the model. In Section 3, we characterize unilateral and cooperative equilibrium policies for the case of two symmetric countries. Section 4 analyzes the relationship between green and producer interests. Section 5 discusses the relative e¢ciency of the policy outcomes. Finally, Section 6 presents some concluding remarks.

2 The Model

2.1 The Economy

We consider two large countries, denominated home (no *) and foreign (*). Our analysis is focused on the economic and political structure of the home country (the foreign country will have symmetric characteristics).

The economy is described by a Ricardo-Viner model in which there are $N + 1$ goods

[7] For example, regulatory plant inspections have increased from 1425 in 1990 to 13,993 in 1995.

[8] Fredrikkson (1999) compares an initial scenario with exogenously given tari¤s with a free trade scenario. As noted by the author, this analysis only applies to small open economies with a negligible impact on multilateral trade talks.

$i = 0;1;::::;N$. All goods are produced under constant returns to scale and sold in a competitive market. Production of the numeraire good 0 requires labor alone and does not generate pollution. Production of all other goods requires both the mobile factor, labor, and a sector speci…c capital, and generates emissions at the …xed level $\bar{}$ per unit of output.

The numeraire good is traded freely across countries, with a world and a domestic price equal to one. In a competitive equilibrium, this implies that wage rate is also equal to unity.[9]

Let $¼_i$ be the international price of a non-numeraire good and q_i and p_i be its domestic consumer and producer prices, respectively. The reward to the owners of a speci…c factor can be denoted as $¦_i(p_i)$. By Hotelling's Lemma, the industry supply curve is then equal to $Y_i(p_i) = @¦_i=@p_i$, where $@Y_i=@p_i > 0$, and $@Y_i=@p_i^2 · 0$.

The economy is populated by H individuals, $h = 0;1;::::;H$, with identical preferences. Utility is quasilinear and additively separable:

$$u_h(c_0;::::;c_N;Z) ´ c_0 + \sum_{i=1}^{N} u_i(c_i) ¡ Z; \tag{1}$$

where c_0 and c_i indicate consumption of the numeraire and non-numeraire goods. The functions $u(c_i)$ are di¤erentiable, increasing, and strictly concave. The last term captures the disutility caused by environmental damage:

$$Z(p;p^¤) ´ \sum_{i=1}^{N} \left[(1 ¡ \mu_i)\bar{}_i Y_i(p_i) + \mu_i \bar{}^¤_i Y_i^¤(p_i^¤)\right]; \tag{2}$$

where p and $p^¤$ are vectors of producer prices and $(1 ¡ \mu_i)$ and μ_i are the relative weights associated with domestic and foreign emissions in sector i, respectively. Equation (2) implies that, if the coe¢cient μ_i is positive, citizens in the home country are negatively a¤ected by the emissions generated in both the domestic and foreign production of good i. The larger is μ_i, the larger is the impact of foreign pollution on the environmental damage su¤ered by the home citizens.

Inverse demand for a non-numeraire good can be expressed as a function of its price

[9] The economy's labor supply is assumed to be su¢ciently large for the supply of the numeraire good to be positive.

alone, i.e. $D_i(q_i)$. The indirect utility function corresponding to (1) can be written as:

$$V_h(q;p;p^{\alpha}) \quad \acute{} \; L_h + \sum_{i=1}^{N} {}_{,i}^{h} \Pi_i(p_i) + \frac{1}{H} \sum_{i=1}^{N} t_i Y_i(p_i) + \frac{1}{H} \sum_{i=1}^{N} \left({}_{\dot{c}i}^{h} D_i(q_i) \; \text{¡} \; Y_i(p_i) \right)^{i}$$
$$+ \sum_{i=1}^{N} u \; {}^{3} D_i(q_i) \quad \acute{} \quad \sum_{i=1}^{N} q_i D_i(q_i) \; \text{¡} \; Z(p;p^{\alpha}): \qquad (3)$$

The terms in the …rst row of (3) represent income, which consists of wage income (L_h), capital claims (with ${}_{,h}$ indicating the share of capital owned by individual h)[10] and 1=H of environmental and trade revenues, transferred as a lump sum. The …rst two terms in the second row capture consumer surplus and the last term indicates environmental damage.

We consider two policy instruments: environmental taxes/subsidies t and import tari¤s/subsidies ¿. Thus the consumer prices of a non-numeraire good is given by $q_i = ¼_i + ¿_i$ and its producer price is $p_i = ¼_i + ¿_i \; \text{¡} \; t_i$.

International product markets clear when

$$M_i(¼_i;¿_i;t_i) + M_i^{\alpha}(¼_i;¿_i^{\alpha};t_i^{\alpha}) = 0; \qquad 8i = 1;:::;N; \qquad (4)$$

where $M_i = D_i(q_i) \; \text{¡} \; Y_i(p_i)$ and $M_i^{\alpha} = D_i^{\alpha}(q_i)^{\alpha} \; \text{¡} \; Y_i^{\alpha}(p_i)^{\alpha}$ represent the net imports of the home and foreign countries.

2.2 The Leakage E¤ects of Trade and Environmental Policies

In the setup described above, both countries are “large” in that they are able to a¤ect world prices. In such a scenario, a unilateral increase in pollution taxes or a unilateral tari¤ cut will raise world prices and hence lead to an increase in foreign emissions. The indirect e¤ects of domestic policies on foreign emissions via trade are referred to in the literature as emission leakages (Copeland and Taylor, 2000).

Formally, an increase in the domestic pollution tax on good i[11] generates the fol-

[10] We assume that individuals own at most one type of speci…c factor.

[11] Given the quasilinearity of the utility function, there is no possibility of substitution among goods such that the amount of pollution resulting from a given level of production can be varied. This allows us to study the determination trade and environmental policies in a representative non-numeraire sector i of the economy. For ease of the exposition, in what follows we drop the sectoral subscript.

lowing e¤ect on its international price:

$$\frac{@¼}{@t} = ¡\frac{Y_p}{M0 + M¤0} ´ ±; \tag{5}$$

where $M0 = D_q ¡ Y_p$, with $Y_p = @Y=@p$ and $D_q = @D=@q$. Notice that ± always lies between 0 and 1, implying an increase in the international price. Therefore, a unilateral increase in domestic pollution taxes shifts the comparative advantage of producing 'dirty' goods in favor of the foreign country and generates the following leakage e¤ect:

$$\frac{@E¤}{@t} = ¯¤Y_p¤±: \tag{6}$$

Hence, if pollution taxes are raised unilaterally and unaccompanied by the use of import tari¤s, they can only reduce domestic pollution at the cost of increased foreign pollution. It is important to stress that what is leaking through trade is not domestic pollution but domestic environmental policy. Thus, a leakage could also arise if environmental problems are strictly local. However, it is only in the case of transboundary environmental problems ($μ_i > 0$) that the leakage negatively a¤ects domestic residents. In this case, the environmental impact of an increase in the domestic pollution tax from the point of view of domestic residents is

$$\frac{@Z}{@t} = (1 ¡ μ)¯Y_p(± ¡ 1) + μ¯¤Y_P¤±; \tag{7}$$

hence in the presence of trade ‡ows higher domestic pollution taxes have two opposite environmental e¤ects: a direct positive e¤ect, due to a reduction in domestic emissions by $(1 ¡ μ)¯Y_p(± ¡ 1)$; and an indirect negative e¤ect, due to an increase in foreign transboundary emissions by $μ¯¤Y_p¤±$. The relative importance of the negative environmental e¤ect increases with the size of the emission leakages and the degree to which foreign emissions cross over into the home country. Therefore,

Proposition 1 A unilateral increase in pollution taxes, if unaccompanied by an increase in import tari¤s, can lead to environmental degradation. A su¢cient condition for this to occur is that the indirect environmental costs associated with the increase in transboundary foreign emissions outweigh the direct environmental bene…ts due to the reduction in domestic emissions.

Consider now the impact of a unilateral increase in domestic import tari¤s on the international price:

$$\frac{@¼}{@¿} = ¡\frac{M⁰}{M⁰ + M¤⁰} ´ ¡Á: \tag{8}$$

Since $0 < Á < 1$, higher domestic tari¤s imply a fall in the international price and a shift of the terms of trade in favor of the implementing country. This generates the following leakage e¤ects:

$$\frac{@E¤}{@¿} = ¡¯¤Y_p¤Á: \tag{9}$$

The overall environmental impact of the domestic tari¤ increase is

$$\frac{@Z}{@¿} = (1 ¡ µ)¯Y_p(1 ¡ Á) ¡ µ¯¤Y_p¤Á: \tag{10}$$

Therefore, in the presence of trade ‡ows higher domestic pollution taxes have two opposite environmental e¤ects: a positive e¤ect, due to a reduction in transboundary foreign emissions by $¡µ¯¤Y_p¤Á$; and a negative e¤ect, due to an increase in domestic emissions by $(1 ¡ µ)¯Y_p(1 ¡ Á)$. The relative importance of the negative environmental e¤ect decreases with the size of the emission leakages and the degree to which foreign emissions cross over into the home country. The following result follows immediately from (10):

Proposition 2 A unilateral increase in import tari¤s, if unaccompanied by an increase in pollution taxes, can lead to environmental degradation. A su¢cient condition for this to occur is that the environmental costs associated with the increase in domestic emissions outweigh the environmental bene…ts due to the reduction in transboundary foreign emissions.

To summarize the results obtained in this Section, when emission taxes and import tari¤s are selected unilaterally and are not combined, they can only reduce pollution in one country at the cost of increased pollution in the other country.

Propositions 1 and 2 will be key in understanding the relationship between green and producer lobbies. In Section 3.4, we will show that, in the presence of emission leakages such relationship will be ambiguous; if, however, the leakages e¤ects of domestic policies are eliminated either through the combined use of pollution taxes and import tari¤s or through international policy coordination, the relationship between the two lobbies will be unambiguous.

2.3 The Political Process

Our model does not explain the process of lobby formation. We simply assume that only the following groups of citizens can overcome the free-riding problem described by Olson (1965) and get politically organized: a proportion s^E of the population, the 'environmentalists', who form a national green lobby; and the owners of a subset S of all speci…c factors, who form producer lobbies in their respective sectors. In each sector i 2 S, capital owners represent a proportion s^P of the population.

Political competition can be modelled as a two-stage game. In the …rst stage, green and producer lobbies simultaneously present incumbent policymakers with contribution schedules, namely functions mapping every combination or trade and environmental policy into a level of political contribution. We assume that a citizen cannot be a member of more than one interest group. We also exclude the possibility that lobbies cooperate with one another and that they can o¤er political contributions to politicians in the other country. Therefore, when we refer to an 'alliance' between green and producer lobbies, we will be alluding to the fact that they exercise political pressure in the same direction, without formally coordinating their actions. The equilibrium set of contribution schedules is one in which each lobby maximizes the aggregate utility of its members, given the schedules of the other lobby group.

In the second stage, incumbent politicians select trade and environmental policies, given the equilibrium contribution schedules, and collect the corresponding contributions from every lobby. They are concerned with aggregate well-being, but also with the support they get from interest groups. In equilibrium, the decision-makers balance optimally the marginal bene…t of net aggregate contributions against the marginal welfare cost of distortionary trade and environmental policies.

In contrast to Grossman and Helpman (1994), we assume that interest groups are 'functionally specialized' (Aidt, 1998), in the sense that producer lobbies are only concerned about industry pro…ts and the green lobby is only concerned about environmental damage.[12] The gross (of contributions) welfare of a producer lobby i 2 S is

[12] The motivation for focusing on functionally specialized lobby groups is empirical: while it is possible to …nd examples of lobby groups with multiple goals, most interest groups are highly specialized (see Marshall, 1998).

thus given by:

$$W_i^P(t_i;¿_i;t_{¡i}^¤;¿_{¡i}^¤) ´ s^P H ¦_i(t_i;¿_i;t_{¡i}^¤;¿_{¡i}^¤); \qquad 8i 2 S; \tag{11}$$

while the utility of the national environmental lobby is

$$W^E(t;¿;t^¤;¿^¤) ´ B ¡ s^E HZ(t;¿;t^¤;¿^¤); \tag{12}$$

where B is a constant.

National producer and green lobbies present their government with contribution schedules $C_i(t;¿;t^¤;¿^¤)$. Their objective functions are, respectively,

$$W_i^P(t;¿;t^¤;¿^¤) ´ W_i^P(t_i;¿_i;t_{¡i}^¤;¿_{¡i}^¤) ¡ C_i(t_i;¿_i;t_{¡i}^¤;¿_{¡i}^¤); \qquad 8i 2 S; \tag{13}$$

and

$$W^E(t;¿;t^¤;¿^¤) ´ W^E(t;¿;t^¤;¿^¤) ¡ \sum_i C_i(t_i;¿_i;t_{¡i}^¤;¿_{¡i}^¤): \tag{14}$$

The implicit objective of incumbent politicians is to be reelected.[13] This implies that they care about the utility level achieved by the median voter, particularly if voters are well informed about the e¤ects of government policy and base their vote partly on their standard of living. Incumbent politicians also value political contributions for …nancing future campaigns and deterring competitors. The government's objective is thus given by

$$G(t;¿;t^¤;¿^¤) ´ aW(t;¿;t^¤;¿^¤) + \sum_i C_i(t_i;¿_i;t_{¡i}^¤;¿_{¡i}^¤); \qquad a ¸ 0; \tag{15}$$

where W is the welfare of citizens (or "social welfare") and a represents the weight that the government attaches to social welfare relative to lobbies' contributions. Social welfare is de…ned as aggregate income plus total consumer surplus minus total environmental damage:

$$W(t;¿;t^¤;¿^¤) ´ L + \sum_{i=1}^{N} ¦_i(t_i;¿_i;t_{¡i}^¤;¿_{¡i}^¤) + \sum_{i=1}^{N} t_i Y_i(t_i;¿_i;t_{¡i}^¤;¿_{¡i}^¤) + \sum_{i=1}^{N} ¿_i M_i(t_i;¿_i;t_{¡i}^¤;¿_{¡i}^¤)$$
$$+H\left[\sum_{i=1}^{N} u^3 D_i(t_i;¿_i;t_{¡i}^¤;¿_{¡i}^¤) ¡ \sum_{i=1}^{N} q_i D_i(t_i;¿_i;t_{¡i}^¤;¿_{¡i}^¤)\right] ¡ HZ(t;¿;t^¤;¿^¤): \tag{16}$$

[13] See Grossman and Helpman (1996) for an explicit treatment of the electoral stage.

In order to derive the equilibrium cooperative policies, we can rely on the notion that the outcomes of international negotiations must satisfy Pareto e¢ciency for the two policy-makers involved (see Grossman and Helpman, 1995a). This implies that cooperative policies must maximize the weighted sum

$$G^W \equiv a^*G + aG^* = a^*\left[W(t;\phi;t^*;\phi^*) + W^*(t^*;\phi^*;t;\phi)\right] + a^*\sum_i C_i(t_i;\phi_i;t_i^*;\phi_i^*) + a\sum_i C_i^*(t_i^*;\phi_i^*;t_i;\phi_i): \quad (17)$$

Thus the cooperative equilibrium policies are the same that would be selected by a single decision (a "supra-national mediator") with preferences as given on the right hand side of (17).[14]

Common agency games of the types described typically admit a multiplicity of Nash equilibria. Following Grossman and Helpman (1994), we focus on truthful equilibria, where lobbies make contributions up to the point where the resulting change in economic policies is exactly o¤set by the marginal cost of the contributions.[15]

3 The Policy Equilibria

In this section, we characterize the (politically) optimal unilateral and cooperative equilibrium policies in a sector $i \in S$ of the economy.[16] We focus on the simple case in which the two countries have identical economic and political structures and consider three alternative policy regimes: one where governments have control over both trade and environmental policies; one in which they are restrained to the use of environmental

[14] Notice that (17) stipulates that cooperative policies must be e¢cient for the two governments without specifying how the surplus will be divided between them. To determine which utility pair $(G;G^*)$ will be selected, a bargaining procedure should be introduced. One could adopt the Nash bargaining solution or, as in Grossman and Helpman (1995a), the Rubinstein's bargaining solution.

[15] It can be shown that only truthful contributions support coalition-proof Nash equilibria, and vice-versa, all such equilibria are re‡ected by truthful contributions (see Bernheim and Whinston, 1986).

[16] The equilibrium conditions for unilateral and cooperative trade and environmental policies are given in the Appendix.

policy by an existing free trade agreement; and one in which trade policy is the only instrument at their disposal.

3.1 Trade and Environmental Outcomes

Let us …rst consider the case where governments set trade and environmental taxes independently. Using the equilibrium conditions given in the Appendix, we obtain:

$$¿_{NC} = ¿^{¤}_{NC} = \frac{¯H\mu Y_p(a + s^E)}{a(Y_p ¡ D_q)}; \tag{18}$$

and

$$t_{NC} = t^{¤}_{NC} = \frac{H[¯Y_p(a + s^E)(1 ¡ \mu) ¡ s^P Y]}{aY_p}: \tag{19}$$

In the case of centralized decision-making, governments select the following policies:

$$¿_C = ¿^{¤}_C = 0; \tag{20}$$

and

$$t_C = t^{¤}_C = \frac{H[¯Y_p(a + s^E) ¡ s^P Y]}{aY_p}: \tag{21}$$

3.2 Environmental-only Outcomes

Next, consider the case in which the two governments have signed a free trade agreement, eliminating the tari¤s on each other's imports. In this scenario, environmental policy is the only instrument available. Unilateral emissions are given by

$$t_{NC} = t^{¤}_{NC} = \frac{H[¯Y_p(a + s^E)(± + \mu ¡ 1) ¡ s^P Y(± ¡ 1)]}{aY_p(± ¡ 1)}; \tag{22}$$

while international policy coordination yields

$$t_C = t^{¤}_C = \frac{H[¯Y_p(a + s^E) ¡ s^P Y]}{aY_p}: \tag{23}$$

3.3 Trade-only Outcomes

Finally, suppose trade policy is the only instrument available. Unilateral policy-making leads to the adoption of the following import tari¤s:

$$¿^{NC} = ¿^{¤}_{NC} = \frac{H[\bar{Y}_p(a + s^E)(1 ¡ 2µ) ¡ s^P Y]}{a(D_q ¡ Y_p)}; \tag{24}$$

while cooperative policy-making results in the adoption of identical import tari¤s:

$$¿^C = ¿^{¤}_C: \tag{25}$$

4 Green and Producer Lobbies: Competition or Alliance?

In this section, we examine the impact of lobbying by green and producer groups on the policy outcomes derived above. This then allows us to evaluate whether green and producer lobbies have similar or divergent interests over trade and environmental policy. As a measure of a lobby's in‡uence, we consider the e¤ect of a change in its size on the policy outcomes, i.e. $@¿=@s^E$ and $@t=@s^E$ for the green lobbies and $@¿=@s^P$ and $@t=@s^P$ for producer lobbies.[17]

Let us examine each of the policy scenarios considered in the previous section, starting from the case in which governments can use both policy instruments and act in a non-cooperative manner. We obtain the following result:

Lemma 3 If two symmetric governments select trade and environmental policies unilaterally, green and producer lobbies will have opposite interests over environmental policy.

PROOF: Green lobbying leads to an increase in the pollution tax by

$$\frac{@t^{NC}}{@s^E} = \frac{\bar{H}(1 ¡ µ)}{a} > 0; \tag{26}$$

and to an increase in the import tari¤ by

$$\frac{@¿^{NC}}{@s^E} = \frac{\bar{H}µY_p}{a(Yp ¡ Dq)} > 0: \tag{27}$$

[17] The use of partial derivatives captures the symmetric change in the policy outcomes of the two countries given symmetric changes in the strength of their green and producer lobbies.

Producer lobbying leads to a fall in the pollution tax by

$$\frac{@t_{NC}}{@s^P} = ¡ \frac{HY}{aY_p} < 0; \tag{28}$$

and has no e¤ect on equilibrium import tari¤s:

$$\frac{@¿_{NC}}{@s^P} = 0: \tag{29}$$

Q.E.D.

Moving to the case of centralized decision-making, we …nd:

Lemma 4 If two symmetric governments select trade and environmental policies co-operatively, green and producer lobbies will have opposite interests over environmental policy.

PROOF: The presence of the green lobby implies an increase in cooperative pollution taxes:

$$\frac{@t_C}{@s^E} = \frac{¯H}{a} > 0: \tag{30}$$

The impact of producer lobbying on the cooperative equilibrium policies is:

$$\frac{@t_C}{@s^P} = ¡ \frac{HY}{aY_p} < 0: \tag{31}$$

None of the lobbies has any impact on the trade policy outcomes:

$$\frac{@¿_C}{@s^E} = \frac{@¿_C}{@s^P} = 0: \tag{32}$$

Q.E.D.

Consider now the situation in which governments have committed to free trade. In the case of decentralized decision-making, we obtain the following result:

Lemma 5 If two symmetric governments select emission taxes non-cooperatively, the interests green and producer lobbies will have opposite interests over environmental policy if and only if $± + µ < 1$.

PROOF: Under a free trade regime, green lobbying has an ambiguous e¤ect on the non-cooperative environmental outcomes:

$$\frac{@t_{NC}}{@s^E} = \frac{\bar{H}(\pm + \mu - 1)}{a(\pm - 1)}: \tag{33}$$

It is straightforward to verify that expression (33) is positive for $\pm + \mu < 1$. This condition implies green lobbies will support a unilateral increase in pollution taxes only if the environmental bene…ts associated with the decrease in domestic pollution outweigh the environmental costs due to the increase in foreign transboundary pollution. The impact of producer lobbying on the unilateral environmental policy outcomes is

$$\frac{@t_{NC}}{@s^P} = -\frac{HY}{aY_p} < 0: \tag{34}$$

Q.E.D.

If the decision-making process is centralized, the relationship between environmental and producer groups is described by the following lemma:

Lemma 6 If two symmetric governments select emission taxes cooperatively, green and producer lobbies will always have opposite interests over environmental policy.

PROOF: Green lobbying biases cooperative emission taxes upwards:

$$\frac{@t_C}{@s^E} = \frac{\bar{H}}{a} > 0; \tag{35}$$

while producer lobbying has the opposite e¤ect:

$$\frac{@t_C}{@s^P} = -\frac{HY}{aY_p} < 0: \tag{36}$$

The competitive nature of the relationship between the two lobbies is due to the fact that a multilateral increase in emission taxes will unambiguously lead to a reduction in productive activities in both countries, which implies a reduction in total environmental damage and a fall in industry pro…ts in both countries. Q.E.D.

Let us now consider the scenario in which trade policy is the only instrument available. When import tari¤s are selected in an independent manner, we obtain:

Lemma 7 If two symmetric governments select import tari¤s unilaterally, green and producer lobbies will have opposite interests if and only if $\mu < 1=2$.

PROOF: An increase in the size of the green lobby has the following impact on non-cooperative import tari¤s:

$$\frac{@¿^{NC}}{@s^E} = \frac{¯HY_p(1 ¡ 2\mu)}{a(D_q ¡ Y_p)}; \tag{37}$$

which is negative for $\mu < 1=2$. This implies that in the case of local or regional environmental problems ($\mu \cdot 1=2$) green lobbying will bias import tari¤s downwards, since in this case the environmental costs associated with the increase in domestic emissions will outweigh the environmental bene…ts due to the fall in foreign emissions; in the case of global environmental problems ($\mu = 1=2$), green lobbying will have no e¤ect on the trade policy outcomes, since the environmental gains associated with the decrease in foreign pollution will exactly o¤set the costs associated with the increase in domestic emissions. The impact of producer lobbying is:

$$\frac{@¿^{NC}}{@s^P} = \frac{HY}{a(Y_p ¡ D_p)} > 0: \tag{38}$$

Q.E.D.

Finally, Lemma 8 applies to the case of trade policy coordination:

Lemma 8 If two symmetric governments select import tari¤s cooperatively, green and producer lobbies have no impact on the policy outcomes.

PROOF: an increase in the side of the green or producer lobby has no e¤ect on the cooperative equilibrium tari¤s:

$$\frac{@¿^C}{@s^E} = \frac{@¿^C}{@s^P} = 0: \tag{39}$$

This result is due to the fact that in equilibrium two symmetric countries will always adopt identical import tari¤s and trade policy will thus have no impact on productive activities and emission levels. Q.E.D.

The results presented in Lemmas 3-8 are summarized by Table 3.1 and by the following Proposition:

Proposition 9 The nature of the relationship between green and producer lobbies depends crucially on which policy instruments are available, whether government act in a unilateral or cooperative manner, and the magnitude of the emission leakages and the associated transboundary spillovers.

Table 1: The Relationships between Green and Producer Lobbies

Policy Regimes	Policy-making Process	
	Decentralized	Centralized
Trade and Environment	1 Competition over environmental Policy	2 Competition over environmental Policy
Environment only	3 Competition over environmental policy if $\pm + \mu < 1$	4 Competition over environmental Policy
Trade only	5 Competition over trade policy if $\mu < 1=2$	6 —

Table 3.1 shows that the ambiguity of the relationship between green and producer groups arises only in the presence of emission leakages (cases 3 and 5). If instead emission leakages are eliminated either through the combined use of trade and environmental policy (cases 1 and 2) or through international policy coordination (cases 2, 4, and 6), the relationship between green and producer groups is always unambiguous.

5 The E¢ciency Question

The model presented in this chapter is characterized by the existence of three types of distortions: an environmental distortion, caused by the presence of emission spillovers; a trade distortion, due to the fact that countries are able to a¤ect the terms of trade; and a political distortion, arising from the lobbying activities of green and producer groups. The question we want to address in this section is the following: is it still possible to achieve e¢cient policy outcomes in this second-best world?

The …rst-best solution, which is obtained when benevolent policymakers act co-operatively, requires that governments eliminate tari¤s on each other's imports and adopt optimal Pigouvian emission taxes, which re‡ects the social marginal damage of emissions:

$$¿ = ¿^{¤} = 0; \tag{40}$$

$$t_P = t_P^{¤} = \bar{}H: \tag{41}$$

Due to the symmetry assumption, the two countries always select identical tari¤s. As noted above, this implies that in equilibrium there is no trade distortion. In this setup, it is thus possible to focus the analysis on the relative e¢ciency of alternative environmental policy outcomes, which we simply measure scenarios in terms of their distance from (41). We obtain to the following result:

Proposition 10 In the case of symmetric countries, the …rst-best solution requires: (i) the use of pollution taxes; (ii) a competitive relationship between green and producer lobbies; and (iii) green lobbies of size $s^{\hat{E}}$.

PROOF: Table 3.2 reports the size of the green lobby for which the environmental policy outcomes given in Section 3.3 are equal to the optimal Pigouvian taxes. Notice that e¢ciency can only be achieved though the use of emission taxes. In the policy regime in which import tari¤s are the only available instrument, the environmental distortion cannot be corrected. The reason behind this result is that, due to the symmetry assumption, trade policy has no e¤ect on relative prices and productive activities.

Table 3.2 also reveals that the relative e¢ciency of the policy outcomes depends on the nature of the relationship between the two lobbies: if governments act unilaterally

and are bound by a free trade agreement, $\hat{s}^E$ is positive if and only if $\mu + \pm < 1$. This implies that e¢ciency can only be achieved if the green and producer lobbies are in competition. Q.E.D.

Table 2: E¢ciency and the Size of the Green Lobby

Policy Regimes	Policy-making Process	
	Decentralized	Centralized
Trade and Environment	$\hat{s}^E = \frac{s^P Y + \bar{H}a\mu Y_p}{\bar{Y}_p(1 - \mu)}$	$\hat{s}^E = \frac{s^P Y}{\bar{Y}_p}$
Environment only	$\hat{s}^E = \frac{s^P Y(1 - \pm) + \bar{a}\mu Y_p}{\bar{Y}_p(1 - \pm - \mu)}$	$\hat{s}^E = \frac{Y}{\bar{H}Y_p}$
Trade only	—	—

Comparing the unilateral and cooperative policy-making processes, we obtain the following result:

Lemma 11 The size of the green lobby necessary to reach e¢ciency at the supra-national decision-making level is smaller than at the national level.

PROOF: Consider …rst the regime where both trade and environmental policies are available. The di¤erence between the critical size of green lobbies in the case of a

unilateral decision-making and in the case of policy cooperation is:

$$\frac{\mu(s^P Y + \bar{a} Y_p)}{\bar{Y}_p(1 - \mu)} > 0: \tag{42}$$

The corresponding expression for the regime in which environmental policy is the only available instrument is

$$\frac{\mu(s^P Y + \bar{a} Y_p)}{\bar{Y}_p(1 - \pm - \mu)} > 0: \tag{43}$$

Q.E.D.

The intuition behind Lemma 11 is simple. Cooperative pollution taxes are e¢cient in the absence of lobbies; in the presence of green and producer lobbies, they can be e¢cient if green lobbies are large enough to exactly o¤set the political pressure exercised by producer lobbies. For unilateral environmental policies to be e¢cient, however, green lobbies must be larger, so that their bias towards higher taxes counteracts the downward bias of both producer groups and the national governments.

6 Concluding Remarks

In this chapter we have employed a common agency model to examine the role of green and producer lobbies in the joint determination of trade and environmental policy. We have focused our analysis on the case of two large symmetric countries, which are linked through trade and transboundary pollution.

We have characterized the policy outcomes and the relationship between lobbies in three alternative policy regimes: one where governments control both trade and environmental policies; one in which they are restrained to the use of environmental policy by an existing free trade agreement; and one in which trade policy is the only available instrument.

We have shown that, when domestic policy generate emission leakages, the relationship between green and producer interests over trade and environmental policy is ambiguous. If the emission leakages are eliminated through the combined use of trade and environmental policy instruments or through international policy cooperation, green and producer lobbies will unambiguously be enemies or allies.

Appendix

We introduce the following indicator variables:

- I_E (I_E^*): equal to one if the home (foreign) government is in‡uenced by a national green lobby, and zero otherwise;
- I_P (I_P^*): equal to one if there is an organized producer lobby in the home (foreign) country, and zero otherwise.

Unilateral Policies

In the case of non-cooperation, trade and environmental policies are selected to maximize (15). Under the assumption that lobbies o¤er truthful political contributions, the …rst-order conditions for the derivation of the domestic (politically) optimal non-cooperative policies in a representative sector of the economy are:

$$a\frac{@W}{@t} + I_E\frac{@W^E}{@t} + I_P\frac{@W^P}{@t} = 0; \tag{44}$$

$$a\frac{@W}{@¿} + I_E\frac{@W^E}{@¿} + I_P\frac{@W^P}{@¿} = 0; \tag{45}$$

while foreign unilateral policies must satisfy

$$a^*\frac{@W^*}{@t^*} + I_E^*\frac{@W^{E*}}{@t^*} + I_P^*\frac{@W^{P*}}{@t^*} = 0; \tag{46}$$

$$a\frac{@W}{@¿^*} + I_E^*\frac{@W^{E*}}{@¿^*} + I_P^*\frac{@W^{P*}}{@¿^*} = 0: \tag{47}$$

Substituting partial derivatives into (44) and (45), we obtain:

$$\begin{aligned} & a\Big[Y(\pm - 1) + tY_p(\pm - 1) + Y + ¿\Big[D_q\pm - Y_p(\pm - 1)\Big] - D\pm \\ & - H\Big[(1-\mu)^{-}Y_p(\pm - 1) + \mu^{-*}Y_p^*\pm\Big] \\ & - I_E s^E H\Big[(1-\mu)^{-}Y_p(\pm - 1) + \mu^{-*}Y_p^*\pm\Big] \\ & + I_P s^P H Y(\pm - 1) = 0; \end{aligned} \tag{48}$$

and

$$\begin{aligned}
&a^{n} Y(1 - Á) + ¿(1 - Á)(D_q - Y_p) + D - Y + tY_p(1 - Á) - D(1 - Á) \\
&- H^{h}(1 - µ)^{-}Y_p(1 - Á) - Áµ^{-¤}Y_p^{¤}{}^{io} \\
&- l_E s^E H^{h}(1 - µ)^{-}Y_p(1 - Á) - µ^{-¤}Y_p^{¤}Á^{i} \\
&+ l_P s^P H Y(1 - Á) = 0: \qquad (49)
\end{aligned}$$

Foreign environmental and trade policies must satisfy two symmetric conditions.

In Section 3.1, we use (48)-(49) and the market clearing condition (4)[18] to derive the unilateral trade and environmental policy outcomes.

Cooperative Policies

In the case of cooperation, environmental and trade policies are chosen so as to maximize equation (17). Under the assumption of truthfulness of the political contributions, this implies the following …rst-order conditions:

$$a^{¤h} l_E \frac{@W^E}{@t} + l_P \frac{@W^{P\,i}}{@t} + a^{h} l_E^{¤} \frac{@W^{E¤}}{@t} + l_P^{¤} \frac{@W^{P¤\,i}}{@t} + aa^{¤h} \frac{@W}{@t} + \frac{@W^{¤\,i}}{@t} = 0; \quad (50)$$

$$a^{¤h} l_E \frac{@W^E}{@¿} + l_P \frac{@W^{P\,i}}{@¿} + a^{h} l_E^{¤} \frac{@W^{E¤}}{@¿} + l_P^{¤} \frac{@W^{P¤\,i}}{@¿} + aa^{¤h} \frac{@W}{@¿} + \frac{@W^{¤\,i}}{@¿} = 0; \quad (51)$$

$$a^{h} l_E^{¤} \frac{@W^{E¤}}{@t^{¤}} + l_P^{¤} \frac{@W^{P¤\,i}}{@t^{¤}} + a^{¤h} l_E \frac{@W^E}{@t^{¤}} + l_P \frac{@W^{P\,i}}{@t^{¤}} + aa^{¤h} \frac{@W}{@t^{¤}} + \frac{@W^{¤\,i}}{@t^{¤}} = 0; \quad (52)$$

$$a^{h} l_E^{¤} \frac{@W^{E¤}}{@¿^{¤}} + l_P^{¤} \frac{@W^{P¤\,i}}{@¿^{¤}} + a^{¤h} l_E \frac{@W^E}{@¿^{¤}} + l_P \frac{@W^{P\,i}}{@¿^{¤}} + aa^{¤h} \frac{@W}{@¿^{¤}} + \frac{@W^{¤\,i}}{@¿^{¤}} = 0: \quad (53)$$

[18] Market clearing implies the following equilibrium conditions:

$$\frac{@M}{@t} = -\frac{@M^{¤}}{@t} \;) \; Dq± - Yp(± - 1) = (Yp^{¤} - Dq^{¤})±;$$

$$\frac{@M}{@¿} = -\frac{@M^{¤}}{@¿} \;) \; (Dq - Yp)(1 - Á) = -Á(Yp^{¤} - Dq^{¤}):$$

Substituting partial derivatives into (50) and (51), we obtain:

$$\begin{aligned}
&a^{\alpha}\Big[-I_E s^E H\Big[(1-\mu)^{-}Y_p(\pm-1)+\mu^{-\alpha}Y_p^{\alpha}\pm\Big]+I_P s^P H Y(\pm-1)\Big]\\
&+a\Big[-I_E^{\alpha}s^{E\alpha}H^{\alpha}\Big[(1-\mu^{\alpha})^{-\alpha}Y_p^{\alpha}\pm+\mu^{\alpha-}Y_p(\pm-1)\Big]+I_P^{\alpha}s^{P\alpha}H^{\alpha}Y^{\alpha}\pm\Big]\\
&+aa^{\alpha}\Big[Y(\pm-1)+tY_p(\pm-1)+Y+\zeta\Big[D_q\pm-Y_p(1-\pm)\Big]-D\pm\\
&-H\Big[(1-\mu)^{-}Y_p(\pm-1)+\mu^{-\alpha}Y_p^{\alpha}\pm\Big]\\
&+Y^{\alpha}\pm+t^{\alpha}Y_p^{\alpha}\pm+\zeta^{\alpha}\pm\big(D_q^{\alpha}-Y_p^{\alpha}\big)-D^{\alpha}\pm\\
&-H^{\alpha}\Big[(1-\mu^{\alpha})^{-\alpha}Y_p^{\alpha}\pm+\mu^{\alpha-}Y_p(\pm-1)\Big]\Big]=0;
\end{aligned}\tag{54}$$

and

$$\begin{aligned}
&a^{\alpha}\Big[-I_E s^E H\Big[(1-\mu)^{-}Y_p(1-\acute{A})-\mu^{-\alpha}Y_p^{\alpha}\acute{A}\Big]+I_P s^P H Y(1-\acute{A})\Big]\\
&+a\Big[-I_E^{\alpha}s^{E\alpha}H^{\alpha}\Big[-(1-\mu^{\alpha})^{-\alpha}Y_p^{\alpha}\acute{A}+\mu^{\alpha-}Y_p(1-\acute{A})\Big]-I_P^{\alpha}s^{P\alpha}H^{\alpha}Y^{\alpha}\acute{A}\Big]\\
&+aa^{\alpha}\big[fY(1-\acute{A})+\zeta(1-\acute{A})(D_q-Y_p)+D-Y+tY_p(1-\acute{A})-D(1-\acute{A})\\
&-H\Big[(1-\mu)^{-}Y_p(1-\acute{A})-\mu^{-\alpha}Y_p^{\alpha}\acute{A}\Big]\\
&-Y^{\alpha}\acute{A}-\zeta^{\alpha}\acute{A}\big(D_q^{\alpha}-Y_p^{\alpha}\big)-t^{\alpha}Y_p^{\alpha}\acute{A}+D^{\alpha}\acute{A}\\
&-H^{\alpha}\Big[-(1-\mu^{\alpha})^{-\alpha}Y_p^{\alpha}\acute{A}+\mu^{\alpha-}Y_p(1-\acute{A})\Big]\Big]=0:
\end{aligned}\tag{55}$$

Two symmetric expressions hold for the foreign country.

In Section 3.1, we use (54)-(55) and the market clearing condition to derive cooperative trade and environmental policy outcomes.

In the case of a free trade regime (Section 3.2), we set $\zeta=\zeta^{\alpha}=0$ and use (48) and (54) to solve for the equilibrium unilateral and cooperative environmental taxes.

Finally, when trade policy is the only instrument (Section 3.3), unilateral and cooperative equilibrium tari¤s are obtained by setting $t=t^{\alpha}=0$ and solving equilibrium conditions (49) and (55).

References

Aidt, T. S. (1998). "Political Internalization of Economic Externalities and Environmental Policy", Journal of Public Economics 69, 1-16.

Austen-Smith, D. (1997). "Endogenous Informational Lobbying", Fondazione ENI Enrico Mattei, Nota di Lavoro 27/97.

Bernheim, B. D. and M. D. Whinston (1986). "Menu Auctions, Resource Allocation, and Economic In‡uence", Quarterly Journal of Economics 101, 1-31.

Bernstein, P. M, W. D. Montgomery, and T. F. Rutherford (1999). "Global Impacts of the Kyoto Agreement: Results from the MS-MRT Model", Resource and Energy Economics 21, 375-413.

Cadot, O., J. de Melo, and M. Olarreaga (1997). "Lobbying and the Structure of Protection", CEPR Discussion Paper No. 1574.

Clinton Administration (1998). "The Kyoto Protocol and the President's Policies to Address Climate Change: Administrative Economic Analysis". White House, Washington, DC.

Conconi, P. (2000). "Can Green Lobbies Replace a World Environmental Organization?", Fondazione Eni Enrico Mattei Note di Lavoro: 56/2000.

Cooper, B. R., and M. S. Taylor (1995). "Trade and Transboundary Pollution", American Economic Review 85, 716-737.

Fredriksson, P. (1997). "The Political Economy of Pollution Taxes in a Small Open Economy", Journal of Environmental Economics and Management 33, 44-58.

Fredriksson, P. (1999). "The Political Economy of Trade Liberalization and Environmental Policy", Southern Economic Journal 65, 513-525.

Gawande, K., and U. Bandyopadhyay (2000). "Is Protection for Sale? Evidence on the Grossman-Helpman Theory of Endogenous Protection," Review of Economics and Statistics 82(1), 139-152.

Grossman, G. M. and E. Helpman (1994). "Protection for Sale", American Economic Review 84, 833-850.

Grossman, G. M. and E. Helpman (1995). "Trade Wars and Trade Talks", Journal of Political Economy 103, 675-708.

Grossman, G. M. and E. Helpman (1996). "Electoral Competition and Special Interest Politics", Review of Economic Studies 63, 265-286.

Hausman, R. F., and D. J. Zaelke (1992). "The Collision of Environment and Trade: the GATT Tuna/Dolphin Decision," Environmental Law Report 22.

Hillman, A. L. (1982). "Declining Industries and Political-Support Protectionist Motives", American Economic Review 72, 1180-1187.

Hillman, A. L., and H. W. Ursprung (1988). "Domestic Politics, Foreign Interest and International Trade Policy", American Economic Review 78, 729-745.

Hillman, A. L., and H. W. Ursprung (1988). "The In‡uence of Environmental Concerns on the Political Determination of Trade Policy," in K. Anderson, and R. Blackhurst (eds.), The Greening of World Trade Issues. Harvester Wheatcheaf, New York.

Hillman, A. L., and H. W. Ursprung (1994). "Greens, Supergreens, and International Trade Policy: Environmental Concerns and Protectionism", in C. Carraro (ed.), Trade, Innovation, Environment. Kluwer Academic, Dordrecht.

Husted, A. L., and J. M. Logsdon (1997). "The Impacts of NAFTA on Mexico's Environmental Policy, Growth and Change 28, 24-48.

Intergovernmental Panel on Climate Change (IPCC) (1996). Climate Change 1995: Economic and Social Dimensions of Climate Change. Cambridge University Press, Cambridge.

Manne, A. S., and R. G. Richels (1992). Buying Greenhouse Insurance—The Economic Costs of Carbon Dioxide Emission Limits. MIT Press, Cambridge, MA.

Manne, A. S., and R. G. Richels (1998). "The Kyoto Protocol: a Cost-E¤ective Strategy for Meeting Environmental Objectives?", mimeo.

Markusen, J. R. (1975a). "International Externalities and Optimal Tax Structures", Journal of International Economics 5, 15-29.

Markusen, J. R. (1975b). "Cooperative Control of International Pollution and Common Property Resources", Quarterly Journal of Economics 89, 618-632.

Mitra, D. (1999). "Endogenous Lobby Formation and Endogenous Protection: A Long-Run Model of Trade Policy Determination", American Economic Review 89, 1116-1134.

Nordhaus, W. D., and J. G. Boyer (1998). "Requiem for Kyoto: An Economic Analysis of the Kyoto Protocol", paper presented at the Energy Modelling Forum meeting, Snowmass, Colorado, 10-11 August.

Olivera-Martins, J., J-M Burniaux, and J. P. Martin (1992). "Trade and the E¤ectiveness of Unilateral CO_2-Abatement Policies: Evidence From GREEN", OECD Economic Studies 19, 124-140.

Olson, M., 1965, The Logic of Collective Action. Harvard University Press, Cambridge, MA.

Peltzman, S. (1976). "Toward a More General Theory of Regulation", Journal of Law and Economics 19, 211-240.

Persson, T. and G. Tabellini (2000). Political Economics and Economic Policy. MIT Press, Cambridge, MA.

Perroni, C., and R. M. Wigle (1994). "International Trade and Environmental Quality: How Important are the Linkages?", Canadian Journal of Economics 27, 551-567.

Rama, M., and G. Tabellini (1998). "Lobbying by Capital and Labor over Trade and Labor Market Policies", European Economic Review 42, 1295-1316.

Rodrik, D. (1995), "Political Economy of Trade Policy", in G. Grossman, and K. Rogo¤ (eds.) Handbook of International Economics, vol. III. Elsevier Science.

Schleich, J. (1999). "Environmental Quality with Endogenous Domestic and Trade Policies", European Journal of Political Economy 15, 53-71.

Stigler, G. J. (1971). “The Theory of Economic Regulation”, Bell Journal of Economics 2, 359-365.

VanGrasstek, C. (1992). “The Political Economy of Trade and Environment in the United States,” in P. Low, International Trade and the Environment. World Bank, Washington, DC.