

‘Cleaning up’ while cleaning up? Pollution abatement, interest groups and contingent trade policies*

MICHAEL P. LEIDY

International Monetary Fund, Washington, D.C. 20431

BERNARD M. HOEKMAN

GATT Secretariat, Rue de Lausanne 154, CH-1211 Genève 21

Accepted 18 may 1992

Abstract. This paper analyzes the political economy of environmental-policy formation in a trading economy with established rules for administered protection. We argue that the social costs associated with the adoption of an inefficient environmental regime are likely to be compounded by induced restrictions on trade when the effected industries are import competing. The preferences of interest groups for alternative environmental regimes tend to be linked to the legal-institutional setting in which trade policy is conducted. Under existing rules and practices in the area of administered protection, there is reason to believe that interest group preferences for an inefficient approach to pollution control will be strengthened because the adoption of such a regime is more likely to lead to a concomitant increase in trade barriers.

1. Introduction

In the last twenty years or so two apparently unrelated policy developments have swept across many industrialized economies. First, there has been a dramatic rise in instances of sector-specific administered protection from foreign competition.¹ At the same time, environmental concerns have stimulated a policy response that continues to spread a patchwork of environmental rules and regulations across these same economies. When one looks at these environmental policies, efficient regimes have been largely rejected in favor of various inferior (second- or Nth-best) options. Both developments imply disturbing deadweight losses. They also warrant asking whether there are interactions between trade policy and environmental policy reinforcing these developments.

The purpose of this paper is to analyze the political economy of environ-

* We thank Kym Anderson, Richard Blackhurst, Peter Lloyd, Richard Snape, John Whalley, Alan Winters and participants in a GATT workshop on trade and the environment for helpful comments on an early draft of this paper. We are also indebted to an anonymous referee for several constructive suggestions. The views expressed are our own and should not be attributed to the GATT Secretariat or the IMF.

mental-policy formation in a trading economy with established rules for administered protection. It extends the closed-economy analysis of Buchanan and Tullock (1975), Maloney and McCormick (1982), and Yandle (1989) who have observed that there may be incentives for industrial polluters to support inefficient pollution-abatement policies. These authors point out that because industrial pollution control may imply restrictions on output, the opportunity arises for polluters to consolidate market power on the road to pollution control. We argue that the social costs associated with the adoption of an inefficient environmental regime are likely to be compounded by consequent restrictions on trade when the affected industries are import competing. The preferences of interest groups for alternative environmental regimes tend to be linked to the legal-institutional setting in which trade policy is conducted. Under existing rules and practices in the area of administered protection, there is reason to believe that interest group preferences for an inefficient approach to pollution control will be strengthened because the adoption of such a regime is more likely to imply a concomitant increase in trade barriers. It is shown that there may be a confluence of interests among import-competing polluters, environmental interests, labor groups, and even foreign exporters, all favoring an inefficient regulatory package. And this support derives in part from the heightened expectation of trade restrictions likely to accompany the inefficient environmental regime.

How might an inefficient environmental regime enhance the prospect of protection under existing administrative rules? It may do so by inducing structural adjustments that increase the likelihood of satisfying the injury criteria for protection; by setting up environmentally-based barriers to entry that can help secure the profits of protection, thereby inducing more petitions than otherwise; by setting a precedent for market sharing that may facilitate the negotiation of a voluntary export restraint agreement (VER); and by establishing an Olsonian "other purpose" enabling the industry to more-readily speak with one voice when petitioning for protection.

A sense of the significance of this analysis is suggested by an empirical study by Tobey (1990) who concluded that, "... the stringent environmental regulations imposed on industries in the late 1960s and early 1970s by most industrialized countries have not measurably affected international trade patterns in the most polluting countries" (p. 192). Three of the five industries included in his study, however, are heavily protected industries in most industrialized countries (primary iron and steel, chemicals, and paper and pulp). Our analysis suggests that the effects on trade patterns expected by Tobey (and others) need not emerge because new trade barriers which tend to offset such effects may be induced by environmental policy. Thus Tobey may be measuring the status-quo preserving effects of endogenous protection rather than the trade-altering effects of pollution-control policy *ceteris paribus*. Indeed he speculates in his fi-

nal paragraph that impediments to trade may be confounding his results.

Industries facing the highest pollution-abatement costs are among those most frequently seeking and receiving protection in industrialized countries. Metals, including basic metal products, and chemical products account for ten of the top 19 (of 122) U.S. industries ranked by pollution-abatement costs.² Industries in these categories accounted for 68 per cent of all antidumping (AD) investigations (260 of 381 cases) and 78 per cent of all definitive AD duties (119 of 153 actions) taken in the U.S. from July 1980–June 89 (GATT, 1990). Among all the arrangements restraining exports to the U.S. in effect in 1989 (including voluntary export restraints, orderly marketing arrangements, industry-to-industry arrangements, and other VER-like arrangements), the sub-category of steel and steel products alone accounted for 51 per cent (33 arrangements), by far more than any other single category (GATT, 1989). A similar concentration of protectionist events in high-abatement-cost industries appears in the European Community (E.C.) and Australia, two other major users of AD.³ In the European Community, the chemical industry has been the single most active user of AD law. It accounted for almost 40 per cent of all AD cases initiated and 46 per cent of those ending in a restrictive outcome between 1980 and 1987. When Iron and Steel is added, these sectors accounted for 56 per cent of all restrictive outcomes from EC AD petitions during this period (GATT, 1991). In Australia, petitions from basic metals and chemicals producers accounted for 45 per cent of all AD investigations initiated between 1983–89 (Banks, 1990).

The following two examples are suggestive of the possible linkages between environmental regulation and administered protection. The Australian Chemical industry had explicitly linked domestic environmental policy to the sharp increase in imports during 1989–90, and in a recent report warned that the emphasis on environmental issues 'has reached unhealthy levels and may result in the substantial de-industrialization of Australia' (*Journal of commerce*, 4 February 1991). The chemical industry is the single most active initiator of AD petitions in Australia, having initiated one-third of all cases (91 in total) between 1983–90 (Banks, 1990). Following the 1989–90 surge in imports, between mid-1990 and mid-1991, 42 new AD cases were brought by the industry. This was over 60 per cent of the total, a marked increase on its average share of one-third noted above.

The cement industry ranks first in pollution abatement costs among 122 U.S. industries. Relying predominantly on coal-fired ovens and kilns (USITC, 1989), it has been affected by relatively stringent air-quality standards under the Clean Air Act. A 1977 amendment to the Clean Air Act established mandatory use of so-called scrubbing technology, regardless of levels of sulphur dioxide emissions, type of coal used or local air quality. Since 1978 the U.S. industry (including regional associations) has petitioned six times for AD relief. The most recent petition was presented in 1989 by an association of southern-state

producers. It resulted in the imposition of definitive duties on cement imports from Mexico in August 1990,⁴ where environmental regulations are less strict.⁵

The analysis below provides a theoretical framework that identifies several dimensions of the suspected endogeneity of trade barriers to environmental regulations and how this endogeneity may influence interest-group preferences for alternative environmental policies. It suggests that the state of environmental regulations may be a significant new explanatory variable in commercial-policy analysis.⁶

2. Penalty taxes versus quantity regulation in trading economy

Buchanan and Tullock (1975) examined the case of a polluting industry under perfect competition in a closed-economy setting. They showed that while a penalty tax is the efficient instrument to achieve any given level of pollution-abatement, firms will tend to prefer quantity regulation because it may confer cartel-like gains. Maloney and McCormick (1982) reach a similar conclusion in a model that imposes a standards-based approach to pollution control. In this section the Buchanan-Tullock model is extended by incorporating a foreign exporting sector and explicitly considering the interests of environmentalists, foreign exporters, labor groups and domestic producers of an import-competing good. One should not interpret our modelling choice as indicating that we believe the world of pollution control is restricted to a choice between penalty taxes or quantity regulation. This is clearly not the case.⁷ Instead this model offers an illustration of the incentives for pressure groups in a trading economy to block the efficient approach to pollution control, while also providing insight into the broad scope for unintended and socially costly linkages between environmental and commercial policies.

2.1 Structural adjustment under alternative environmental regimes

Suppose a competitive import-competing industry is initially in long-run equilibrium. There are N_0 identical domestic firms and there are industry-wide pecuniary diseconomies of scale due to rising factor prices with industry expansion. This implies an upward sloping long-run market supply curve for domestic suppliers.⁸ For simplicity it is assumed that the minimum efficient scale (MES) is unchanged as industry expansion and contraction alters factor prices, raising and lowering cost curves.⁹ This implies that underlying the home-industry supply curve S in Figure 1, all domestic firms are producing at their MES and that movements along the curve imply entry (movement up and right) and rising factor prices, or exit (down and left) and falling factor prices.¹⁰ The

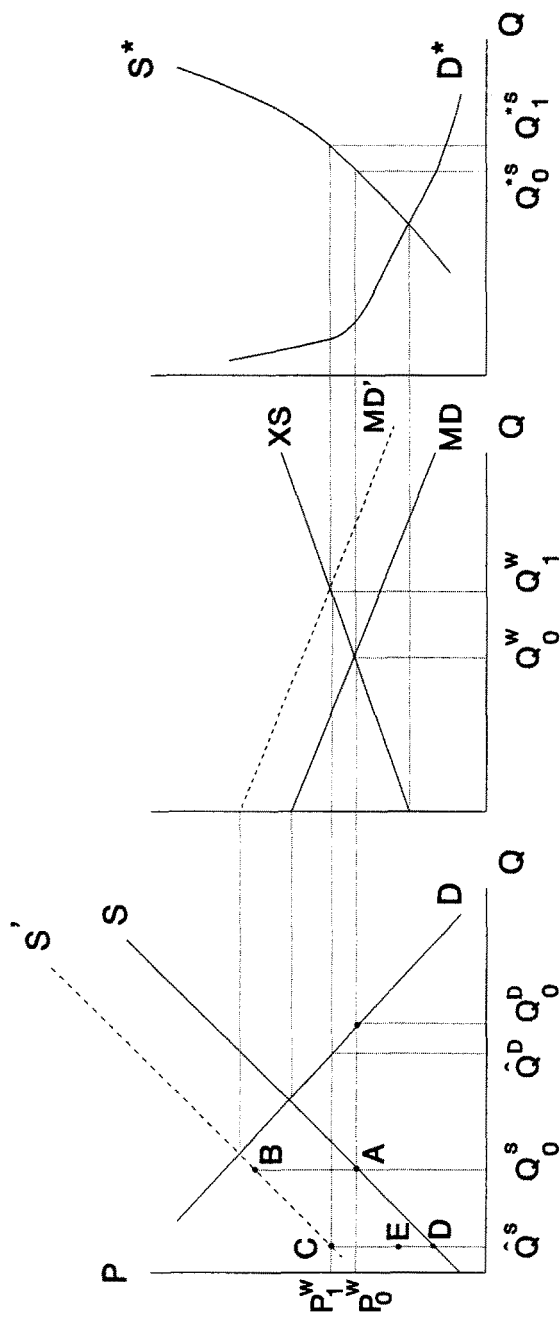


Figure 1. Home

Figure 2. Trade

Figure 3. Foreign

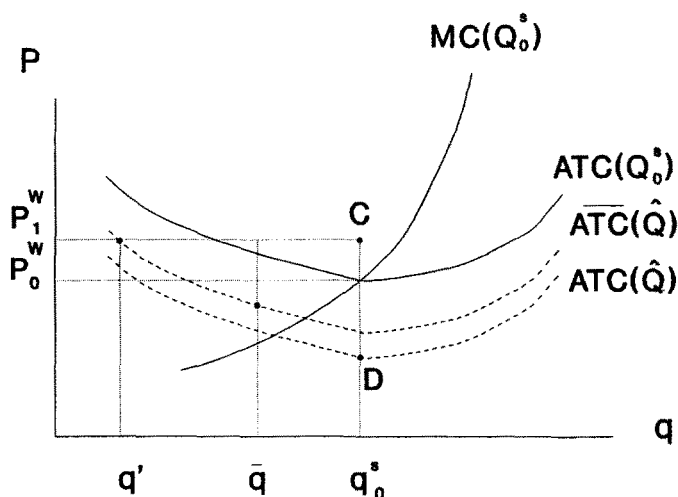


Figure 4. Representative domestic firm

value P_0^w is the world price at which imports are supplied, the quantity $Q_0^D - Q_0^S$ is imported, and all domestic firms are normally profitable and producing at their minimum efficient scale, q_0^s in Figure 4. The fact that factor prices change with industry scale is indicated in Figure 4 by expressing cost curves as functions of total domestic output.

Following Buchanan and Tullock (1975), it is assumed that each unit of output generates a fixed amount of environmental pollution and that the authorities can accurately measure and monitor these emissions, and have determined the amount by which they wish to reduce them. Let the desired level of pollution abatement be achieved when domestic production falls to \hat{Q}^s in Figure 1. In principle, a penalty tax, τ , could be imposed on units of domestic production to achieve the desired level of pollution abatement.¹¹ If such a tax were imposed the minimum of the long-run average cost rises to the level indicated by point B in Figure 1 (not shown in Figure 4). The domestic market supply curve shifts upward by τ to S' and import demand shifts right as indicated in Figure 2. At the initial world price, the home industry experiences losses and exit begins. As exit proceeds and factor demand falls, factor prices decline domestically and the sector contracts toward point C. Excess demand for imports causes the world price and imports to rise. The foreign export sector experiences transitional supranormal profits which induces entry. As foreign entry proceeds, sector-specific factor prices rise abroad. Entry continues until excess profit is eliminated at P_1^w . Firms at home (and abroad) are once again producing at their MES and earning a normal return. In this sense the pollution abatement is achieved efficiently.

As an alternative to the penalty tax, policy makers could simply impose production restraints on existing domestic firms. The effect of allocating production quotas can also be analyzed in Figure 1. To achieve the level of pollution abatement implied by \hat{Q}^s , the regulatory authority assigns the quota \bar{q} to each domestic firm, where $N_0 \cdot \bar{q} = \hat{Q}^s$. The effective market supply curve is then given by the original supply curve in Figure 1 up to point D, at which point it becomes vertical. The same static equilibrium obtains as under the penalty tax. While such a policy achieves the pollution-abatement objective, it does so inefficiently in the sense that each firm is assigned a production quota below its minimum efficient scale.¹² Inefficiency implies that for a given set of factor prices the regulated industry will require a greater quantity of all factors (if there are no inferior factors) than under the efficient tax-based case. Thus to produce \hat{Q} under the regulatory solution requires a smaller decline in factor demand than is implied under the penalty tax. Aggregate employment and sector-specific wages fall, therefore, by somewhat less than under the penalty tax. Domestic sales decline, market share is lost and domestic firms will have excess capacity at their assigned production quota. At the same time imports rise, exporters experience unusually high rates of capacity utilization during the transition, transitional excess profits induce entry in the foreign market, sector-specific factor prices and employment rise while total foreign output expands. Because of the factor price effect, which drives minimum unit costs for domestic firms to a point like E, supranormal profits can be earned if the production regulation is not overly strict.

Since domestic firms are not producing at their MES and because the factor-price effect is less under the quantity regulation, per-unit profit must be less than the value CD, which is the amount of the corresponding penalty tax. The cost conditions of the representative firm appear in Figure 4. Prior to the environmental regulation the long-run cost curves are given by $MC(Q_0^s)$ and $ATC(Q_0^s)$. As the output restraint is imposed under the regulatory regime, industry-specific factor prices fall and cost curves shift downward while the market price rises.¹³ Any firm-level quota greater than q' yields positive profits. But per unit profit must be less than per unit tax revenue under the equivalent penalty tax. And since aggregate output is the same under both regimes, total tax revenue must exceed the total profit under the regulatory approach.

2.2. Interest group preferences and trade policy linkages

The structural adjustment process described above can be summarized as follows: both output regulation and the penalty tax generate layoffs of sector-specific labor (and other factors), sector-specific factor prices fall, domestic

market share declines, sales decline, and excess capacity is created (permanently under the quota and in the transition to the new equilibrium under the tax) while imports surge to fill the initial demand gap. Indeed, it is clear that the openness of the economy (which prevents domestic prices from rising by as much as they otherwise would) exacerbates the policy-induced decline in the domestic industry. The only indication of industry health under output regulation is that profits are up, having gone from normal to supranormal, assuming that the quota does not excessively overshoot the quasi-cartel optimum. These developments may be significant to commercial policy, in part, because they offer evidence of injury *due to imports*.¹⁴

The presence of injury due to imports (the standards of causality vary from country to country but they are almost uniformly weak) opens a world of potential government assistance to shelter such firms from foreign competition.¹⁵ One should anticipate some change in the probability of contingent protection under such a scenario, even though this chain of events was set in motion by domestic environmental policy. While evidence of injury caused by import competition is the true prerequisite of protection, not “injury” *per se*, separating injury which is linked directly to foreign competition from that which is attributable only to environmental policy is unlikely to be feasible for trade regulators. In practice, since establishing causality is quite difficult, objective evidence of injury is identified without being able to attribute cause with any precision.¹⁶ Thus there is great scope for the “injury” introduced directly by domestic environmental policies to affect the incidence and outcomes of petitions for protection under existing rules.

In evaluating the preferences of interest groups for alternative environmental regimes this and other links to commercial policy become relevant. Consider first the interests of domestic polluters. As emphasized by Buchanan and Tullock (1975), their preferences lie squarely in favor of production quotas with strict enforcement measures and binding barriers to entry since cartel-like profits are potentially available.¹⁷ In practice the barriers to entry selected by governments tend to appease both firms and environmentalists. Frequently, prospective new entrants must meet technology-based pollution control standards that are far more stringent than those imposed on existing firms. The right to use the old technology tends to be grandfathered for existing firms. Potential entrants are thereby placed at a substantial cost disadvantage making entry all but impossible. As long as the proposed quantity restraint does not overshoot by too much the underlying cartel solution, polluting firms will favor such a regulatory package.

The proposition that domestic polluting firms will favor regulation over a tax-based approach is strengthened when these firms must compete with foreign imports. In the United States, import-competing firms are adept at using the antidumping procedures, Section 301 threats,¹⁸ and rules for emergency

protection against foreign rivals to gain strategic advantage.¹⁹ Similarly, import-competing polluters can be expected to identify the strategic opportunities presented by calls for environmental protection. In the present context, the regulatory approach to pollution control becomes additionally appealing to these firms because it enhances the expected present value of the prospect of protection in several ways.

It does this first by providing a formal institutional setting for cooperative behavior that reinforces their ability to pursue other (non-pollution abatement) areas of mutual interest, including protection from foreign competition. In their empirical study of the U.S. steel industry's use of unfair trade laws from 1982–1986, Herander and Pupp (1991: 143–144) observed that “segments of the industry which have difficulty forming an effective coalition because of the free-rider problem obtain a less favorable policy outcome, allowing for the degree of material injury”. In his analysis of the collusive effects of E.C. antidumping law, Stegemann (1990: 276–278) also points out that domestic producers who “present a common view” enhance their chance of a favorable outcome. Olson (1965: 132) observed the importance of such organizational catalysts to rent seeking when he pointed out that “The common characteristic which distinguishes all of the large economic groups with significant lobbying organizations is that these groups are also organized for some *other* purpose.” Regulatory oversight under a pollution-control regime may offer import-competing industries this *other* purpose. Internalizing industry-wide incentives, including the incentive to petition for protection, is certainly part of the attractiveness of the regulatory approach.

Second, the regulatory regime establishes a precedent for market sharing that may pave the way to the inclusion of foreign firms. Domestic firms may be able to use the market-sharing arrangement imposed for environmental reasons to argue for its extension to foreign firms. That is, should protection be granted it may be marginally more likely that a negotiated voluntary export restraint will be the chosen instrument. Other things equal, such quantity-based protection offers greater opportunities for the consolidation of market power and thus greater profits.

Third, because of the barriers to domestic entry established under the regulatory pollution-abatement scheme, the prospective profits of protection will not be dissipated by competition over time. This means that the regulatory scheme serves to increase the expected present value of the profits of protection, thereby increasing the appeal of protection. No such barrier exists under the penalty tax and so protection from foreign competition would offer only transitory profits.

Finally, there is the issue of injury. When the conditions outlined above are linked to the induced structural upheaval (layoffs, declining sector-specific factor prices, declining market share, reduced domestic sales, and excess capacity)

and the corresponding surge in imports, the probability of a successful petition for protection from this sector under the regulatory approach to pollution control almost certainly rises.²⁰ In short, the pressure for protection under the regulatory scheme is enhanced since the domestic industry experiences injury in several dimensions, this injury coincides with a surge in imports, regulatory barriers to entry increase the expected capitalized value of protection, and the cooperative behavior enforced by the regulations furthers the industry's ability to speak with one voice.

For those troubled by the proposition that the probability rises under the regulatory approach (by at least as much as under the penalty tax) even though profits are up, a few additional points can be made. In a recent paper, Leidy and Hoekman (1991b) argue that because import-competing firms collectively control or influence many of the indicators of injury (employment, sales, capacity utilization, profits, etc.) they are not likely to remain passive in this regard in their pursuit of contingent protection. Instead, they can be expected to attempt to manage these criteria as an *indirect* means to rent seeking. Whether through accounting practices, public bluffs (e.g., announcing the cancellation of a significant capital expansion program) strategic layoffs of workers (sufficient to induce greater political visibility), and the like, firms can influence the political perception of industry health, and thereby influence the probability of obtaining protection. Should such firms perceive that current profits will hurt them in a petition for protection, especially when all other indicators support their case, they will have a strong incentive to adjust their behavior at the margin, giving up some current profits in the expectation of recouping these under future protection. Under the regulatory approach to pollution control a mechanism for overcoming the free-rider problem is already in place since the industry's ability to act in unison is being facilitated by the regulatory regime. So the fact that under passivity industry profits rise need not jeopardize the industry's prospect of protection at all.²¹

Next consider the case of sector-specific factors. For simplicity of exposition we will treat these factors collectively as a composite of sector-specific labor. The analytical work above indicates that layoffs will occur under both a penalty tax and output regulation. But because the industry output \bar{Q} is produced inefficiently under the output regulation, industry-wide factor demand falls by less than under the penalty tax. This suggests that while sector-specific factors may oppose the environmental protection in the first place (since factor prices and employment decline), once the decision to intervene has been made, the penalty tax poses a greater threat to employment and wages than does output regulation. Other things equal, this suggests a strict preference for the regulated approach over the penalty tax.

A number of additional factors reinforce this preference. First, anticipation of the rents accruing to domestic firms under output regulation offers a poten-

tial carrot to labor. Beyond this, the expected increase in the likelihood of protection, together with the entry barriers accompanying regulation which prevent the profits of protection from being dissipated should strengthen this preference. The prospect of capturing any small share of these rents will help to render the quantity restraint the preferred approach. Under the penalty tax no rents accrue to the penalized industry, and so no prospect of an ameliorating outcome for labor is built into the tax scheme. Second, in the case of regulated output, layoffs are distributed evenly across existing firms, while a penalty tax produces all-or-nothing outcomes. That is, under the penalty tax a given firm either lays off its entire work force as it exits the industry, or it survives intact with its full contingent of workers undisturbed. If labor and politically aligned groups perceive evenly distributed layoffs to be more equitable (in a self-interested sense) than the all-or-nothing purges of a tax, the strict preference for the regulated approach to pollution control is again strengthened. Since such all-or-nothing layoffs are likely to have regional implications, and since regional labor officials are likely to want to avoid the prospect of their demise, it seems likely that a preference for the evenly distributed layoffs associated with the regulatory approach will emerge over the all-or-nothing option tied to the penalty tax. In addition, the burden of the proportional layoffs under regulation will most likely affect employees with the least seniority. To the extent that the interests of workers with greater seniority are protected over those of more recent vintage, the threat of evenly distributed layoffs under quantity regulation appears attractive relative to the all-or-nothing threat under the penalty tax.

Environmentalists can be expected to value both current and expected future environmental quality, largely to the exclusion of all else.²² Given such focused preferences, how will environmentalists evaluate a penalty tax versus the quantity regulation? Both achieve the same pollution objective in the static framework. Nevertheless, environmentalists can express reasonable concern with each approach. The penalty-tax approach is attractive since it is self-enforcing. There is no incentive for firms to deviate from the new equilibrium, other things equal. At the same time, there is no reason to be absolutely confident about the stability of the induced reduction in output. After all, firms are not *required* to reduce output and pollution. Should there be, for example, an exogenous decline in factor prices firms can be expected to step up production, and so emissions. The introduction of cost-saving technologies, that may be equally polluting, will also induce firms to step up production under a fixed penalty tax. If environmentalists weigh the threat of such future developments strongly they may conclude that the flexibility and autonomy remaining in the hands of polluting firms under a penalty tax is undesirable. Indeed a penalty tax might be viewed as "license to pollute."

The regulatory alternative carries with it the potential problem that it is not

self-enforcing. The incentive for each firm to exceed its production allotment is strong in the absence of effective oversight and severe sanctions. This is because at the assigned production quota price exceeds marginal cost for each firm. But when packaged with a credible enforcement component and effective barriers to entry, something also desired by domestic polluters, the regulatory approach is likely to dominate the tax-based scheme from the environmentalist's perspective. It has two principle advantages. First, it provides greater certainty than the tax scheme. The level of pollution cannot rise in this sector because production is controlled directly by government regulators, and violations are penalized severely. Environmentalists are likely to prefer the binding regulatory solution to the promise of deterrence under the penalty tax. A second factor pointing to the superiority of the regulatory approach is that environmentalists may be concerned with the cleanup of past environmental degradation. Under the penalty tax scenario some firms are forced to exit the industry and those that remain earn zero economic profits. Under the quantity regulations no firms exit and each earns supranormal profits, with or without new protection from foreign competition. The presence of ongoing supranormal profits provides assurance that these firms will have the wherewithal to correct past abuses. While governments can impose *barriers to exit* if certain cleanup criteria have not been met, firms still require resources to engage in any cleanup activity. Hence, just as labor might see the rents associated with the regulatory approach as being potentially captured at a later date, so environmentalists may view these rents as assuring latent resources for expected future cleanup. Should they anticipate the link to commercial policy developments, this pool of latent resources for cleanup appears still more attractive. And, beyond this, domestic environmentalists are likely to favor such protection if there are international pollution spillovers from foreign production, since it implies an incidental reduction in these transborder pollution flows.

Finally, consider the interests of foreign exporting firms.²³ Recall that exports and the world price rise equally under both the penalty tax and the regulatory approach, suggesting indifference between the two regimes at this point. The structural upheaval in the domestic market is thus only of interest to foreign exporters to the extent that it affects the probability that barriers to trade will block market access in the future. While both approaches to pollution abatement generate injury and so enhance the probability of future barriers to trade through this channel, exporter preferences cannot be separated from the type of protection likely to arise. Unlike, for example, tariff barriers under an act of emergency protection, or quantitative restrictions where the quota rights are auctioned, VERs are often negotiated so as to confer rents on both foreign exporters and domestic firms (see, e.g., Harris, 1985). The prospect of a VER therefore is often not a threat but an opportunity for foreign exporters to consolidate market power. Because the market-sharing approach to pollution

abatement increases the likelihood of a mutually advantageous VER being negotiated, exporting firms should express a strict preference for the regulatory approach.²⁴ Under the penalty tax, even if it could be argued that a VER might also be sought and won, the absence of domestic entry barriers still makes it a less attractive alternative since any profits that might initially arise will be dissipated by competition over time. The domestic barriers to entry combined with the prospect of a mutually advantageous VER, therefore, makes the regulatory solution the approach preferred by foreign exporters.

3. Concluding comments

Much of the support for the inefficient regime derives from the likelihood that regulation, together with the help of existing rules for contingent protection, will facilitate the joint cartelization of the regulated market by domestic *and* foreign producers. Thus the appropriate measure of the social cost of inefficient pollution-abatement policies may extend substantially beyond the problem of static inefficiency. Under current rules for contingent protection, pollution control in an import-competing sector may come at the expense of open trade, unless the policy prescriptions of economists include measures to preempt these incentives.

Throughout the analysis it was assumed that the prospective tax revenues from a penalty tax were to become part of a general fund not specifically designated for any interest group. One obvious way government might shift the balance of lobbying power toward the efficient policy is to credibly precommit a share of these revenues to one or more of the interested parties. It has already been determined that the potential profits under the quantity restraint (the prospective profits of international cartelization aside) will fall short of the total tax revenues. In principle, it might appear therefore that there is sufficient revenue generated by the tax to “buy” the support of the polluting industry. But this is not the case. If the government imposes a penalty tax and commits to redistributing the revenue in lump sums independent of production (as it must be to maintain efficiency) to polluting firms, free entry will still drive industry profits net-of-tax and net-of-tax-revenue to zero. The appeal of such a scheme falls short of that of the regulatory approach unless it can be combined with entry barriers, e.g., grandfathering the rights to the tax revenues. Hence for polluting firms it is not simply the unattractiveness of the tax scheme that leads them to support the regulatory approach. It is the prospective profits of the regulatory approach that wins their favor. And these profits are heightened by the improved prospect of protection. In order to enlist their support for the penalty tax it must cease being a penalty. It must produce an expected net benefit at least as great as the regulatory approach. And this cannot be achieved by any possible redistribution of tax revenues alone.

Environmentalists though might be persuaded to shift their support under a credible plan to divert a share of tax revenues to the environment. Recall the original source of environmentalist's support for the regulatory approach. Principally, it was argued that the regulatory approach provides greater certainty of a favorable environmental outcome and that it assures firms will have the resources required to correct past abuses. If a share of total tax revenues were set aside for environmental causes, any increase in industry production will generate new revenues for environmentalists at the same time it increases direct pollution. The flexibility that was perceived as a fault before is now a mixed blessing. Hence such a plan may undermine the primary source of environmentalist opposition to the penalty tax approach.²⁵

There is, of course, still no guarantee that the interests of domestic import-competing firms, foreign exporters and sector-specific labor groups, will be blocked under such a policy. In fact, the expected economic profit under the regulatory approach provides firms with the resources needed to bribe environmentalists for their support in the same way that government might use tax revenue to that end. And the increase in the probability and expected profitability of protection under the regulatory approach supplements the industry's ability to secure environmentalist support. So the proposal that a share of any environmentally-based tax revenues be committed to environmental causes is probably necessary but not sufficient to make the efficient policy politically feasible.

If the lessons of this analysis are robust, the distaste for efficiency among interest groups in the area of environmental policy may be exacerbated by existing commercial-policy practices. The connection between environmental policy and trade policy arises in the first instance directly out of the injury criteria for protection. But it was also argued that the inefficient environmental regime strengthens the trade-policy linkage in several other ways. It sets a precedent for market sharing that may be extended to foreign firms, making a VER marginally more likely. It establishes barriers to entry that will preclude the dissipation of the profits of protection, thereby increasing its appeal and inducing more petitions for protection, other things equal. And it also provides an institutional framework that may assist in the presentation of a unified front when seeking protection. The deadweight costs of inefficient environmental policies applied in import-competing sectors, therefore, may be compounded by the social costs of the administered protection they help to induce.

Notes

1. Administered protection, also called contingent protection, includes antidumping and countervailing duty procedures, and escape clause mechanisms implementing Article XIX of the GATT (the *safeguards clause*). In the U.S., for example, there were just three findings of

dumping from 1952–60, eleven during 1961–1968, whereas during the period 1980–1988 there were 385 antidumping cases of which 72 per cent ended in restrictive outcomes, including price undertakings and negotiated restraint agreements (Finger and Murray, 1990).

2. Three digit SIC rankings of industries by pollution-abatement costs per unit of output are reported in Low (1991). The original source is the U.S. Dept. of Commerce, *Manufacturers Pollution Abatement Capital Expenditures and Operating Costs*, Annual Survey of Manufacturers (1988).
3. The U.S., the E.C., and Australia were the top three initiators of AD investigations during the 1980s.
4. A petition was filed by the Ad Hoc Committee of Arizona-New Mexico-Texas-Florida Producers of Gray Portland Cement in September 1989. On 18 May 1990, the Ad Hoc Committee of Southern California Producers of Gray Portland Cement filed a separate petition against Japanese producers.
5. Mexico supplied half of all imports in the southern region at the time of the petition. It can also be noted that Mexican plants use oil-fired ovens and kilns, and therefore may be friendlier environmentally than U.S. coal-fired plants.
6. While our analysis focuses on the linkages of environmental policy to trade policy through *existing* rules for contingent protection, *new* legislation may eventually establish a more direct and transparent link. For example, a bill before the U.S. Senate (S 984 introduced by Senator David Boren on 25 April 1991) would grant countervailing duties on imports produced under less-strict environmental standards than those in the United States. A similar amendment was introduced in 1990 by Senator Frank Lautenberg (Congressional Record, 24 April, p. S4817). Explicitly identifying differential environmental standards as a source of “unfair” trade threatens to strengthen the environmental policy/trade policy links identified in the current analysis. Such legislation would make evidence of differential environmental standards directly admissible in support of petitions for relief under the unfair-trade statutes.
7. Maloney and McCormick (1982) show that often technology-based regulation accompanied by entry restrictions produces the same type of cartel-like gains associated with output regulation.
8. Buchanan and Tullock assumed that the industry was sufficiently small that there were no such factor-price effects, producing a horizontal long-run supply curve. But a horizontal supply curve is not consistent with positive foreign imports. Hence this modification of the Buchanan and Tullock assumptions is a necessary part of the internationalization of their model. Alternatively, an upward sloping long-run market supply curve might be a consequence of firms having different technologies, with all but marginal entrants experiencing positive profits. This case is not considered, however.
9. In general, of course, the scale at which the firm’s long-run average cost curve reaches a minimum may increase or decrease as factor prices rise and fall. While this information is not essential to the results, the details of the story are enhanced by working through each of these possibilities. It is well known in the case of technology-based pollution control that such regulation will not necessarily affect all firms identically. Leone (1977) has argued, for example, that the metal finishing industry saw a five-fold increase in the minimum efficient scale due to water quality standards (reported in Oster, 1982). Such a change clearly has important implications for market structure, and thus for trade, that are not addressed here.
10. While the analysis is carried out under the assumption that the country is large enough to effect its terms of trade, all of the results go through in the small country case. For a discussion of the adjustment process in the absence of a terms-of-trade effect see our original working paper (Leidy and Hoekman, 1991a), available upon request.
11. In what follows it is assumed that any potential revenues generated from a penalty tax become part of a general fund to be dispersed evenly across all segments of the economy.
12. It is noteworthy that had we eliminated the assumption of the constancy of the minimum effi-

cient scale under the factor-price effect, the conclusion that output regulation is inefficient remains, unless by chance the firm's MES declines exactly to the quota level selected by officials. This is highly improbable. Nevertheless, the extent of the inefficiency will depend to some degree on the change in a firm's MES.

13. Due to the factor-price effect and the terms-of-trade effect, domestic firms are able collectively to exercise both monopsony and monopoly power under the quantity regulation.
14. In practice, injury is the major necessary condition firms must satisfy in order to obtain import relief. Under U.S. trade laws, indicators of injury focus on industry "health" as reflected in the levels and trends of production, capacity utilization, market share, inventories, profits, import penetration, price underselling (i.e., the supply price offered by foreign firms is less than that of domestic import-competing firms), and employment. But not all of these indicators need to be effected and other indicators may also be invoked. Commissioners have a great deal of discretion in deciding which indicators to emphasize and which to downplay (Kaplan, 1991). Finger and Murray (1990: 39), in looking at the United States unfair trade cases, found that "in almost every unfair trade case that gets to a formal determination, the U.S. government finds that the foreigners are unfair – that the foreign merchandise has been dumped or subsidized. When the U.S. government turns down a petition for an import restriction it is almost always because the injury test is negative."
15. Article XIX of the GATT, the so-called *safeguards* provision, offers signatory nations an avenue to escape their GATT obligations and to erect protective barriers to trade under the condition that "product is being imported into the territory of that contracting party in such increased quantities and under such conditions as to cause or threaten *serious injury* to domestic producers in that territory" (Article XIX[1][a]). The action may continue "to the extent and for such time as may be necessary to prevent or remedy the injury" (Article XIX[1][b]). An additional avenue of protection is provided in Article VI of the GATT, supplementary provisions to Article VI and in the Agreement on Implementation of Article VI of the GATT (commonly known as the Anti-Dumping Code). Again, relief under this article is contingent on a finding of injury; specifically a finding of *material injury* or the threat of such is required. Material injury means "harm that is not inconsequential, immaterial, or unimportant" (Jameson, 1986: 522). This language is meant to convey the intention that material injury is established at a low threshold. The final avenue to protection is a so-called "grey area" measure in GATT parlance. Specifically, industries that are injured can use their rights under antidumping law and GATT Article XIX-conforming law to seek government assistance in negotiating a VER.
16. Under Section 201 of the Trade Act of 1974 (the U.S. escape clause), what had been a fairly demanding standard of causality was weakened substantially. Its predecessor, the Trade Expansion Act of 1962, required that a specific tariff concession under the General Agreement on Tariffs and Trade (GATT) be cited as causing serious injury, the "major cause" of which was import penetration. Currently, imports need be only a "substantial cause of serious injury, or the threat thereof," and no tariff concession need be identified as causing injury (Jackson, 1989: 161–165).
17. Had the analysis considered a domestic industry that is already highly concentrated and exercising substantial market power, neither form of pollution control may appear attractive. If, however, a monopolized sector saw sufficient value in shifting the ongoing expense of deterring entry to government regulators, the regulatory approach may then be supported in order to capture that prize.
18. Section 301 of the U.S. Trade Act enables domestic firms to allege "unjustifiable or unreasonable" trade actions by foreign governments that impose barriers to market access. If the accusation is supported by the case, special market-sharing arrangements may be negotiated with the foreign government. The European Community has a similar instrument in Regulation 2641/84. See Jackson (1989: 107–109).

19. See e.g., Hoekman and Leidy (1989) for references to the literature.
20. As mentioned above, the injury criteria established under escape-clause and unfair-trade legislation offer a great deal of discretion in evaluating the health of an industry. See, e.g., Morkre and Kruth (1990), and Jackson (1989). The principle value of injury for VER protection is that it helps to mobilize the political resources needed to induce protective action. That is, once an industry is entitled to protection under existing administrative rules (e.g., unfair trade laws), the prospect of negotiating a VER becomes more likely.
21. One way that firms might adjust their current profit figures during the protection-seeking stage is for them *voluntarily* to incur costs related to improving the environment. Examples might include the cleanup of past hazardous dump sites, initiating a new tree-planting program, etc. Such tactics would serve the dual purpose of winning the ongoing favor of their coalition partners (the environmentalists) while also enhancing their prospect of protection by concealing supranormal profits.
22. Labor and environmental groups often appear on the same side of an issue. One should not conclude, however, that environmentalists value labor issues for their own sake, nor that labor groups have a special affinity for the environment. Instead, as in the case that is evolving here, support for the same policy likely arises for reasons of direct self-interest. Labor groups and environmentalists, for example, have joined forces recently to oppose a U.S.-Mexico free-trade agreement that would expand Mexico's maquiladora program. Maquiladoras are export-oriented foreign-owned manufacturing firms located in Mexico just across the U.S. border that may import components duty free. Environmentalists are concerned about the air- and water-born pollution that may spill across the U.S. border under the less stringent Mexican standards, while labor groups are concerned with their displacement by low-cost labor.
23. See Hillman and Ursprung (1988) for a recent model of trade-policy formation that explicitly incorporates foreign interests. Also see the discussion in Hillman (1990).
24. Hillman and Ursprung (1988) argue that because VERs are a conciliatory trade policy, whereas tariffs come at the expense of foreign exporters, VERs tend to be chosen over tariffs whenever that policy choice is available. In the current model the political support for a VER is strengthened.
25. In a related vein, Reuter's (March 1991) recently reported that the European Environmental Bureau (EEB), a federation of 130 environmental groups, expressed their support for a European energy tax. The EEB's proposal, however, sets aside one-third of the tax revenues for spending on environmental policies at the E.C. and national levels.

References

- Banks, G. (1990). Australia's antidumping experience. *World Bank Working Paper*, WPS 551, December
- Buchanan, J.M. and Tullock G. (1975). Polluter's profits and political response: Direct controls versus taxes. *American Economic Review* 65: 139-147.
- Finger, J.M. and Murray, T. (1990). Policing unfair imports: The United States example. *Journal of World Trade* 24: 39-55
- General Agreement on Tariffs and Trade (GATT). (1989). Developments in the trading system. September 1988 - February 1989.
- General Agreement on Tariffs and Trade (GATT). (1990). *Trade policy review: The United States of America*, March.
- General Agreement on Tariffs and Trade (GATT). (1991). *Trade policy review: The European Community*, Volume 1, June.

- Harris, R. (1985). Why voluntary export restraints are 'voluntary'. *Canadian Journal of Economics* 18: 799–809.
- Herander, M.G. and Pupp, R.L. (1991). Firm participation in steel industry lobbying. *Economic Inquiry* 29: 134–147.
- Hillman, A.L. (1990). Protectionist policies as the regulation of international industry. *Public Choice* 67: 101–110.
- Hillman, A.L. and Ursprung, H.W. (1988). Domestic politics, foreign interests, and international trade policy. *American Economic Review* 78 (4): 729–745.
- Hoekman, B.M. and Leidy, M.P. (1989). Dumping, antidumping, and emergency protection. *Journal of World Trade* 23(5): 27–44.
- Jackson, J. (1989). *The World Trading System*. Cambridge, MA.: MIT Press.
- Jameson, P.W. (1986). Recent ITC practice regarding the material injury standard: A critique. *Law and Policy in International Business* 18(3): 517–577.
- Kaplan, S. (1991). Injury and causation in USITC antidumping determinations: Five recent views. In M. Tharakan (Ed.), *Policy implications of antidumping measures*. Amsterdam: North Holland.
- Leidy, M.P. and Hoekman, B.M. (1991a). 'Cleaning up' while cleaning up: Pollution abatement, interest groups and contingent trade policies. *Workshop On Trade and the Environment*, GATT Secretariat, Geneva, 10–11 June. Mimeo.
- Leidy, M.P. and Hoekman, B.M. (1991b). Spurious injury as indirect rent seeking: Free trade under the prospect of protection. *Economics and Politics* 3(1): 111–137.
- Leone, R. (1977). The real cost of regulation. *Harvard Business Review* (November–December): 57–66.
- Low, P. (1991). Trade measures and environmental quality: Implications for Mexico's exports. *Symposium on International Trade and the Environment*. International Economics Department, The World Bank, 21–22 November.
- Maloney, M.T. and McCormick, R.E. (1982). A positive theory of environmental quality regulation. *Journal of Law and Economics* 25: 99–123.
- Morkre, M.E. and Kruth, H.E. (1989). Determining whether dumped or subsidized imports injure domestic industries: International Trade Commission approach. *Contemporary Policy Issues* 7(3): 78–95.
- Olson, M. (1965). *The logic of collective action*. Harvard Economic Studies. Cambridge: Harvard University Press.
- Oster, S. (1982). The strategic use of regulatory investment by industry sub-groups. *Economic Inquiry* 20: 604–618.
- Stegemann, K. (1990). EC anti-dumping policy: Are price undertakings a legal substitute for illegal price fixing. *Weltwirtschaftliches Archiv* 126(2): 268–298.
- Tobey, J.A. (1990). The effects of domestic environmental policies on patterns of world trade: An empirical test. *Kyklos* 43(2): 191–209.
- United States International Trade Commission (USITC). (1989). Gray portland cement and cement clinker from Mexico. USITC Publication no. 2235, November.
- Yandle, B. (1989). *The political limits of environmental regulation*, New York: Quorum Books.