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TRADE AND THE ENVIRONMENT: DOES ENVIRONMENTAL DIVERSITY DETRACT FROM THE CASE FOR FREE TRADE?

T.N. Srinivasan
Yale University

Jagdish Bhagwati
Columbia University

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Abstract

The argument that fair trade or level playing fields constitute a pre-condition for free trade and that, therefore, harmonization of domestic policies across trading countries is necessary before free trade can be beneficial is becoming increasingly salient in political debate. Its deceptive policy appeal is nowhere stronger than in the area of environmental standards.

This paper reviews the factors that drive the demand for cross-country harmonization of standards by identifying and analyzing in detail the four main objections to diversity in standards: (i) lower standards (LS) in one country relative to its trading partner amount to implicit subsidization of its producers and provide them an unfair competitive advantage, (ii) free trade with a LS country threatens the maintenance of higher standards (HS) at home, (iii) LS are ethically inferior and (iv) in multilateral institutions LS countries could object to HS in other countries and by prevailing threaten their HS. Several analytical propositions are derived concerning optimal commercial and environmental policies under different circumstances when the environmental problem is purely domestic. The trade problems that differentially arise when the environmental problems are international (or "global"), i.e. they involve transborder externalities are sketched.

KEY WORDS: Free Trade, Environmental Standards, Diversity, Harmonization, Domestic and Transborder Externalities, Global Warming

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Introduction[*]

The potency of the contention that fair trade or level playing fields constitute a precondition for Free Trade and that, therefore, harmonization of domestic policies across trading countries is necessary before Free Trade can be embraced to one's advantage, should not be underestimated today. It is nowhere more manifest, and compelling in its policy appeal, than in the area of environmental standards.

Both the <u>general</u> view that cross-country intra-industry (CCII) harmonization of environmental standards is required if Free Trade is to be implemented, and the <u>specific</u> proposals currently in vogue to implement this view, are therefore in need of analytical scrutiny.[1] This is the task that we undertake primarily in the present paper.

Section I briefly reviews the factors that drive the demands for cross-country intra-industry harmonization of environmental standards and the specific proposals, in particular the countervailing of so-called "social dumping" when harmonization does not obtain but Free Trade does. Its main purpose, however, is to categorize the (four) main issues that arise as the "high standards" and

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[*]We have profited from the comments on an earlier draft by several Project participants, especially Ken Abbott, Christopher Bliss, Drussilla Brown, Alessandra Casella, Alan Deardorff, Robert Hudec, Al Klevorick, Brian Langille, Virginia Leary, Andre Sapir and John Wilson, at a Conference at the Minnesota Law School in July 1993 and at a Washington D.C. Conference in October 1994. The comments of Claude Barfield, Steve Charnowitz, Dan Esty, William Nordhaus, Susan Rose-Ackerman and Karl-Göran Mäler have been very helpful. While we take joint responsibility for the entire paper, the blame for any errors in the text must be assigned to Bhagwati and in the Appendix to Srinivasan!

[1]By CCII, we mean harmonization of standards within the <u>same</u> industry across different trading countries.

"low standards" countries engage in freer trade and contemplate consequences of the differences in their environmental standards when the pollution involved is purely domestic.

Section II sets forth several basic theoretical propositions (derived from the theoretical Appendix), concerning optimal commercial and environmental policies under different circumstances when the environmental problem is purely domestic. In light thereof, the basic legitimacy and desirability of free trade with diversity of domestic environmental standards is established. Also, a detailed examination of two (of the four) issues distinguished in Section I is offered: relating to the objections to diversity under free trade, reflecting fears of unfair trade and the loss of one's High Standards.

Section III considers the related but distinct problems raised by concerns with ethical preferences or "values" that result in objections to free trade with diverse standards.

Section IV addresses the concern that current institutional mechanisms for overseeing free trade, chiefly the GATT and its successor WTO, threaten High Standards by permitting successful challenges by Low Standards countries on diverse grounds reflecting mainly their market-disruption potential.

While these analyses concern the issues arising from purely domestic environmental problems, Section V concludes by sketching the trade problems that differentially arise when the environmental problems are international (or "global"), i.e. they involve transborder externalities.

I.   Demands for Cross-Country Intra-Industry Harmonization
of Environmental Standards: Categorizing the Issues
for Purely Domestic Environmental Problems

In reviewing and assessing the demands for CCII harmonization of environmental standards, it is customary now to make a distinction of analytical importance between (i) environmental problems that are intrinsically <u>domestic</u> in nature (though they may be "internationalised" for reasons we will discuss); and (ii) those that are intrinsically <u>international</u> in nature because they inherently involve "physical" spillovers across national borders.

Thus, if India pollutes a lake that is wholly within its borders, that is an intrinsically domestic question. If, however, she pollutes a river that flows into Bangladesh, that is an intrinsically international question. So are the well-known problems of acid rain, ozone layer depletion and global warming. These latter, intrinsically-international problems of the environment raise questions that interface with the trade questions both in common and in different ways from the former, intrinsically-domestic problems.

It has become commonplace among some environmentalists to assert that this distinction is of no consequence because the intrinsically-domestic environmental problems are increasingly seen to have transnational impacts. Science has shown, for instance, that aerosol sprays are not just an environmental nuisance where used; they endanger the planet! But the fact that science seems occasionally to turn local (and partial-equilibrium) environmental impacts into transnational (and general-equilibrium) impacts, is no proof that the former are an empty set. We should not be deterred therefore from using this important conceptual distinction.

A. <u>Objections to Diversity of Standards</u>

It would seem, at first glance, that at least the intrinsically-domestic environmental problems should be matters best left by governments to domestic

solutions and within domestic jurisdiction (although transnational, global "educational" and lobbying activities by environmental nongovernmental organisations, the NGOs, are compatible with this solution). Why should anyone object to the conduct of Free Trade with any country on the ground that her preferred environmental choices and solutions (by way of setting pollution standards and taxes) to intrinsically-domestic questions are unacceptable because they are incompatible with the case for (gains from) Free Trade? Yet, the fact is that they do.

And the objections are directed, not merely at Free Trade, but also at the institutional safeguards and practices, as at the GATT, which are designed to ensure the proper functioning of an open, multilateral trading system that embodies the principles of Free Trade. These objections take mainly four forms:

1. <u>Unfair Trade</u>: If you do something different, and especially if you do what appears to be less, concerning environment than I do in the same industry or sector, this is considered to be tantamount to lack of "level playing fields" and therefore amounts to "unfair trade" by you. Free Trade, according to this doctrine, is then unacceptable as it requires, as a precondition, "Fair Trade".[2]

2. <u>Losing Higher Standards</u>: Then again, the flip side of the "Fair Trade" argument is the environmentalists' fear that if Free Trade occurs with countries having "lower" environmental standards, no matter what the justification for this situation, the effect will be to lower their own standards. This will follow from the political pressure brought to bear on governments to lower standards to ensure the survival of their industry.

An associated argument is that capital will move to countries with lower standards, so that countries will engage in a "race to the bottom," each winding

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[2]This, of course, is the central issue addressed later in this paper.

up with lower standards than desired because standards are lowered to attract capital from each other.

3. <u>Conflicting Ethical Preferences</u>: Environmentalists also often want at times to impose their ethical preferences, considered "morally superior", on other nations. Free Trade in products that offend one's moral sense (either in themselves, or because of the way in which they are produced as in the use of purse-seine nets in catching tuna or the leghold traps in hunting for fur) is then considered objectionable because <u>either</u> trade in such products should be withheld so as to induce or coerce acceptance of such preferences <u>or</u> such trade should be abandoned, even if it has no effective consequence and might even hurt only oneself, simply because "one should have no truck with the devil."[3]

The former argument presumes higher morality in one's behalf, which should be spread to other nations with lower morality (and with corresponding lack of standards/laws therefore to reflect the higher morality). The latter argument seeks no such morally-imperial outreach; it simply wants no part in complicity with lower morality elsewhere via participating in gainful free trade with nations guilty of tolerating such lower morality. In either case, the diversity of standards is considered then to be incompatible with the pursuit of free trade.

4. <u>Institutional Vulnerability of High Standards to Countries with Low Standards Fearing Protectionism</u>: Then, finally, the environmentalists fear that they will lose their High Standards, not because market forces under free trade bias the <u>domestic</u> political equilibrium in favour of lower standards or generate

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[3]The suspension of trade generally, i.e. the use of trade "sanctions" (to promote human rights, for instance) is a related but different issue which we do not discuss in this paper in depth.

a race to the bottom[4], but because the current "institutional arrangements, at the GATT in particular, enable the Low Standards countries to object to, and threaten, the High Standards in other countries by claiming protectionist intent or consequences, for instance.[5]

B. The Political Salience of these Objections

Thus, just consider why the first argument concerning the <u>unfair trade</u> of lower CCII standards elsewhere has become such a politically salient issue today. While we turn to this argument in greater depth in Section II below, it should suffice to note here that the fear is that competition will be greater if a rival abroad faces lower burdens of environmental regulations and hence the argument follows that this competitive advantage enjoyed by one's foreign rivals is <u>illegitimate</u> and must be countervailed, much like dumping or subsidization is, or must be eliminated at the source.

Thus, Senator Boren, who introduced legislation in US Congress to countervail the "social dumping" allegedly resulting from lower standards abroad, proposed such a measure on the ground that[6]

> We can no longer stand idly by while some US manufacturers, such as the US carbon and steel alloy industry, spend as much as 250 percent more on environmental controls as a percentage of gross domestic product than do other countries...I see the <u>unfair advantage enjoyed by other nations exploiting the</u>

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[4]As in argument 2 above.

[5]The difficulties posed by the GATT, and now the WTO, for the environmentalists extend to GATT law, i.e. Dispute Settlement Panel findings, in regard to the ethical-preference issue as well. The general issue of GATT law on the entire range of relevant questions concerning the environment is addressed by Frieder Roessler in his paper for this Project.

[6]<u>International Pollution Deterrence Act of 1991</u>, Statement of Senator David L. Boren, Senate Finance Committee, October 25, 1991.

> environment and public health for economic gain when I
> look at many industries important to my own state of
> Oklahoma...

We will argue, in Section II, that environmental diversity is, contrary to these assertions, perfectly legitimate, that it can arise not merely because the environment is differently valued between countries in the sense that the utility function defined on income and pollution is not identical and homothetic, but also because of differences in endowments and technology across countries. Hence, the common presumption driving harmonization and (alternatively) "social-dumping"-countervailing demands, that others with different CCII standards are illegitimately and unfairly reducing their costs, is untenable.[7]

Nonetheless, these demands are part of a general shift to demands to harmonize a great, and possibly increasing, number of domestic policies: in labour standards, in technology policy etc. Why?[8]

With industries everywhere increasingly open to competition, thanks precisely to our postwar success in dismantling trade barriers, with multinationals spreading technology freely across countries through direct investments, and with capital more free than ever to move across countries, producers face now the prospect that their competitive advantage is fragile and that more industries than ever before are "footloose". There is therefore much more sensitivity to any advantage that one's rivals abroad may enjoy in world competition, and a propensity therefore to look over their shoulders to find

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[7]We will be considering several objections to this view, of course, before reaching this conclusion.

[8]The entire range of the factors (philosophical, economic and political) that are currently prompting the drive towards CCII harmonization is reviewed and synthesized in Bhagwati, "Demands to Reduce Domestic Diversity among Trading Nations," mimeo, Columbia, 1994, also prepared for this Project. See also the discussion in Daniel Esty, Greening the GATT, Institute for International Economics, Washington, D.C., 1994, pp. 108-114; 156-67.

reasons why their advantage is "unfair".

The notion of unfairness is also attractive to those who seek relief from international competition. If you go to your Congresswoman and ask for protection because the competition is tough, it is going to be difficult to get it. After all, many of them have been sufficiently educated, or perhaps brainwashed (depending on your point of view), into thinking that protection, while not a four-letter word, is not something you want to embrace if you aspire to anything like statesmanship. But if you go to her and say that your successful rival is playing by "unfair" rules, you are going to do better. In the United States, in particular, the "unfairness" notion can take you really far since the economic and social ethos reflects notions of fairness and equality of access (rather than success) more than anywhere else.

The fact that the United States also went through the "diminished giant" syndrome vis-a-vis the Pacific nations which fed her fear of consequent deindustrialization, also made the American politicians more susceptible during the 1980's to these "unfair trade" arguments from interested lobbies. The continuing dominance of the United States in setting the world's trading agenda powerfully reinforces, in turn, the trend towards "fair trade" and "level playing fields".

While the "unfair trade" argument for rejecting free trade with countries with different environmental standards is therefore part of the generic and more general demands for harmonization and level playing fields in world trade, environment (whose protection is legitimately a virtue in itself) brings to this trend yet added arguments with perhaps even more powerful appeal. Chief among them is the fear, leading to the second argument listed above, that competition with the imports and exports in third markets from countries with lower standards

will put pressure on domestic industries, triggering political action by them to lower standards <u>down</u> to the levels abroad.

Believing (possibly with justification) that US Vice President Quayle's Competitiveness Council was doing precisely this under the Bush administration, the environmental NGOs in the United States, and their friends in the European Community and elsewhere, came to see this as a real threat to their goals if free trade is embraced and if harmonization <u>up</u> is not imposed simultaneously by coercion on foreign countries, especially the poor ones. As Walter Russell Mead put it in a much cited article in <u>Harper's Magazine</u>:[9]

> Either the progressive systems of the advanced industrial countries will spread into the developing world or the Third World will move north. Either Mexican wages will move up or American wages will move down. Environmentalists, labor unions, consumer groups, and human-rights groups must go global--just as corporations have done.

This concern reflects at the global level the debate within the EC: the fear that the Common Market's free trade and free capital flows will lead to harmonization <u>down</u> of standards "from below" and the efforts by many in consequence to impose harmonization at a <u>higher</u> level of standards "from the top".

Finally, the demands for CCII harmonization are fed also by the feared adverse effects of free trade and capital flows on the real wages of workers: an issue that became important in the last Presidential election in the United States. The Clinton campaign focused, not just on the failure of the Bush administration to revive the economy. It also made much of the so-called "structural" problem which is defined by the stagnation of real wages of the unskilled workers during the 1980's. At least one of the candidates for

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[9]"Bushism, Found: A Second-Term Agenda Hidden in Trade Agreements," <u>Harper's Magazine</u>, September 1992, p. 44.

explaining this phenomenon has been the integration of the world economy and the competition in consequence with poor countries with abundant unskilled labour.

We doubt the importance of this explanation[10] but it has powerful appeal. The attempts at globalizing the higher environmental and labour standards, with the latter coming uncomfortably close to attempts at also raising wages in the industrial sectors of the poor countries on human-rights and labour-rights grounds, can be seen in fact as indirect ways of trying to reduce the perceived threat to real wages of the unskilled in rich countries from free trade with (and capital outflows to) the poor countries.

We may remark that, if the argument about the adverse effect of trade on wages of the unskilled is really bought, we are back to the old concerns that free trade with the poor countries will truly act like free immigration from them: the immigration would directly depress workers' wages, free trade would indirectly do so. Interestingly, in the animated British debate prior to the passage of the 1905 Immigration Act, the free traders were also free immigrationists, and the protectionists were also for restrictions on immigration. Immigration was even described as Free Trade in Paupers![11]

Hence, the growing sentiment that Free Trade with the poor countries will increasingly depress rich countries' real wages should eventually lead to, not just palliatives like the imposition of harmonized-up environmental and labour standards, and attempts at restricting capital outflows (synonymous in politics

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[10]Cf. J. Bhagwati and M. Kosters (ed.), <u>Trade and Wages</u>, American Enterprise Institute, Washington D.C., 1994. Several trade economists share this skeptical view; see the most recent review in Jagdish Bhagwati, "Trade and Wages: Choosing Among Alternative Explanations," <u>Federal Reserve Bank of New York Economic Policy Review</u>, January 1995.

[11]Cf. J. Bhagwati, "Free Traders and Free Immigrationists: Friends or Foes?," Russell Sage Foundation, New York, <u>mimeo</u>, 1992.

with "losing jobs") to them by way of Direct Foreign Investment. We predict that we will also witness increasing attempts at encouraging population control in these countries.[12]

II. The Case for Free Trade with Diversity of Environmental Standards

We now argue (based on the theoretical analysis in the Appendix) that the case for Free Trade, with diversity of environmental standards across countries, is essentially robust. We then proceed to address specifically the two issues distinguished at the beginning of this paper: unfair trade and fear of loss of higher standards.

At the outset, note that "standards" may refer either to the general principles such as the "polluter pays" principle; or they may be defined as the precise tax rates that are levied on the polluter. In the political debate over differential standards, and the demands for CCII harmonization or for "eco-dumping" duties when harmonization does not obtain, the complaints are evidently against lower pollution tax rates or charges: e.g. that widget manufacturers are taxed, for the effluents that they discharge, at lower tax rates in Mexico than in the U.S. That defines therefore the sense in which we will discuss CCII harmonization below, unless otherwise specified.

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[12]The prominent US role in the UN Conference on Population in Cairo in September 1994 may be explained, at least in part, in this fashion.

A. <u>The Basic Theoretical Presumptions</u>

Distinguish again between the two major cases: where the pollution is domestic and where it is global (and spills over across national borders). Then, the following basic theoretical conclusions follow (Appendix), defining welfare in the conventional economic sense.

<u>Domestic Pollution</u>:

1. For a small country (with no influence on her terms of trade), free trade remains the best policy, with its own pollution being taxed as required, and regardless of whether the other country fixes its own pollution.[13] Where abatement is feasible with spending, there is no case for a subsidy.[14]

2. For a small country, if its own pollution is not taxed optimally, free trade will generally cease to be optimal. Also, it follows equally from the postwar theory of commercial policy under distortions that free trade, with domestic distortions, can immiserize.[15]

3. For a large country, free trade is not an optimal policy but an optimal tariff is (on the assumption that there is no retaliation), while its domestic pollution is directly fixed through a pollution tax. As is well known, such an optimal solution for the large country is not Pareto Optimal for the world

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[13]Cf. Section IA, Appendix.

[14]Cf. Section IB, Appendix.

[15]Thus, any unfixed domestic distortion, such as failure to have optimal pollution taxes or adequate institutional arrangements to prevent the overuse of commons, for instance, can lead to immiseration under free trade vis-a-vis autarky. Cf. the review in Bhagwati, "The Generalized Theory of Distortions and Welfare," in J. Bhagwati, R. Jones, R. Mundell and J. Vanek (eds.), <u>Trade, Balance of Payments and Growth</u>, North Holland: Amsterdam, 1971. Also see the recent writings of Chichilinsky, Lloyd etc. on this question.

economy.[16]

4. With free trade between two countries (small or large) and optimal pollution taxes with each country, global Pareto Optimality will follow.

5. However, generally speaking, the optimal pollution taxes (in a globally Pareto Optimal solution) will <u>not</u> be equal across the countries: <u>diversity in these tax rates will be both natural and appropriate, hence also "legitimate."</u>

6. Imposing one country's pollution tax rates on another will then be to create an <u>inefficient</u>, globally Pareto sub-optimal solution.

7. Such harmonization, or "straitjacketing" to be more accurate, of the other country's standards towards one's own will also necessarily harm the other country. Thus, a lower standard country, forced to "harmonize up," will be harmed.

8. Whether such "harmonization up" will benefit the higher standard country is, however, problematic: it may help or harm.[17] The presumption that it will necessarily help is false.

<u>Global Pollution</u>

1. When global pollution occurs, the globally Pareto Optimal solution will be characterized by free trade and by pollution taxes in each country producing the pollution, these taxes being different except in singular circumstances.[18]

2. The globally Pareto Optimal solution is not necessarily equitable. To

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[16]Cf. Section IIB, Appendix.

[17]Cf. the contribution of D. Brown, A. Deardorff and R. Stern to this Project. The answer eventually depends on how the offer curve of the lower standard country shifts with the harmonization up.

[18]The conditions under which tax harmonization will occur in a globally Pareto Optimal solution are discussed in Section V of Appendix.

be equitable as well, the market solution must be generally supplemented by (lump sum) transfers.[19]

3. A small country, taking the foreign terms of trade, tariffs and pollution abatement as given, will continue to find free trade to be its optimal policy. It will combine this with optimal pollution taxes and abatement addressed to its own pollution.[20] But such Cournot behavior makes little sense: it is more likely that each small country will "free ride" on pollution taxes and abatement and reproduce the "tragedy of the commons" in the use of the common property resource (i.e. the target of the pollution).

4. A large country, indulging in Cournot behavior with respect to the foreign tariffs and pollution abatement expenditures, will use an optimal tariff, not free trade, to maximize its welfare. The Cournot behavior, however, will yield a Nash equilibrium which is not Pareto Optimal.[21]

B. Examining the Objections: Unfair Trade and Feared Loss of High Standards

In light of these propositions, we can now proceed to examine the four issues distinguished in Section I, especially the first one relating to "unfair trade" and the associated agitation for countervailing duties against "eco-dumping" in the absence of CCII harmonization.

1. Does Diversity of Environmental Standards Imply that Low Standard Countries are Indulging in "Unfair Trade"?

The theoretical analysis clearly shows that the basic presumption is that different countries will have legitimate diversity of CCII environmental

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[19]Cf. Section VI, Appendix.

[20]Cf. Section III, Appendix.

[21]Cf. Section IV, Appendix.

taxes/standards. This diversity will arise even if they share the same "utility function" with associated tradeoffs between income and different types of pollution: the diverse tax rates can come from differences in technology and in endowments in the broadest sense (so as to include weather, demography, geography, inherited abatement policies etc.).[22]

As it happens, there is also no compelling reason to think that every society must share the same utility function. It is perfectly appropriate, and not an indulgence of wilful "sovereignty," for Mexico to value clean water higher than clean air, compared to the US, because a dollar expended on the former instead of the latter will produce greater health gains for Mexicans whereas it would be the reverse for the US.

The overall trade-off between income and (some generalized index of) pollution will also be different between societies: income may be more valuable at the margin when societies are poor and poverty takes people close to malnutrition than when societies are rich and malnutrition results from overindulgence rather than deprivation. A clear example again is the emphasis on saving dolphins rather than increasing productivity in tuna fishing in the US and the contrasting emphasis on ameliorating poverty instead in Mexico by using purse-seine nets that kill dolphins while fishing for tuna.

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[22]We should also state the related but distinct proposition that diversity of standards across countries will be observed as the norm in competitive equilibrium and, besides, will change with trade and hence income (as implicit, of course, in our analysis above and in the Appendix). This proposition is derived in the context of a model where standards are characterised as having some of the characteristics of "public goods" in each of two trading countries and enter directly the utility functions in these countries, by Alessandra Casella in her paper prepared for this project (mimeo, June 1994, Columbia University). The focus of our analysis instead is on the issue of CCII harmonization and on the question of standards-diversity when welfare-maximization is being pursued (and may require departure from a laissez-faire competitive equilibrium).

The notion therefore that the diversity of CCII pollution standards/taxes is illegitimate and constitutes "unfair trade" or "unfair competition" is itself illegitimate. So is the consequent demand, following from this notion, that CCII harmonization is necessary for "free and fair trade"[23], in absence of which CCII differences must be treated as eco-dumping and be countervailed.

In fact, since the effect of such policies would be to force (at least some) countries to harmonize up their preferred lower CCII standards, the consequence would equally be to inflict a welfare loss on them. We might even argue then that, while we advocate free trade traditionally, with diversity of domestic standards, on the presumption that voluntary trade is beneficial (relative to autarky) for every trading nation, and hence it is a mutual-gain policy prescription, the opposite is true for CCII harmonization to be superimposed on free trade[24]: it will amount to immiseration of the trading nation whose standards are being "distorted" up.

This basic case against CCII harmonization can be challenged on grounds which we now examine and mainly find unpersuasive.

Objection (1): Competing with foreign firms that do not bear equal burdens is unfair: This competitiveness argument is common, especially on the part of some business groups and also some unions. As notions of unfairness are expressed by them, and as implied by proposed legislation to equalize burdens, this is certainly a strongly-felt belief. Underlying it is the sense of outrage

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[23]This phrase has passed even into the latest Annual Report of the Council of Economic Advisers as part of a definition of "competitiveness" which Paul Krugman has castigated in a recent article in Foreign Affairs.

[24]If the country is large, then we must substitute an optimal tariff for free trade in this sentence.

that one's ability to hold on to an industry is compromised by the fact that one's rivals abroad do not carry the same burdens.

The contrary arguments, which reject this competitiveness argument, are as follows:

(i) The fact that others abroad do not carry the same burdens is symmetric with the fact that these countries have different wages, capital costs, skills, infrastructure, weather, and what have you: all of which lead to differential advantages of production and trade competitiveness. Diversity of environmental tax burdens is thus no ground for complaints of unfairness.

(ii) If we lose competitive advantage because we put a larger negative value on a certain kind of pollution whereas others do not is simply the flip side of the differential valuations. To object to that implication of the differential valuation is to object to the differential valuation itself, and hence to our own larger negative valuation. To see this clearly, think only of a closed economy without trade. If we were to tax pollution by an industry in such an economy, its implication would be precisely that this industry would shrink: it loses competitive advantage vis-a-vis other industries in our own country. To object to that shrinking is to object to the negative valuation being put on the pollution. There is therefore nothing "unfair" from this perspective, if our industry shrinks because we put Higher Standards on our industry and others, who value the pollution less, choose Lower Standards.

(iii) Besides, attributing competitive disadvantage to differential pollution tax burdens in the fashion of CCII comparisons for individual industries confuses absolute with comparative advantage. Thus, for example, in a two-industry world, if both industries abroad have lower pollution tax rates than at home, both will not contract at home. Rather, the industry with the

<u>comparatively</u> higher tax rate will.

<u>Objection (2): Others' Lower Standards do not reflect correctly their</u>

<u>citizens' Preferences</u>: In turn, some environmentalist critics argue that the

foreign governments do not reflect their citizens' "true preferences" and

therefore in relation to these true preferences which would lead to higher

valuation of pollution, the governments have unduly low standards, implying

"unfair" competition.

There are counter arguments, in turn:

(i) Similar arguments, about failure of "political markets," apply to most

countries, including High Standard countries, and to many areas of governmental

regulation. It is commonly argued that the earliest legislations mandated "too

high" environmental standards that went beyond the "optimal" levels because costs

were ignored and virtually limitless gains were assumed from the regulations.

Now, in the US for sure, cost-benefit considerations are steadily being

introduced into the legislative process; and even the judiciary seems to have

turned increasingly to this type of analysis which then tends to weaken the bite

of the standards legislatively laid down.[25]

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[25]Thus, recent judicial determinations in the US have undermined the
Public Law that had grown up earlier with strong support for environmentalism
not reflective of costs and benefits, for the possibility of "takings" in the
public environmental interest and in regard to standing and judicial review.
The earlier Public Law literature is well represented by Abram Chayes, "The
Role of the Judge in Public Law Litigation," 89, <u>Harvard Law Review</u>, 1976, and
Ronald Dworkin, <u>Law's Empire</u>, 1986; and it is also well developed in India, in
regard to standing (for NGOs etc.) in particular, in the public interest
litigation developed in the Supreme Court. The reverse movement in the US can
be seen from cases such as *Lucas v. South Carolina Coastal Council* and *Nollan
v. California Coastal Commission* on takings, *Lujan v. National Wildlife
Federation* and *Lujan v. Defenders of Wildlife* on standing, and *Competitive
Enterprise Institute v. National High way Traffic Safety Administration* and
Corrosion Proof Fittings v. EPA on judicial review. The last area has, in
particular, seen the increased judicial scrutiny of the cost-benefit aspects

Since arguments can be made persuasively that all legislation strays from the optimal because of political market failures endemic to any political system, however democratic, objecting only to Lower environmental Standards as reflecting such political market failure is to be arbitrary. It is also to open a Pandora's Box, in favour of the more powerful countries which can then throw stones at others' glass houses while building a fortress around their own.

(ii) Again, even if one argues that the decisions made undemocratically by a dictatorship or an oligarchy are vitiated, there is no reason to believe that the Higher Standards being pursued by a foreign country representing the competitive interests of a foreign industry or labour union in an industry are what a more democratic process would yield. The correct approach should rather be to encourage a shift to more democratic procedures in arriving at social and economic legislation, including environmental policy. Process, not outcomes (especially outcomes sought by self-serving groups elsewhere), is what we should aim at in countries that lack democratic ways.[26]

2.   <u>Should High Standards Countries Force Low Standards Countries into Upward Harmonization to Preserve Their High Standards?</u>

There are two forms of political-economy-theoretic arguments for CCII harmonization, however, which take the High Standards themselves to be at risk under Free Trade. Consider each, in turn.

(1) The less common argument is simply that, under pressure of competition

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of executive actions implementing legislated regulation. The US Congress is itself currently in the midst of an intense battle over precisely this question, with the New-Democrat Clinton administration much more open to cost-benefit analysis than the older Democrats.

[26]The question of democracy is addressed, from a different perspective, in Section IV C below.

from the Low Standards countries, the political equilibrium will shift in favour of those who oppose High Standards.

But this argument suffers from the fallacy of misplaced concreteness. Intensified international competition, _no matter why it arises_, will put such pressure on governments to reduce business costs. Why pick on Lower Standards elsewhere, even assuming that they are contributing to the problem?

(2) Far more worrisome to environmentalists than the simple effects of trade competition are the fears that "capital and jobs" will move to countries with Lower Standards, triggering a "race to the bottom" (or, as John Wilson has remarked, more accurately a race _towards_ the bottom) where countries lower their standards in an inter-jurisdictional contest, below what some or all would like in order to attract capital and jobs. So, a cooperative solution that would _coordinate_ the setting of standards would generally speaking be a better solution. This coordinated solution, however, need not be characterized by harmonization at the level of the standards in the High Standards country or, in fact, by harmonization at all.

What we have here is a valid theoretical argument.[27] It is stated with analytical rigour as follows: independent governments (or jurisdictions), setting public policy for environmental protection (via taxes and abatement) and competing for investment by reducing environmental standards in a world of mobile and scarce capital, will set these standards at levels that are "too low," i.e. that are inefficient for the world economy (composed of the nations whose governments compete in this way). The inefficiency is to be construed as usual:

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[27]An in-depth review and synthesis of the theoretical literature on this question is provided by John Wilson in his paper for the Project. We therefore only sketch here the nature of the argument. Cf. John Wilson, "Capital Mobility and Environmental Standards: Is There a Theoretical Basis for a Race to the Bottom?", mimeo, June 1994.

alternative policies exist which make at least one jurisdiction better off and no other jurisdiction worse off. In short, we have non-Pareto-optimal Cournot-Nash equilibria (as we have already had in earlier analysis in this paper), characterised by lower environmental standards than in the cooperative equilibrium.

To see the matter more clearly, consider the following analysis based on arbitrarily-specified, conventional pay-off matrices reflecting the incomes yielded (in brackets) when different pollution abatement expenditures are undertaken at levels O and A (i.e. zero and a finite amount) by the two countries, Home and Foreign. The abatement expenditures are assumed to be a monotonic and increasing function of environmental standards.

There are thus four possible combinations of home and foreign expenditures on abatement. The pay-offs associated with each combination (with the first (resp. second) component being the pay-off of the Home (resp. foreign) jurisdiction are given by the following pay-off matrix:

		Foreign Expenditure	
		O	A
Home	O	(-2,-2)	(2,-3)
Expenditure	A	(-3, 2)	(1, 1)

It is easily seen that each jurisdiction has a dominant strategy, viz. to spend nothing, because by doing so it maximises its pay-off whether the other jurisdiction spends nothing or A. Yet, compared to this individually-rational dominant-strategy Nash equilibrium with both jurisdictions spending nothing on abatement, the collectively rational strategy of each spending A will yield a

<u>higher</u> pay-off for <u>both</u>.

Of course jurisdictional competition need not necessarily lead to such a "prisoner's dilemma" type of Nash equilibrium. For example, if the pay-off matrix is as follows,

$$(-4, -4) \qquad (2, -3)$$
$$(-3, 2) \qquad (1, 1)$$

(O,A) and (A,O), so that one jurisdiction spends nothing while the other spends A, are "pure strategy" Nash equilibria.

In both cases above, the Nash equilibrium is characterised by a "race to the bottom" in the sense that the pollution abatement expenditure is zero for at least one jurisdiction. But this need not be so, as consideration of the following pay-off matrix shows. Thus, consider:

$$(-2, -2) \qquad (2, -3)$$
$$(-3, 2) \qquad (3, 3)$$

and it is readily seen that we have a unique Nash equilibrium where each jurisdiction spends A on abatement.

Of course, these are arbitrarily-constructed pay-off matrices and we need to ground them in underlying models of economies to see whether such outcomes are sensible within them. As argued by John Wilson, this can indeed be done to show that the "race to the bottom" need not occur, and that even a "race to the top" might.[28]

The question that now arises is whether this theoretical possibility of the "race to the bottom" is an empirical possibility of any significance. Leaving

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[28]Wilson, ibid.

out the question as to whether the parametric evidence shows that the noncooperative Nash equilibrium, including the special case of the Prisoners' Dilemma, will be characterized by significantly lower environmental standards relative to the cooperative equilibrium, we may ask whether there is any empirical support anyway for the propositions that (1) capital is in fact responsive to the differences in environmental standards and (2) different countries/jurisdictions actually play the game then of competitive lowering of standards to attract capital. Without both these phenomena holding in a significant fashion in reality, the "race to the bottom" could be a theoretical curiosum.

As it happens, systematic evidence is available for the former proposition alone, but the finding is that the proposition is not supported by the studies to date: at best, there is very weak evidence in favour of interjurisdictional mobility in response to CCII differences in environmental standards. Arik Levinson, who has reviewed the available evidence thoroughly, concludes[29]:

> "The conclusion of the literature on domestic location decisions, like that on international locations, is that there is not a lot of evidence that environmental regulations deter investment. In fact, most authors are careful to note the limitations of their research, and to place caveats on their counter-intuitive conclusions that stringent regulations do not deter plants nor do lax regulations attract them. But the literature as a whole presents fairly compelling evidence that this is true."

Of course, there are many ways to interpret this finding of an extremely weak effect of CCII differences in environmental standards on industry location. There are three classes of explanation for the finding: (1) that the differences

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[29]Cf. Arik Levinson's paper for the Project, "Environmental Regulations and Industry Location: International and Domestic Evidence," 1994. Levinson looks at both the international and the domestic (e.g. inter-state locational decisions in the US since states have different standards) evidence, having himself produced first rate work in the latter genre.

in standards are not significant and are outweighed by other factors that affect locational decisions; (2) that exploiting differences in standards is not a good strategy relative to not exploiting them, and (3) that lower standards may paradoxically even repel, instead of attracting, direct foreign investment.

Explanation (1):

(i) The obvious, and most cited, explanation is that the standards differences are a small factor in the location decision because they are dominated by other more important factors such as tax breaks, infrastructure facilities and proximity to markets.[30]

(ii) Industry location may be seen to be more sensitive to CCII differences in standards if executive enforcement and voters-cum-NGO activism are taken into account as well. The de facto differences in standards may then be more acute than assumed in many studies.[31]

Explanation (2):

(iii) Another (static) explanation is that when multi-plant firms, such as most multinationals, invest in different locations, they tend to work uniformly with the most stringent standards they face among these locations, to reduce the transaction costs involved in making diverse choices.[32]

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[30]Cf. Levinson, ibid., citing, for instance, work by Baumol and Oates, Low, etc.

[31]Levinson, ibid., cites work by Hamilton, Baldwin and Welles, and Walter on voter participation, in particular.

[32]Levinson, ibid., cites this explanation from the work of Gladwin and Welles, and Knögden. The argument requires that the transaction costs of diverse choices are large enough to offset the foregone advantage of meeting each standard only as necessary and not beyond. Besides, it does not apply to single-plant firms, or to subsidiaries which act as more or less independent

(iv) Another (dynamic) explanation is that, faced with divergent standards, firms extrapolate that all countries are on an escalator to similar higher standards and therefore decide that it is best to be "ahead of the curve" in the currently-lower-standards countries and to conform to higher standards even though not required. In this case, again, convergence of standards adhered to will emerge, as in the preceding (static) argument, and differences in (required) standards across different jurisdictions will become moot, showing little relationship in practice between such differences and industry-location choices.[33]

(v) Another (dynamic) explanation is that firms may argue that the higher-standards countries are the ones that innovate, that many innovations lead to embodied technical change, that such innovations are likely to be embodied (only) in recent vintages of capital goods that already meet the higher standards, and therefore the important benefit of significant technical change will accrue to a firm only insofar as processes and capital goods using higher-standards technology at present are being used by it.

Explanation (3):

(vi) An ingenious explanation of a different analytical variety is that multinationals are discouraged from investing in low-standards countries because local firms have comparative advantage in using pollution-intensive technology that conforms to lower standards. Hence, Direct Foreign Investment (DFI) is likely to be less, not more, when CCII differences in standards are greater

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decision makers.

[33]Again, the argument requires that the advantages of being "ahead of the curve" offset the advantages of conforming to lower standards now and adapting or retooling later when the higher standards emerge.

between countries![34]

A possible underlying explanation is that firms in the higher-standard countries are likely to scrap their earlier-vintage lower-standard equipment and sell it to the lower-standard countries for the local firms to use, instead of undertaking DFI themselves with such discontinued technology. In short, arm's length sale of lower-standards-conforming equipment to local manufacturers may be preferred to DFI with such equipment, because the local firms are more likely to be able to work with this technology than the multinationals that have moved on to higher-standards-conforming newer-vintage technology--engineering and maintenance know-how tend to get specific to the technology one is working with.

Most of these suggested explanations only reinforce the view that CCII differences in standards, as a factor prompting a "race to the bottom," should not be a source of concern.[35] And this conclusion is only reinforced when one contemplates the fact that there is almost no evidence for the proposition that, regardless of the capital-sensitivity to CCII differences in environmental standards, different countries and jurisdictions nonetheless actually compete for capital by sacrificing environmental standards[36] (as against doing so _via_ tax breaks, infrastructure construction, tariff policy, preferential trading arrangements such as NAFTA where Mexico sought DFI-diversion towards itself through preferential access to the US market, etc.).

The fuss that is made nonetheless over the "race to the bottom" in the

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[34]Cf. Levinson, _ibid_., citing Pearson.

[35]E.g. the (static and dynamic) arguments underlying Explanation (2) above imply that CCII differences will be disregarded by multinationals in any event, with their plant-design choice gravitating towards the higher-standards-conforming technology everywhere and therefore locational choices becoming independent of CCII differences in standards.

[36]Cf. Levinson, _ibid_.

political arena, as happened in the NAFTA negotiations, can then be explained either as a reaction to ill-founded fears or as a cynical ploy to advance environmental or protectionist lobbying interests.

3. Other Arguments and an Alternative Proposal

Therefore, both the concerns with "unfair trade" (Question 1) and "threat to high standards" (Question 2), as the reason to push for CCII harmonization as a precondition for Free Trade or alternatively to invoke eco-dumping duties to countervail CCII differences in pollution tax burdens, are not compelling. It is best to take, as a general policy, the option of mutual recognition of standards, recognizing the fact that diversity of CCII standards is basically a natural and appropriate phenomenon, consistent with Free Trade and the consequent gains from trade for all.

(i) Protectionist Capture: The wisdom of this policy conclusion is reinforced by contemplating the certain protectionist consequences of doing otherwise. Thus, consider what an eco-dumping procedure, supplementing our normal anti-dumping (AD) procedure, would do. We presume that the eco-dumping procedure would calculate the subsidy implied by lower standards and proceed to levy a countervailing duty unless the foreign costs were raised by the estimated amount, with the option that the duty would be lifted as and when foreign standards were suitably raised and the costs of foreign firms demonstrably raised by the calculated amount.

It is well-known that AD actions have become the favored policy instrument of protectionists today. Their desirability from the viewpoint of protectionists derives form the fact that, unlike safeguard actions (under Section 201 of US law and Article XIX of the GATT), AD actions are selective: they can target down to

the level of the firm, not just a specific foreign country! Compared to pre-set tariffs, besides, they are also <u>elastic</u>: the duties will be set at rates that are decided during litigation and therefore are a function of litigation expenditure, impartiality of the procedures governing the litigation, and the bilateral game played between the complainants and the targets.

Besides, in playing the game, the rules are set in favour of litigants, relative to what the rules would be if the objective of AD actions was truly to avoid economically-defined predation. In particular, the usual game of reconstructing true costs, against which prices charged are compared to determine dumping margins, has been played to the hilt to get these margins to be as high as possible in litigation. But, as was the case with the former centrally planned economies whose own prices and costs were dismissed as illegitimate, these reconstructed "true" costs can be arbitrary, leading the procedure to effective protectionist capture.

Such capture would surely be the case also with eco-dumping duties since the eco-dumping margins would have to be <u>necessarily</u> estimated on the basis of reconstructed costs of meeting the pollution standards of the complainant country. The EPA of the US, for example, would be estimating the cost of implementing US standards in Rio or in Jakarta, so as to arrive at the implicit (<u>not</u> actual and observable) subsidy that must be countervailed through an eco-dumping duty by the US, just as the Department of Commerce does for conventional dumping. There is no reason to doubt that the inherently-arbitrary outcomes would be similarly obliging to local lobbies.[37]

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[37]To our knowledge, the countervailing of <u>implicit</u> subsidies would be a novel principle in GATT law on subsidies as well, and is not to be contemplated with equanimity in view of its explosive potential, which is probably why the concept of remedy used by the proponents of harmonization of standards is that of AD rather than of CVD (countervailing duties on foreign

(ii) <u>Infinite Shadow Prices</u>? Thus, we conclude that the demands for eco-dumping duties to countervail CCII differences in environmental standards and pollution tax and abatement burdens are both illogical (in denying the legitimacy of such diversity) and unwise (in being inherently susceptible to protectionist capture). We have considered, at different stages of our analysis, several reasons why nonetheless these demands appear reasonable and why they have political salience. We must conclude, however, by adding one more reason, which probably has a counterpart also in the case of labour standards, which springs from the nature of our basic argument for the legitimacy of diversity in CCII standards.

Recall our argument that the different shadow prices for pollution that can, and generally will, emerge among different countries, implying differential rather than harmonized environmental taxes and standards, are "natural" for us to contemplate and accept. But suppose that we were putting an infinite price on any and every specific pollution, regardless of its level, small or large. Then, these differences would disappear. We believe that many environmentalists have tended to approach their specific environmental concerns with an implicit infinite shadow price, thus leading to demands for harmonization, though this is increasingly less so. This is well-illustrated by the following remarks in Cropper and Oates' excellent recent review of Environmental Economics:[38]

> The economist's view had--to the dismay of the profession--little impact on the initial surge of legislation for the control of pollution. In fact, the cornerstones of federal environmental policy in the United States, the Amendments to the Clean Air Act in 1970 and to the Clean Water Act in 1972, explicitly prohibited the

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subsidies).

[38]Cf. Maureen Cropper and Wallace Oates, "Environmental Economics: A Survey," <u>Journal of Economic Literature</u>, Vol. XXX, June 1992, pp. 675-740, pp. 675-676.

weighing of benefits against costs in the setting of environmental standards. The former directed the Environmental Protection Agency to set maximum limitations on pollutant concentrations in the atmosphere "to protect the public health": the latter set as an objective the "elimination of the discharge of <u>all</u> [our emphasis] pollutants into the navigable waters by 1985."[1] [Although standards were to be set solely on the basis of health criteria, the 1970 Amendments to the Clean Air Act did include economic feasibility among its guidelines for setting source-specific standards. Roger Noll has suggested that the later 1977 Amendments were, in fact, more "anti-economic" than any that went before. See Matthew McCubbins. Roger Noll, and Barry Weingast (1989) for a careful analysis of this legislation.]

The evolution of environmental policy, both in the U.S. and elsewhere, has inevitably brought economic issues to the fore: environmental regulation has necessarily involved costs--and the question of how far and how fast to push for pollution control in light of these costs has entered into the public debate. Under Executive Order 12291 issued in 1981, many proposed environmental measures have been subjected to a benefit-cost test. In addition, some more recent pieces of environmental legislation, notably the Toxic Substances Control Act (TSCA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FI-FRA), call for weighing benefits against costs in the setting of standards.

Once therefore we get away from the limited, perhaps almost-empty, set of infinite-shadow-price environmental objectives, we are then back also to the legitimacy of diversity of standards among trading nations as the natural and reasonable way to look at the issue.[39]

(iii) <u>An Alternative Proposal</u>: We should thus reject the calls for "CCII harmonization or countervailing duties on eco-dumping." But the political salience of such calls remains a major problem. One may well ask then: are there any "second-best' approaches, short of the eco-dumping and CCII harmonization proposals, that may address some of the political concerns at least economic cost? In that spirit, we would suggest the following proposal for consideration.

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[39]Questions raised by "values"-related differences in CCII standards are considered separately below.

Proposal: Extend Domestic Standards in High Standards Countries to their Firms
in Low Standards Countries, Unilaterally or Through OECD Code: In our view, the
political salience of the harmful demands for eco-dumping duties and CCII
harmonization is greatest when plants are closed by one's own multinationals and
shifted to other countries. The actual shifting of location, and the associated
loss of jobs in that plant, magnify greatly the fear of the "race to the bottom"
and of the "impossibility" of competing against low standards countries.
Similarly, when investment by one's own firms is seen to go to specific countries
which happen to have lower standards, the resentment gets to be focussed readily
against those countries and their standards. However, when jobs are lost simply
because of trade competition, it is much harder to locate one's resentment and
fear on one specific foreign country and its policies as a source of unfair
competition.[40] Hence, a second-best proposal could well be to address this
particular fear, however unfounded and often illogical, of outmigration of plants
and investment by one's firms abroad in low standards countries.

The proposal is to adapt the Sullivan Principles approach to the problem
at hand. Under Sullivan, US firms in South Africa were urged to adopt US
practices, not the South African apartheid ways, in their operations. If this
principle that US firms in Mexico be subject to US environmental policies
(choosing the desired ones from the many that obtain across different states in
this federal country) were adopted by US legislation, that would automatically
remove whatever incentive there was to move because of environmental burden

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[40]This, of course, does not apply equally to trade in highly
differentiated products like autos where one can get fixated on specific
countries, e.g. Japan.

differences.[41]

This proposal that one's firms abroad behave as if they were at home--do in Rome as you do in New York, not as Romans do--can be either legislated unilaterally by one High Standard country or by a multilateral binding Treaty among different High Standard countries. Again, it may be reduced to an exhortation, just as Sullivan Principles were, by single countries in isolation or by several as through a nonbinding but ethos-defining and policy-encouraging OECD Code.

The disadvantage of this proposal, of course, is that it does violate the diversity-is-legitimate rule whose desirability was discussed above. Investment flows, like investment of one's own funds and production and trade therefrom, should reflect this diversity. It reduces, therefore, the efficiency gains from a freer flow of cross-country investments today. But if environmental tax burden differences are not all that different, or do not figure prominently in firms' locational decisions, as the empirical literature seems to stress,[42] the efficiency costs of this proposal could also be minimal while the gains in allaying fears and therefore moderating the demand for bad proposals could be very large indeed.

Yet another objection may focus on intra-OECD differences in High Standards. Since there are differences among the OECD countries in CCII environmental tax burdens in specific industries for specific pollutions, this Proposal would lead to "horizontal inequity" among the OECD firms in third countries. If the British burden is higher than the French, British firms would

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[41]See Bhagwati, "American Rules, Mexican Jobs," _The New York Times_, March 24, 1993.

[42]Recall our analysis, based on Arik Levinson's review, _ibid_.

face a bigger burden in Mexico than the French firms. But then such differences already exist among firms abroad since tax practices among the OECD countries on taxation of firms abroad are not harmonized in many respects.[43] Interestingly, the problem of horizontal equity has come up in relation also to the demands of the poor countries (that often find it difficult to enforce import restrictions effectively) that the domestic restrictions on hazardous products be automatically extended to exports by every country. That would put firms in the countries with greater restrictions at an economic disadvantage. But agreement has now been reached to disregard the problem.

Other problems may arise: (i) monitoring of one's firms in a foreign country may be difficult; and (ii) the countries with Lower Standards may object on grounds of "national sovereignty." Neither argument may be compelling. It is unlikely that a developing country would object to foreign firms doing better by its citizens in regard to environmental standards (that it itself cannot afford to impose, given its own priorities, on its own firms). Equally, it would then assist in monitoring the foreign firms.

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[43]One of the important reasons for such nonharmonization (documented by Joel Slemrod in his paper for the Project) is that horizontal equity among firms from different countries abroad can conflict with the desire to have horizontal equity among one's firms at home and one's firms abroad. This problem comes up quite directly in regard to personal income taxation where the US practice is to tax on basis of citizenship while the practice elsewhere is to tax on basis of residence. The former ensures horizontal equity between US citizens at home and abroad but, given the residence-based taxation practice of other nations, leads to lack of horizontal equity between, say, US and French citizens in Manila or New Delhi where US citizens must continue to pay US income taxes (subject to some exemptions) while the French citizens do not have to pay French income taxes. The questions raised by the US practice of exercising income tax jurisdiction on its citizens abroad, through the citizenship rather than residence nexus, have been extensively studied by modern economists cognizant of the extensive international personal mobility today. Cf. Jagdish Bhagwati and John Wilson (eds.), Income Taxation and International Personal Mobility, MIT Press: Cambridge, Mass., 1991.

III. <u>The Question of Ethical Preferences</u>

So far, we have considered only those demands for harmonization of cross-national intra-industry standards that arise because of considerations centered on "unfair trade" and the fear that one's standards would be endangered if competitiveness is reduced because of lower standards abroad.

However, we must recognize that, for some environmentalists, the desire to spread one's ethical values to others also leads to demands for harmonization, especially of production processes. Thus, opponents in the US of purse-seine fishing of tuna, which kills dolphins alongside and cruelly, would like to see the suspension of trade in Mexican tuna so as to get the Mexicans to accept the US restrictions on such fishing. Of course, some of the agitation proceeds from environmentalists who would find it morally reprehensible to trade in products whose harvesting has cruelly abused nature or a preferred species. But a main impulse is simply the old, morality-driven desire to spread the values to which one subscribes, trade suspension of access to one's market being justified by a consequentialist ethic rather than a categorical imperative. Consider these two arguments in reverse order.

A. <u>Spreading Ethical Preferences to Others</u>

We think that GATT-sanctioning of the use of unilateral <u>state</u> action to suspend other countries' trade access, or (in GATT-defined parlance) their trading rights under the GATT "treaty", unless one's choice of ethical concerns is adopted by others through implicit harmonization in one's direction, is

inappropriate for several reasons.[44]

(1) The values so sought to be imposed are often not at the level of "human rights" such as the massacres perpetuated on one's population or apartheid. They are "lesser" values and idiosyncratic in the sense of being closely culture-bound rather than reflective of basic and universal aspects of human nature. Thus, Americans are particularly touched by dolphins being caught cruelly in purse-seine nets in fishing tuna. But we wonder when we see on television an interview with the man who brought this to national attention by filming the dolphins in distress: he is, we think, eating fish in the wilds. If Americans have their dolphins, the Indians have their sacred cows. Animal rights activists object to our slaughter houses. Others may see in Robert Redford's magical moments when he fishes in <u>A River Runs Through It</u>, not his rapport with nature, but his violation of it with cruelty to the fish that twists and turns, writhing in agony.

The culture-specificity of these values, and hence their lack of salience to other economically weaker nations on whom they are sought to be imposed, creates then the inevitable sense that the use of trade sanctions to impose them is simply an act of unjustified moral militancy that is itself ethically offensive. This view gains further credibility when the "values" being pushed on others are actually at the expense of more fundamental values: e.g. Americans would prefer to protect dolphins at the expense of Mexican prosperity (through the use of more productive purse-seine nets) that would reduce Mexican poverty, putting dolphins ahead of Mexicans. The Mexican reaction may then well be

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[44]Insofar as it involves suspension of trade access by a country for products that are produced by processes that are disapproved of, it is also GATT-<u>illegal</u> as per the first Tuna-Dolphin Panel finding, and as discussed in Section IV.

similar to that of American liberals if they had to confront the moral militancy

of Pat Robertson allied with Genghis Khan.

(2) And then there is the objection that comes from the lack of symmetry

in imposing one's idiosyncratic moral preferences on others, as between the

strong and the weak nations. Thus, even some NGOs in poor countries, whose

natural tendency would be to ally with NGOs in rich countries, have expressed

resentment and opposition to the "eco-imperialism" implied when the strong

nations use trade power to force their preferred values on the weaker nations but

the equally autonomous values of the weaker nations cannot be forced upon the

stronger nations thus.[45] These NGOs deny that the NGOs of the strong nations

have monopoly on virtue.

Thus, we may quote the most radical of today's pro-environment NGOs in

India on this issue, in an editorial on "Trade Control is not a fair instrument"

in the country's leading environmental magazine, Down to Earth:[46]

> ... in the current world reality trade is used as an instrument
> entirely by northern countries to discipline environmentally errant
> nations. Surely, if India or Kenya were to threaten to stop trade
> with USA, it would hardly affect the latter. But the fact of the
> matter is that it is the northern countries that have the greatest
> impact on the world's environment and yet, their past record in
> their own countries...is nothing to be proud of...the instruments
> that need to be devised for...a system of global discipline must be
> fair and equally accessible to all. Reinforcing [through unilateral
> muscle-flexing by rich-country NGOs and their governments via trade
> sanctions] the power that already flows in a northern direction
> cannot improve the world.

(3) The GATT Report on Trade and the Environment last year drew attention,

not to this disturbing asymmetry of effective enforceability of the "values" of

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[45]This "break in the ranks" occurs when there are diverse priorities at
stake. Among single-issue NGOs, as on child labour, we can expect more
international solidarity, of course.

[46]August 15, 1992, p. 4. The magazine is published in New Delhi and
enjoys a large circulation.

the North versus the equally autonomous "values" of the South owing to differential power. Rather, eschewing the problem of asymmetric power and instead assuming that each nation can play the same game with equal effectiveness, it advanced the "slippery slope" scenario: that, if any country could suspend another's trading access in products produced in an "unacceptable" fashion (when no international physical spillovers could be cited as a possible justification and only "values" were at stake), the result was likely to be a proliferation of trade restrictions without any discipline or restraint:[47]

> ... it is difficult to think of a way to effectively contain the cross-border assertion of priorities. If governments suspend the trading rights of other nations because they unilaterally assert that their environmental priorities [i.e. "values"] are superior to those of others, then the same approach can be employed on any number of grounds. Protectionists would welcome such unilateralism. They could exploit it to create embargoes, special import duties and quotas against rivals by enacting national legislation that unilaterally defines environmental agendas that other countries [with different "values"] are likely to find unacceptable.
> Changing the world trading rules so as to permit the suspension of trading rights of others by individual contracting parties, based simply on the unilateral and extra-territorial assertion of their environmental priorities, undoubtedly would be difficult because many countries would consider such a change to be a big step down a slippery slope.

(4) These views concerning unilateralism to impose one's values on others acquire yet greater cogency when we recognize that there are alternative ways in which one's values can be indulged and propagated.

(i) Most important, if your values are good, as with now-widely-shared human rights, they will spread because of their intrinsic appeal. Mahatma Gandhi's idea of nonviolence spread far and wide, not because India had economic power to force it on others or because Western NGOs urged trade sanctions against their own nations to canvass its adoption. It spread because of its inherent and

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[47]Cf. GATT, <u>Annual Report</u>, 1991, Geneva: Switzerland, pp. 33-34.

powerful moral attractiveness. The Spanish Inquisition should not be necessary to spread Christianity; quite appropriately, the Pope has no troops.

Thus, consider the following argument, advanced by one of the ablest advocates of environmentalist causes, Steve Charnovitz, in defense of biodiversity:

> There are important medical reasons to preserve biodiversity. But there are also important moral reasons. Geopolitical boundaries should not override the word of God who directed Noah to take two of every living creature into the Ark "to keep them alive with you."[48]

We must confess that, as two Hindus among nearly 900 million on this planet, we find this moral argument culture-specific rather than universal in its appeal. It is unlikely that it can spread because of its intrinsic moral merit; should it then be forced on others anyway?

(ii) Moreover, alternative private options are often available to propagate your particular ethical preferences if greater activism is desired. Nothing today proscribes NGOs in United States, for example, from financing NGOs in Mexico into bringing pressure on their government to change its attitude on purse-seine nets, thus changing the balance of forces in Mexico away from more productive tuna fishing that benefits Mexico economically and towards "dolphin-safe" fishing that benefits the dolphins in the Eastern Pacific instead.

(iii) Then again, voluntary private boycotts can be a potent instrument as well. A long-standing tradition permits such private boycotts in pluralistic democracies. Provided labeling requirements that permit consumers to make the choices in the marketplace between, say, "dolphin-safe" and "dolphin-unsafe" tuna are allowed, these boycotts will provide an option to "dolphin-agitated"

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[48]Cf. Steve Charnovitz, "GATT and the Environment: Examining the Issues," _International Environment Affairs_, vol. 4(3), Summer 1992, p. 211. This is an interesting, thought-provoking and lucidly-argued but ultimately unpersuasive critique of the GATT Report, _ibid_, and on the Dolphin-Tuna Panel Report.

activists.[49]

This option is not the same as proscription, of course. Environmentalists will thus note that labeling may be ineffective because "consumers may act _rationally_ in calculating that their individual purchase of environmentally unfriendly products...would have only a negligible effect" and that "consumers may act _irrationally_" by not appreciating the ecological importance of avoiding the consumption of the offending product.[50]

Then again, there are bound to be substantive disagreements about the nature and extent of labeling: "dolphin-unsafe" labeling may be objected to as too pejorative and "Tuna from Mexico" may be considered too weak. The problems that have plagued the labeling issue for a variety of reasons within the United States itself, both in terms of its design and its uniformity versus diversity among the different States of the Union, will not go away at the international level: if anything, they will be more fiercely debated.[51]

But, against these factors that weaken the efficacy of the voluntary-boycott prescription, we must put contrary arguments. Indeed, one might argue that, if enough people desire to attach opprobrium to "dolphin-safe" tuna producers to put their own "dolphin-safe" labels, requiring only state monitoring and prosecution of false labelling by the dolphin-unsafe tuna producers. After all, Body Shop has done pretty well in this way.

Moreover, boycotts in rich countries with big markets, even when leaky, can

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[49]Cf. GATT Report, _ibid_, pp. 33-34.

[50]Cf. Charnovitz, _ibid_., p. 213.

[51]The recently activated GATT Group on Environment Measures and International Trade has among its tasks the examination of the trade effects of packaging and labeling requirements intended to protect the environment. It has been examining the packaging and labeling questions in depth.

carry disproportionate clout, and the funds at the disposal of some of the environmental NGOs and certainly in their aggregate (as demonstrated when they carry enormously expensive full-page ads simultaneously in newspapers such as The New York Times, The Washington Post and The Financial Times) are evidently large relative to what the poor countries they occasionally target can muster in defense of their own practices and preferences.[52]

One might also add that the passionate zeal with which these boycotts are advocated, and the occasional willingness to portray those that disagree as morally defective, add to their potency as weapons.

A critic may well suggest that we contradict ourselves if we allow private boycotts but would disallow governmental prohibitions, since governments are only "agents" of the citizens. Strictly speaking, this is not true: there is considerable debate in the social science literature on the "principal-agent" relationship and on how poor an agent the government can be. But, that complexity aside, we do distinguish all the time in democracies between state and private actions, permitting far greater latitude to the latter. Thus, when the Harvard lawyer Alan Dershowitz agitated successfully to have the Boston Symphony Orchestra cancel Vanessa Redgrave's appearance because of her politically incorrect views, he was considered well within his rights to disgrace himself; but the United States government proscribing her appearance would have been a disgrace to the nation and in violation of our tradition and would surely have been struck down by our courts. And this asymmetry between what private parties

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[52]It is not just that the budgets of the poor countries are financially strapped. It is also that few Parliaments would sanction expenditure of the huge amounts of money that are needed to take out ads in the Western papers and to hire lobbyists in Washington. The only democratic exception seems to be Mexico which had, at the end of 1991, as many as 71 lobbying firms in US registered as "foreign agents" acting on behalf of NAFTA.

and public governments may do is likely to be accepted by most democratic governments today.

(5) So far, we have proceeded on the assumption that unilateral suspension of trade access to spread one's ethical preferences is effective and have argued essentially that it is unwise and undesirable. But a legitimate critique may well be that such action is likely to be ineffective in its objective, thus disrupting trade to no advantage.

It is hard to settle this question on theoretical grounds alone. The cost imposed on the nation whose offending trade is suspended may or may not be significant enough to matter in its calculation; the cost itself will reflect the importance of the embargoed market relative to others, ability to evade etc. But it is surely improbable that this cost in any specific instance will be compelling.[53]

The matter becomes less problematic if the cost is greatly increased by other punishments and inducements: Mexican compliance with nonuse of purse-seine nets, despite the favorable Tuna-Dolphin Panel ruling, was secured by convincing President Salinas that it would be hard to pass NAFTA in Congress otherwise. These added instruments, however, will be available only to large and powerful nations, chiefly the United States, making the argument's relevance fairly negligible for most nations.

The sanctioning, as WTO-consistent, of unilateral, governmental withdrawal of market access from other nations for their offending products simply with a view to coercing them into accepting one's idiosyncratic "value" preferences seems therefore to be undesirable on several grounds, chiefly:

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[53]We are talking here of unilateral actions. Where a substantial plurilateral or multilateral consensus is achieved on a suspension of trade access, the cost imposed will generally be higher.

* it is essentially intransitive, with each nation able to say its specific values are better than another's; it thus creates the potential for chaotic spread of trade restrictions based on self-righteousness, compounded by a likely encouragement of the process by protectionists;

* in its reliance on force rather than persuasion, it is inherently asymmetric towards poor nations with less economic clout, implying that the economically strong nations are also morally superior and their governments must not be constrained by multilateral rules from coercing others into conversion; and

* there are alternative private options that can be used to create a multilateral consensus of shared values based not on the sword but on precept, example and even pressure _via_ boycotts.[54]

Even though some of the environmental NGOs in the United States, in particular, and perhaps elsewhere too, are skeptical or scornful of them, it is noteworthy that these arguments are spreading within the international community. Thus, Steve Charnovitz has recently complained:[55]

> The GATT's campaign against unilateralism is having some impact. Earlier this year, the UN Conference on Trade and Development adopted a resolution stating that 'Unilateral actions to deal with environmental challenges outside the jurisdiction of the importing country should be avoided.' The Rio Declaration repeats this statement.

We have little doubt, however, that unilateral actions designed simply to spread "lesser values" to others through the use of suspension of trading access are

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[54]Jessica Matthews has argued that sometimes unilateralism has enabled the U.S. to provide leadership on important issues. But, even if this were true, it would not justify unilateralism. After all, just because dictatorships may sometimes be beneficial, we would not permit them and renounce our loyalty to democracy.

[55]Charnovitz, _ibid_, pp. 206-207.

unwise. We are therefore only delighted that this view is gaining ground.

B. Rejecting Trade in "Defiled" Products

Suppose, however, that your intention in unilaterally denying Mexico access to the US market is not to change Mexican fishing of tuna in a "Dolphin-safe" direction, but simply to avoid eating a "defiled" product that offends your moral values.[56] Should you then be forced into consuming Mexican tuna? That would seem a tall order to many.

But there is an answer to this objection. Nothing in current or prospective GATT rules forces you (quite correctly) into this offensive option. For, you could certainly compensate the country whose trading rights (i.e. access to your market) are being denied or suspended by _either_ offering other concessions _or_ (in the odd manner of GATT procedures) having the other country withdraw some "equivalent" concessions of her own to you _or_, (in a manner advocated by some), through cash compensation for the gains from trade lost by the other country.

Confronted by this argument, some environmentalists are offended: why should we have to pay for our principles? The answer is: that is a small price to pay if the alternative (of unilateralism) has the many drawbacks which were noted by us already. If it is right in the Christian tradition to buy

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[56]So, you are not a "consequentialist" but one who has an "absolute" moral value. You may not expect to change Mexican behavior; you may even be hurting only yourself. But you may be doing what you think duty or virtue compels. It is worth noting, however, that one does not have to deny Mexico access to the US market to avoid eating a "defiled product." After all, by not eating any tuna whatsoever and by directing political action at boycotts or education instead of seeking official embargoes, one can adversely hurt the market for Mexican tuna as well. As noted earlier, the market pressure induced by such an action could also lead Mexican fishermen to abandon dolphin-unsafe fishing methods in order to regain lost markets.

indulgences to pay for one's vice, perhaps one should not object to a proposal to pay for one's virtue: at least, the former is for personal gain, the latter (if you accept our arguments) for social gain.[57] Besides, the "payment" is not in cash but in compensation in the form of reductions of other trade barriers against the foreign country to offset the enactment of the trade barrier against its offending export (or a retaliatory raising of trade barriers by the foreign country). Such payment, in fact, should work in the direction of moving resources away from the offending foreign activity, thus reinforcing the case for using such a policy option.

Charnovitz also appeals to "original intent" to argue that the original signatories to the GATT, and earlier practice in some cases, permitted exceptions to market access based on extra-jurisdictional exercise of "values" in cases such as the prohibited US landing and sale of US sponges from the Gulf of Mexico gathered by "certain harmful methods [such as] diving or using a diving apparatus."[58] We are assured by academic legal experts on the GATT however that the GATT's "original intent" is not unambiguously inferred in this as in many other instances.

John Jackson, one of the leading authorities on GATT law, has thus argued that:[59]

> It has been argued [by Charnovitz] that the drafting history of the
> GATT would lead to an interpretation of Article XX that would permit

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[57]There is, of course, a "moral hazard" problem: countries may become deliberately sinful to be bribed into virtue. But we doubt this is likely to be a serious problem since the compensation in practice is likely to continue to be in form of other trade concessions in lieu of the one withdrawn.

[58]Ibid., pp. 204-205.

[59]Cf. John Jackson, "World Trade Rules and Environmental Policies: Convergence or Conflict?", Washington and Lee Law Review, vol. 49(4), Fall 1992, pp. 1241-1242.

governments to take a variety of environmental measures and justify them under the general exceptions of GATT. While this view is interesting, and the research is apparently thorough, it is not entirely persuasive and overlooks important issues of treaty interpretation. Under typical international law, elaborated by the Vienna Convention on the Law of Treaties, preparatory work history is an ancillary means of interpreting treaties. In the context of interpreting the GATT, we have more than forty years of practice since the origin of GATT, and we also have some very important policy questions...Thus, unlike certain schools of thought concerning United States Supreme Court interpretation of the United States Constitution, it is this author's view that one cannot rely too heavily on the original drafting history.

In any event, the liberal environmentalists who would ordinarily oppose the appointments of "original intent" judges on the Supreme Court should not endorse this juridical approach in seeking to prevent the GATT from pursuing (what we have argued are) sensible interpretations of its laws on environmental issues.

C. Dealing with Ethical Preferences

Where does this analysis leave us? Based on it, as also on arguments produced immediately below concerning the way GATT deals with objections by Contracting Parties to processes of production (as distinct from products themselves) used by other Contracting Parties, we think that the following recommendations have merit in case of ethics-based objections to providing market access:

Unilateralism

* Unilateral suspension of trading access for ethical-preference-based reasons should not be sanctioned by the WTO; and

* such unilateral suspensions, where desired, should be "paid for" by other, equivalent trade concessions.

Plurilateralism/Multilateralism

Where the ethical preference is embodied in a plurilateral (i.e. multi-

nation) treaty signed by many nations, we need to distinguish between two major cases:

1. Plurilateral treaties concerning an ethical preference, as on preventing the production of chickens in batteries or injecting cattle with hormones for instance, may be signed by enough nations to enable a WTO waiver; in this case, the compatibility of the plurilateral treaty and the WTO is assured.

2. Where this is not so, and the number of nations signing the ethical-preference-embodying treaty falls short of the required WTO waiver majority, then the conflict can lead to problems. In particular:

* <u>Products</u>: Where the plurilateral treaty simply provides for <u>suspension of trade access</u> for the offending products--such as ivory or tigers or whales--there is no difficulty in enforcing such a ban as long, of course, as the ban extends in a nondiscriminatory fashion to both foreign and domestic supply.[60]

Where, however, the signatory nations seek to impose <u>trade sanctions</u> (i.e. trade disruption of products other than the one in dispute), as a punishment aimed at securing compliance, the consensus appears to be that such sanctions would be GATT-inconsistent.[61] In that case, our solution would be to treat these sanctions as indeed so and instead to encourage nations to use other instrumentalities (of the kind discussed above, e.g. suasion, NGO activities) to

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[60]This is argued in the next Section. It may however be useful to clarify the matter so as to eliminate any ambiguities and doubts in the matter.

[61]Section 301 actions aimed at securing new trade concessions, rather than at securing compliance with treaty-defined trade objections, fall into this class of problems, of course. On their GATT-inconsistency, see Jagdish Bhagwati and Hugh Patrick (eds.), <u>Aggressive Unilateralism</u>, Michigan University Press: Ann Arbor, 1991, and especially the contributions by Hudec and Bhagwati in the volume.

secure the necessary acceptance of the ideas by a plurality of WTO Contracting Parties sufficient to obtain a waiver. This is indeed the procedure that has been used to undertake trade embargoes in matters such as <u>apartheid</u> where South Africa, despite being a GATT member, was embargoed under multilateralism-based UN procedures that would have procured equally a GATT waiver.

* <u>Processes</u>: The GATT would appear to proscribe the suspension of market access to other Contracting Parties in products whose manufacture or production is objected to by the importing Contracting Party. In our view, as developed in the next Section, this is a desirable proscription. If, therefore, it is desired that such suspension of market access be undertaken in any event--as was the case with the proscription of hormone-fed beef by the EC--then we would recommend that the suspension be "paid for" by compensatory trade concessions elsewhere, exactly as in the case of unilateral trade access suspensions discussed above.

IV. <u>Institutional Vulnerability of High Standards to Objections by Low Standards Countries: GATT's Threat to Environmental Autonomy</u>

We turn finally to the question of the threats seen by many environmentalists to their High Standards (aimed at domestic regulation) by GATT procedures that enable Low Standards countries to question, and (if successful) to undermine, these High Standards. We must ask: are the environmentalists legitimately worried about the roadblocks that current and prospective GATT rules can pose for environmental regulations and standards aimed entirely at domestic production and consumption, matters which are conventionally and properly within domestic jurisdiction?

Now, as long as these rules are applied without discrimination between

domestic and foreign suppliers and among different foreign suppliers, there is really little that GATT rules can do to prevent a country from doing anything that it wants to do. For domestic conservation, safety and health reasons, a contracting party of the GATT can even undertake discriminatory, selectively-targeted trade-restraining action, subject to safeguards, under Articles XX(b) and XX(g).[62]

Thus, if you insist on safety-belts or air bags in cars, you can impose them on cars as long as both imports from all sources and domestic production are symmetrically treated. So also for requiring catalytic converters to reduce environmentally harmful emissions.

A. The Problem of Processes

The most significant and contentious conceptual question arises when you have a rule that says that consumption (from both domestic and foreign sources) of a product will be restricted if the product is produced, using a process you disapprove of. Objecting to a process used in a foreign (or, strictly, nondomestic) jurisdiction is, under GATT rulings, not acceptable. There are two types of such process-related problems that we might distinguish:

(i) where the process used is objected to because of "values": e.g. purse seine nets or leghold traps; and

(ii) where the process used is objected to because it creates cross-border physical spillovers and hence a global pollution problem: e.g. acid rain or

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[62]These questions are addressed with far greater authority by Frieder Rosseler, Legal Counsellor to the GATT, in his contribution to this Project, op.cit. Also see the papers by Robert Hudec and Henry Farber, and by Amy Porges, the former on the broader legal issues and the latter on European Community law.

global warming.[63]

GATT law, as currently interpreted, forbids the use of trade restrictions for <u>both</u> classes of objections.   For the first class of actions, this proscription seems to us justified, in light of our discussion in Section III.

The presence of cross-border physical spillovers, whose analysis we sketch only briefly in Section V, raises more legitimate worries about altogether ruling out process-related trade restraints, and appropriate changes in GATT law will be necessary in this class of cases where it seems evidently inappropriate to prevent nations from <u>any</u> use of trade restraints to limit the physical harm being imposed on them by other nations whose trade accentuates this harm.   Such use must, however, be regulated in a way that ensures symmetry of rights, equity and efficiency.   Devising appropriate procedures and rules to regulate the use of such trade restraints in the context of global environmental problems is a challenge for the architects of the new GATT system.

B.   <u>Products</u>

It would appear however that the GATT rules should cause no problems for the environmentalists (except for the process-related issues) when only purely domestic environmental problems are at issue.   Thus, the GATT Report argues that:[64]

Under GATT's rules, governments can employ many different measures

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[63]Nearly all cases can be fitted into one or both of these categories. Thus, if chickens are produced in batteries, this may be objected to as cruel, fitting it into category (i).   If you overfish in the Commons to which I have access, that fits into category (ii).   If you use your forests in an "unsustainable" way, I may object to it because I think that is bad per se, i.e. category (i), or because it affects global warming and hence me, i.e. category (ii), or because of both reasons.

[64]GATT Report, <u>ibid</u>., pp. 22-23.

to protect and improve the local environment. Thus, sales taxes on products that can create pollution (those containing chloroflurocarbons, for example), deposit refund schemes for recyclable waste (bottles, scrap cars), or favourable tax treatment of environmentally friendly products (lead-free gasoline, solar panels for home heating) and other non-discriminatory measures ensuring a pattern of domestic consumption that minimizes pollution would not normally be open to challenge.

There is also nothing in the GATT that prevents contracting parties from taxing or regulating domestic producers who engage in polluting activities--even to the extent of prohibiting the production and sale of particular goods. For instance, ceilings on air pollution levels, and levies on companies that discharge pollutants into lakes and rivers, are fully consistent with GATT rules.

In certain cases, even a measure taken for environmental protection purposes which would otherwise violate GATT obligations not to discriminate may be permitted under Article XX of the GATT. The narrowly-defined exceptions in Article XX permit a contracting party to place health, safety or domestic resource conservation goals ahead of non-discrimination, but only when certain conditions are fulfilled. In general, these conditions ensure that a trade measure is necessary for the achievement of such goals--and that these goals are not used as a pretext for reducing competition from imports.

GATT rules, therefore, place essentially no constraints on a country's right to protect its own environment against damage from either domestic production or the consumption of domestically produced or imported products. Generally speaking, a country can do anything to imports or exports that it does to its own products, and it can do anything it considers necessary to its own production processes.

Alas, that is not the end of the matter for the environmentalists. For, as the GATT Report suggests, even if a regulation or a standard were set in an apparently nondiscriminatory fashion, it is perfectly possible that:

* in reality, its intention is to discriminate against imports rather than to reach the stated (environmental or other) objective; and

* in practice, even if the intention is truly to reach the stated goal, the choice from different ways to reach that goal may have been in favour of a regulation or standard that effectively discriminates most, rather than least, against imports.

Then again, especially when safety and health standards are set (as with

phytosanitary standards), there have been increasing demands for "scientific tests" as a precondition for the imposition of such standards, so as again to make these palatable to other trading nations who might see their resulting loss of markets as otherwise unreasonable.

These are perhaps the most contentious issues today where the trading interests see the reasonableness of current and prospective GATT procedures designed to ensure as much freedom of access to markets as possible whereas the environmental interests see in the same procedures an unreasonable bias against themselves. In all these areas, the GATT permits challenges to be mounted by contracting parties to be mediated by dispute settlement Panels and for codes and rules that define how the Panels might adjudicate these disputes. We will say a little about each of these issues.[65]

1. The Intention Issue:

Economists have long recognized the intention issue. Thus, the classic instance we regale our students with relates to Gottfried Haberler's example of the provision in the German tariff, dating from 1902 and valid decades later, which was clearly meant to apply to Switzerland and Austria, relating to "brown

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[65]The GATT law on this general question, and its relatively more environmentally-friendly nature relative to the inter-state "Dormant Clause" doctrine in the United States, are the subject of the penetrating analysis by Daniel Farber and Robert Hudec in their paper (mimeo, 12 September 1994, University of Minnesota) for this project. They distinguish between the "facially-discriminatory" and the "facially-neutral" (but nonetheless discriminatory, whether "indirectly" and "incidentally" or otherwise) regulations, analyzing how GATT and US jurisprudence apply to each of these in regard to their implications for trade that lead to litigation.

That the GATT law is essentially more environmentally-friendly was borne out also by the GATT panel finding in the EU versus the United States case on US fuel conservation measures in September 1994, which upheld much of the U.S. law as consistent with the GATT, even when the conflict seemed compelling prima facie.

or dappled cows reared at a level of at least 300 meters above the sea and passing at least one month in every summer at a height of at least 800 metres."[66]

Within the environmental field, a fine example where the United States was the aggrieved party is provided by the Canadian province Ontario's 10% tax on beer cans but not bottles, on environmental grounds. Even if the United States authorities did not challenge the objective of restricting the use of cans,[67] they could legitimately note that the law was likely to have been motivated by the desire to discriminate against foreign beer supplies who (unlike local rivals) predominantly used cans rather than bottles, combined tellingly with the fact that the use of cans for other products such as soups and juices (where Ontario producers would have been affected) was not proscribed.[68]

It is hard to see how a good, open trading system cannot permit member countries to examine the bona fides of environmental (and other) regulations in this way. Surely, given the ease with which regulations and standards can be misused for protectionist purposes, some mechanism must exist for grievances to be aired and adjudicated. The GATT dispute settlement mechanism, albeit improved

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[66]Gottfried Haberler, Theory of International Trade, William Hodge & Co., Ltd.: London, p. 339. Haberler cited this amusing case as an instance of the manner in which countries evaded the obligation of the Most Favoured Nation clause.

[67]As argued below, a challenge to recycling and packaging requirements cannot be ruled out on the ground that alternative, less-trade-restricting measures are possible and should be undertaken.

[68]From the economic perspective, a domestic firm acting strategically may also be able to persuade its government to enact higher standards whose effect is to make the cost of entry by foreign rivals, which must tool up to meet these higher standards, disproportionately higher (since the domestic firm has a significantly higher proportion of its sales in its own market). Higher standards in this case would then be in reality a protectionist technique for making market access by foreign firms more expensive.

as contemplated in the Uruguay Round and further in the direction of greater transparency, is sufficiently objective and neutral between contracting parties to provide a better method for dealing with the problem than national procedures which would always be suspect as having been influenced by national political considerations.

2. The Alternative-Measures Issue

There are more difficult issues, however, when the question of the use of alternative ways of reaching an environmental objective is raised.

It seems totally sensible that, if alternative ways of meeting an environmental objective exist, a contracting party should be asked to choose one that infringes least on another's trading rights. In fact, this view seems embodied in GATT's Article XX(b) which allows even discriminatory trade restrictions against another contracting party if the measures are deemed "necessary" to protect human, animal or plant life or health.

Two different views of the matter, however, can be taken in interpreting what is "necessary." Thus, in the case of Thailand's restrictions on importation and internal taxes on cigarettes, the GATT Panel decided that Thailand should use the "least GATT-inconsistent" measure to achieve its domestic objective. Then again, one could consider a "least-trade-restrictiveness" test which, of course, will not necessarily coincide with the "least-GATT-inconsistency" test.[69]

Aside from the greater difficulty of determining ordinally what greater and lesser GATT-consistency means, the economic superiority of the test that requires least damage to trade is manifest. In fact, the December 1991 Dunkel Draft of the proposed Uruguay Round treaty adopted the latter test: it is built into the

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[69]Cf. Charnovitz., ibid., pp. 213-214. For the Thailand case, see GATT, Basic Instruments and Selected Documents, 375/200 (Geneva, Switzerland). Also see Esty, Greening the GATT, op. cit., page 48.

Standards Code and also into the Sanitary and Phytosanitary Decision. It is also

the test used in the GATT Panel decision in 1992 on the Alcohol Beverages case

where the United States lost. The laws in five states that required a common

carrier to enforce their tax and alcohol policy were held to be unacceptable

because

> the United States has not demonstrated that the common carrier
> requirement is the least trade restrictive enforcement measure
> available to the various states and that less restrictive measures,
> e.g. record-keeping requirements of retailers and importers are not
> sufficient for tax administration purposes.[70]

This test seems reasonable, of course. The objections to it amount mainly to

objections to the methods by which the Beverage Panel arrived at the judgment

that less-trade-restrictive measures to achieve the same objectives were

available in that instance. But there are indeed inherent difficulties in

defining the set of alternative policies that, with differential trade impact,

would achieve identical environmental (or other domestic) objectives. It is hard

to imagine identical results on these objectives from alternative policies,

though similar results can sometimes be deemed possible (though, here too,

judgments will differ sharply in many cases).

In the end, any practical enforcement of the "least-trade-restrictive" test

for evaluating the acceptability of an environmental regulation or standard will

likely force the adjudicating Panel into evaluating, implicitly or explicitly,

tradeoffs between the cost in trade disruption and the cost in reaching the

environmental objective: a phenomenon and a problem that economists, who accept

free lunches but do not believe in them, have no difficulty recognizing.

The jurisprudence, by necessity if not by choice, will have to move in the

direction of evaluating and deciding upon the solution to such tradeoffs. Thus,

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[70]Cited in Charnovitz, ibid., p. 214.

in the case of EC law, in the case involving Denmark's laws concerning disposable beer cans, the European Court of Justice seems to have explicitly considered such a tradeoff between the interests of "free movement of goods" (and consequent trade benefits) and "environmental protection."[71]

It is natural therefore that environmentalists and trade experts who seem occasionally to attach opposing weights to the environmental and the trade benefits of any regulation or standard will worry about what weights the adjudicating Panels would choose in reaching their decisions. If therefore disputes are to arise between nations, and tests of "necessity" that imply weighing alternative policies leading to different tradeoffs are to be utilized, it is certainly proper for the environmentalists to seek improvements in the dispute settlement process that would give them greater access in terms of the ability to file written friends-of-the-court briefs and also make the Panel procedures more transparent than hitherto at the GATT.

A complementary policy of prevention rather than cure would also be useful as we move increasingly into this difficult and contentious area. The input of "principally-affected" trading countries into the setting of domestic environmental and other regulatory standards, such that the policy alternatives are discussed and adopted in light of such input, would help to reduce conflict to an irreducible minimum that the judicial process must address and resolve. Instances of such international input into domestic setting of standards are not lacking: the United States, worried by the trade-restrictive implications of EC standards-setting procedures, has indeed gained some access to the EC processes. But clearly more institutionalized and satisfactory procedures for doing so,

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[71]Cf. Charnovitz, ibid., p. 215. Charnovitz calls this the "proportionality" issue; but it is really a "tradeoff" issue.

available to weak and not just to strong nations, would appear to be a most useful innovation.

3. The Scientific-Test Issue

The use of scientific tests to determine whether a product can be proscribed, even on a nondiscriminatory basis between imports and domestic production, creates yet another important source of disagreement. Suppose that the US uses Alar to spray apples and that the EC does not. Suppose then that, faced with agitation from consumers who consider Alar-sprayed apples to be a hazard to their health, the EC bans their sales. The US industry and government can then be expected to demand that the EC justify, through the use of a scientific test, its fear that Alar-sprayed apples are a hazard.

Although this case is hypothetical, the EC-US conflict on EC's proscription of hormone-fed beef is not. In this instance, the US beef producers that used hormones and the biotech industry that had invented and now produced the hormones were pitted against what they considered to be a wholly-unscientific fear of hormone-fed beef. The US went to the length of trade retaliation under Section 301; the EC in the end did not counter-retaliate; and the matter was not taken to the GATT dispute settlement process for adjudication, with both the EC ban and the US retaliation continuing in place. Given the high probability that a scientific test criterion would have been required by a GATT dispute settlement Panel, it is likely that the EC would have lost the case.

But the case was an early-warning sign of the tension between commercial and environmental interests on this issue. Admittedly, even hard science is not hard enough most of the time. The many who are convinced of a hazard to their health, no matter what the current preponderance of scientific opinion, might well turn out to be right after all. Then again, even if scientists were agreed

on measuring the risk from any event or act of consumption or production, the subjective reaction of different people to the objective risk may vary greatly and, in fact, does.

It is tempting then to say: let any regulation pass, regardless of the scientific test, no matter that it reduces another's access to one's market. But we are back then to the "slippery slope" scenario. Without the restraining hand of current science, the itch to indulge one's fears could be overwhelming.

The solution may then well be to institutionalize what in effect happened with the hormone-fed beef case: have the scientific test; if you lose, "pay up" (as the EC did) if you do not wish to change your regulation or standard; or settle by shifting your regulation or standard so as to broadly move in the direction of achieving your objective by alternative policies (e.g. by labeling hormone-fed beef as such rather than proscribing it altogether and then undertaking education, propaganda and boycotts against its use).

Again, if the notion of "paying up" appears offensive to the environmentalists because science should not stand in the way of our deeply-held concerns, we would just urge them to undertake one thought experiment. We all know from science today that AIDS does not spread through simple contact. Suppose that our immigration policy nonetheless rules out HIV-infected immigrants, even when refugees and family reunification are involved, because large numbers of native Americans are sure (unscientifically) that such admissions will spread AIDS to them. Would a typically liberal, activist environmentalist agree to such a policy?

C. The Circumventing-Democracy Issue

We would be remiss if we did not also note the increasing appeal to some

environmentalists of the notion that "the process of negotiating international agreements [as the GATT's Uruguay Round] is less subject to public scrutiny, and therefore a threat to democratic accountability,[72] and that "faceless" and unelected bureaucrats at the GATT will overrule our democratically-enacted environmental and other social regulations. Leaving aside the question whether such regulations will be overturned--an issue that we just discussed at length--, the question regarding democratic process is far more complex than the simplistic denunciations that find their way into anti-GATT propaganda. In particular, we would argue the following:

(i) It is inconsistent to hold simultaneously, as many do, that the Low Standards of other countries should be countervailed by foreign NGOs and governments which are "unelected" and "faceless" as far as these Low Standard countries are concerned, while condemning the GATT Panel members, chosen by democratic procedures multilaterally agreed among the Contracting Parties, as "faceless" and "unelected."

(ii) Is it really correct to hold that one level of governance is more "democratic" than another? After all, it is the Contracting Parties that have chosen democratically the GATT Panel procedures.

(iii) Moreover, it is not correct to argue that the closer the level of governance to the ground, the better the decision. If local governance were dominant, Al Capone could flourish without the Feds, capital punishment would thrive, land reforms in developing countries (legislated and enforced from the

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[72]This was the issue addressed to a Panel of trade and legal scholars at the Conference on "The Morality of Protectionism" at the New York University Law School in November 1992. It is quoted in Robert Hudec's excellent contribution, "'Circumventing' Democracy: The Political Morality of Trade Negotiations," forthcoming in the Proceedings issue of the New York University, Journal of International Law and Politics, 1993.

top when grassroots activism is frustrated by the local power structure) might go slower, and so on.

(iv) There is no reason to think that the GATT works any worse than the national or local legislatures in these matters. Contrast the contribution of the GATT, including its Panels, with the gift that the US Congress gave to the world in 1934 with the Smoot-Hawley Tariff and is currently giving us with its 301 and Super 301 style championing of aggressive unilateralism.

(v) The current US position, opposed effectively by other Contracting Parties, that environmental NGOs be allowed to participate in GATT Council deliberations on Panel rulings is couched in terms of transparency and democracy. But it raises compelling objections that presumably emerged during this debate:

(i) the NGOs should be able to participate _via_ their own governments which represent them _and_ other constituents in democratic governments; there is no reason to think that their added participation is any more desirable than that of consumer groups, protectionist lobbies, unions etc., all of whom can and do compete for influence in national politics and hence on international policy deliberations;

(ii) the environmental NGOs are not necessarily handicapped financially vis-a-vis the other groups, and their organization and clout are disproportionately greater than their finances since they can often successfully claim the higher moral ground (e.g. we are "rescuing the dolphins" from the rapacious multinationals; we are "saving the planet"), so they certainly do not need a "second voice," when others are denied it, at the GATT Council; and

(iii) while there are indeed NGOs in the developing countries, the heavily-financed ones are in the rich countries and will reflect _their_ concerns, priorities and views (e.g. protecting dolphins rather than aiding Mexico's tuna

industry to help Mexico's development and removal of poverty); the rich countries would then have a double voice, when they can often drown out the voice of the poor countries with just one voice, thus undermining the notion of democracy at the _international_ level.

V. Concluding Observations: Environmental Problems with Transborder Externalities and Trade Questions

We conclude our exhaustive analysis of the case of purely domestic environmental problems, and the associated demands for CCII harmonization and eco-dumping countervailing duties _et al_., with a sketch of the policy problems that arise in the context of transborder externalities. These are generally more complex in character than the ones which arise with purely domestic[73] pollution and more compelling as well. It may be useful, from a policy viewpoint, to distinguish among two cases: (1) a special case where the problem is simplified by assuming a single country that pollutes the other, raising questions of response such as the use of trade barriers by the other; and (2) a general case where the problem is truly global in character. A good example of the former is

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[73]Some issues are, of course, similar to those raised in the case of domestic environmental problems. Thus, we must ask again: how convincing is the science being invoked to spur action? Ironically, some of those who attack the use of science to attack environmental regulations in challenging phytosanitary standards defend the use of science in urging action on global problems. The fickle nature of science in these matters is evident from the history of the ozone problem. Scientists in the US were in the forefront in suggesting the link between CFCs and ozone depletion, leading in 1978 to the prohibition of the use of CFCs in aerosol spray cans. The Europeans were skeptical; so was the Reagan administration. The discovery of the big hole in the ozone layer in Antarctica in 1984 turned almost everyone around, leading to the Montreal Protocol in 1987 and the further change therein in 1990 to eliminate CFCs by 2,000 AD.

US transmission of acid rain to Canada; an excellent example of the latter is global warming, to which many countries contribute while all are affected by it (though each in different degrees, and not all negatively).

A. <u>One-way Transmission of Pollution and Two Countries</u>:

This case is helpful because it illustrates in a simple way the problem raised by transborder externalities concerning the use of second-best trade instruments by the injured country when the offending country does not implement a first-best solution and uses its jurisdictional autonomy in the spirit of malign neglect. The principal question then is whether a country that is being damaged by pollution from another has the right to impose a trade restraint to affect the exports, and hence production, and hence the pollution, of the other country that comes into one's area.[74]

Thus, suppose that the US is transmitting acid rain to Canada, thanks to her CO_2-producing processes used in producing electricity in a CO_2-intensive way since the US electricity generation uses fossil fuel (whereas the Canadian industry uses cleaner, hydroelectric processes). If the US refuses to tax her electricity producers for the SO_2 pollution it generates, or refuses to compensate Canada for the damage that is inflicted by the acid rain that is transmitted to Canada by wind drift, then should Canada have the right to tax her import of US electricity (and even of other US exports that are produced, using the electricity that produces the acid rain and then transmits a fraction of it to Canada)?

Modifying the GATT rules to explicitly allow for such a possibility would

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[74]The theoretical analysis of this instrument is in Appendix I and, more fully, in Markusen (1975).

make sense as a "second-best" solution since the offending party (the US in the example) refuses to undertake a "first-best" solution. That also seemed to be, as Charnowitz has noted, the position taken in some early and unofficial thinking by the GATT Secretariat. Of course, the usual <u>caveats</u> about satisfying science tests etc. would have to be noted and codified.[75]

The problem, of course, is that this type of trade remedy is generally likely to be so weak for problems like acid rain that one may ask: is it worth modifying the GATT/WTO to legitimate such trade actions? Thus, take the example of acid rain itself. The generation of acid rain in the US, a fraction of which comes across to Canada, is geographically concentrated, of course, at the border whereas the import tariff would affect all electricity generation in the US; moreover, the effect on SO_2 generation would be indirect, not direct through tax on the process itself; then again, only a fraction of the acid rain generation effect would get into the transmission. The tariff instrument would then be extremely weak and the Canadian gain from its use in reducing the loss from the acid rain is outweighed by the reduced gains from trade, i.e. the gains from importing cheaper electricity from the US.[76]

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[75]This would clearly be a case where the process that generates the <u>physical</u> transborder externality is being objected to and a trade measure against it is being legitimated, as distinct from the "<u>values</u>" objection to a process as discussed earlier.

[76]This is the conclusion reached by Aparna Guha in a dissertation at Columbia University, examining the options before Canada in relation to the acid rain from the United States. She is currently studying the possibility of a market in permits to use fossil fuels in US electricity generation where Canada could bid and pay herself to reduce the acid rain being generated in the US: this would require, of course, that the permits be segmented by the States which generate the acid rain that comes across to Canada, else the cost to Canada could become prohibitive. There is much excellent work on the acid rain problem, both empirically and theoretically, including by Karl-Goran Mäler and his associates in Stockholm.

B. Global Transborder Externalities

The chief policy questions concerning trade policy when global pollution problems are involved instead, as with ozone layer depletion and global warming, take a different turn related to the cooperative-solution-oriented multilateral treaties that are sought to address them.[77] They are essentially tied into noncompliance ("defection") by members and "free riding" by nonmembers. Because any action by a member of a treaty relates to targeted actions (such as reducing CFCs or CO_2 emissions) that are a public good (in particular, that the benefits are nonexcludable, so that if I incur the cost and do something, I cannot exclude you from benefiting from it), the use of trade sanctions to secure and enforce compliance automatically turns up on the agenda.

At the same time, the problem is compounded because the agreement itself has to be <u>legitimate</u> in the eyes of those accused of free riding or noncompliance. Before those pejorative epithets are applied and punishment prescribed in form of trade sanctions legitimated at the GATT/WTO, these nations have to be satisfied that the agreement being pressed on them is efficient and, especially, that it is equitable in burden-sharing.[78] Otherwise, nothing prevents the politically powerful (i.e. the rich nations) from devising a treaty that puts an inequitable burden on the politically weak (i.e. the poor nations) and then using the cloak of a "multilateral" agreement and a new GATT/WTO-legitimacy to impose that burden with the aid of trade sanctions with a clear conscience, invoking the white man's burden to secure the white man's gain.

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[77]Of course, the question of single-country use of a second-best tariff policy can be raised here just as well as in the preceding case discussed earlier, but this question has raised no interest in the global-pollution context.

[78]Cf. Section VII, Appendix I on this question.

This is why the policy demand, often made, to alter the GATT/WTO to legitimate trade sanctions on Contracting Parties who remain outside of a treaty, whenever a plurilateral treaty on a global environmental problem dictates it, is unlikely to be accepted by the poor nations without safeguards to prevent unjust impositions. The spokesmen of the poor countries have been more or less explicit on this issue, with justification. These concerns have been recognized by the rich nations.

Thus, at the Rio Conference in 1992, the <u>Framework Convention on Climate Change</u> set explicit goals under which several rich nations agreed to emission level-reduction targets (returning, more or less, to 1990 levels), whereas the commitments of the poor countries were contingent on the rich nations footing the bill.

Ultimately, burden-sharing by different formulas related to past emissions, current income, current population etc. are inherently arbitrary; they also distribute burdens without regard to efficiency. Economists will argue for burden-sharing dictated by cost-minimization across countries, for the earth as a whole: if Brazilian rain forests must be saved to minimize the cost of a targeted reduction in CO_2 emissions in the world, while the US keeps guzzling gas because it is too expensive to cut that down, then so be it. But then this efficient "cooperative" solution must not leave Brazil footing the bill! Efficient solutions, with compensation and equitable distribution of the gains form the efficient solution, make economic sense.

A step towards them is the idea of having a market in permits again, at the world level: no country may emit CO_2 without having bought the necessary permit

from a worldwide quota. That would ensure efficiency[79], whereas the distribution of the proceeds from the sold permits would require a decision reflecting some multilaterally-agreed ethical or equity criteria (e.g. the proceeds may be used for refugee resettlement, UN peacekeeping operations, aid dispensed to poor nations by UNDP, WHO fight against AIDs, etc.). This type of agreement would have the legitimacy that could then provide the legitimacy in turn for a GATT/WTO rule that permits the use of trade sanctions against free riders.

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[79]This efficiency is only in the sense of cost minimization. The number of permits may, however, be too small or too large, and getting it right by letting nonusers also bid (and then destroy permits) is bedeviled by free rider problems.

APPENDIX

We consider a sequence of models to illustrate the trade policy implications of bringing environmental considerations into contexts that differ with respect to (i) the nature of pollution (e.g. purely domestic versus global), (ii) whether or not the economy is a price taker in world markets, (iii) whether or not pollution can be abated through expenditure of resources, and (iv) whether global welfare or national welfare is the policy objective. In much of the analysis pollution is modelled as a production externality which affects welfare. In the last section we relate our analysis to that in the literature.

PURELY DOMESTIC POLLUTION

IA.   Small Country; Purely Domestic Pollution; No Abatement Possible

For simplicity consider a two-commodity model with the production transformation function $X_1 = F(X_2)$ where X_i is the output of good i. Pollution $P = P(X_1, X_2) \equiv P(F, X_2)$. Clearly for any given production choice (X_1, X_2) where $X_1 = F(X_2)$, pollution P is determined regardless of trade. As such since the economy has no market power, free trade is optimal from a consumer perspective.

This implies in particular that, if the given production choice is fixed at the production vector associated with the autarky optimum, opening the economy to free trade in consumption cannot reduce welfare. As such, as long as appropriate policy instruments are available to ensure the separation of consumption from production, trading cannot hurt.

Now, allow instead a production response to trading opportunities. Writing $Y = X_1 + \pi X_2 = F + \pi X_2$ for income where π is the world relative price of

good 2 in terms of good 1, $V(\pi, Y, P)$ for the indirect utility function, the first order condition for the optimal choice of production is given by[80]

$$V_2 \ (F_1 + \pi) + V_3 \ (P_1F_1 + P_2) = 0 \qquad (1)$$

where the subscript i of a function denotes the partial derivative with respect to its ith argument.

Of course if $V_3 = 0$ so that pollution does not affect welfare, (1) reduces to $\pi = -F_1$ or world price = domestic marginal rate of transformation so that free trade is optimal from a producer perspective as well. In the case where $V_3 < 0$ so that pollution affects welfare adversely, (1) can be rewritten as

$$\pi + V_3(P_1F_1 + P_2)/V_2 \ = -F_1 \qquad (2)$$

Now $(P_1F_1 + P_2)$ is the _net_ marginal change in pollution as the output of good 2 increases: it is the sum of the direct marginal change P_2 from the increase in output of good 2 and the indirect marginal change P_1F_1 from the fall F_1 in output of good 1 induced by the increase in the output of good 2. Thus if $P_1F_1 + P_2$ is negative (resp. positive) so that the net change in pollution from an increase in the output of good 2 is negative (resp. positive), the domestic rate of transformation of good 2 for good 1 is larger (resp. smaller) than the world price of good 2, i.e. if an increase in the output of good 2 reduces (resp. increases) pollution, since pollution is an uninternalized _domestic_ externality, the output of good 2 should be subsidized (resp. taxed) relative to its world price. This optimal rate of tax or subsidy will in general be different in a trading optimum as compared to autarky. Nonetheless welfare in a free trading optimum will be no less than under autarky.

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[80]In this appendix, unless otherwise stated, we will simply _assume_ that the relevant set of first order conditions indeed characterize a unique solution to the optimization problem under consideration. We do not go into the assumptions on the production, utility and pollution functions that will ensure that this will be the case.

This is a straightforward application of the standard theory of domestic distortions to what, in the present instance, is a production externality.[81]

IB. Small Country: Purely Domestic Pollution: Abatement Possible by Spending Resources

Let K_a, L_a denote the amount of capital and labour respectively devoted to abatement. Let $\bar{K}$, $\bar{L}$ denote the aggregate endowment of capital and labor. Now the transformation function is $X_1 = F(X_2, \bar{K} - K_a, \bar{L} - L_a)$ and pollution is $P = P(X_1, X_2, K_a, L_a)$.

As before, with given X_1, X_2, K_a, and L_a, clearly free trade is optimal from a consumer perspective. As such, opening the economy to trade in consumption, while keeping production at autarky optimum levels, cannot reduce welfare. The indirect utility is as before $V(\pi, Y, P)$ where $Y = X_1 + \pi X_2$.

The first order conditions for the optimal (interior) choice of production of X_2 and of resources K_a, L_a devoted to abatement are:

$$V_2(F_1 + \pi) + V_3 (P_1F_1 + P_2) = 0 \tag{3}$$

$$V_2F_2 + V_3P_3 \qquad\qquad = 0 \tag{4}$$

$$V_2F_3 + V_3P_4 \qquad\qquad = 0 \tag{5}$$

First, (4) and (5) imply $F_2/F_3 = P_3/P_4$, i.e. the marginal rate of substitution of capital and labour is the same in commodity production (i.e. F_2/F_3) as in pollution abatement (i.e. P_3/P_4).

Second, (3) is the same as (1) so that the conclusion that if an increase in output of 2 reduces (resp. increases) pollution it should be subsidized (resp. taxed) relative to its world price remains even with abatement possibilities.

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[81]Cf. Srinivasan (1987) and Bhagwati (1971).

Only now, the effect of or pollution of an increase in output of 2 is evaluated given the optimum levels of resources devoted to abatement.[82]

Finally, the result that welfare in a free trading optimum is no less than under an autarky optimum, though in general the optimal production tax or subsidy could be different in the two optima, continues to hold. Again this is a straightforward implication of the standard theory of domestic distortions.

IIB. Large Country: Purely Domestic Pollution: Active trade policy with no retaliation: Abatement feasible.

It should be evident from the analysis of the small-country model that, as long as pollution is a purely domestic distortion, standard theory should go through when a purely international distortion, namely, the ability to influence the terms of trade (which is not internalized by private domestic agents) is added. We confine ourselves to demonstrating this for the case with abatement possible. The same results can be easily seen to hold for the case when abatement is not possible.

Since terms of trade are now endogenous it is more convenient to work with the direct utility function.

$$U(F(X_2, \ \overline{K}-K_a, \ \overline{L}-L_a) + \pi(E_2)E_2, \ X_2 - E_2, \ P(F, \ X_2, \ K_a, \ L_a))$$

where E_2 represents the net exports of good 2 and $\pi(E_2)$ the average price (in terms of good 1) per unit of good 2 exported. The choice variables are X_2, E_2, K_a, L_a. The corresponding first-order conditions for an interior maximum of U are

$$U_1F_1 + U_2 + U_3(P_1F_1 + P_2) = 0 \tag{6}$$

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[82]Note also that we do not have a reason to subsidize the use of abatement technology.

$$U_1(\pi_1 E_2 + \pi) - U_2 \qquad\qquad = 0 \qquad\qquad (7)$$

$$-(U_1 + U_3 P_1)F_2 + U_3 P_3 \qquad = 0 \qquad\qquad (8)$$

$$-(U_1 + U_3 P_1) + U_3 P_4 \qquad\qquad = 0 \qquad\qquad (9)$$

From (7) it is seen that the domestic marginal rate of substitution between good 2 and good 1, i.e. U_2/U_1, equals the _marginal revenue_ (in terms of good 1) per unit of exports of good 2 at the optimal level of exports. Thus U_2/U_1 equals the marginal terms of trade and differs from the average terms of trade by the term $\pi_1 E_2$. The difference is the standard optimal tariff to exploit market power.

From (8) and (9) it is clear that the marginal rate of substitution between capital and labor in goods production, i.e. F_2/F_3 equals that in pollution abatement, i.e. P_3/P_4. Rewriting equation (6) as

$$-F_1 = U_2/U_1 + U_3(P_1 F_1 + P_2)/U_1 \qquad\qquad (10)$$

it is seen that the domestic marginal rate of transformation between goods 1 and 2, i.e. $-F_1$, differs from the domestic marginal rate of substitution U_2/U_1 by the addition of $U_3(P_1 F_1 + P_2)/U_1$. By assumption, pollution hurts welfare so that U_3, the marginal utility of pollution, is negative while U_1, the marginal utility of consumption of good 1, is positive. Thus the additional term is positive, zero or negative according as the net addition to pollution of an increase in production of good 2, i.e. $(P_1 F_1 + P_2)$ is negative, zero or positive. For example, if the net addition to pollution is positive so that the additional term is negative, it follows that, in addition to an optimal tariff (equation (7)) to exploit market power in external markets, an optimum tax (of $U_3(P_1 F_1 + P_2)/U_1$) on the production of good 2 is needed to allow for the _purely domestic distortion_ of pollution.

It is evident that the feasibility of abatement does not affect the

algebraic form of equation (6) and (7) on which the above result (about the need for an optimum tariff and a production tax) is based. As such the absence of the possibility of abatement does not affect the result.[83] Also it should be obvious that welfare with trade restricted by an optimum tariff would be no less than under autarky.

The rest of the world's offer curve to the home economy, i.e. $\pi(E_2)$, in the above analysis in principle could be viewed as a function $\pi(E_2,T^*)$ of home exports E_2 and foreign tariffs on home imports. Thus, given Cournot behaviour, the home economy's optimal tariff will be a function (the home reaction function) of the given foreign tariff T^*. Similarly, there will be a foreign reaction function linking their optimal tariff to the home economy's tariff. As is well known since the work of Harry Johnson (1954), the intersection of the two reaction functions is the Cournot-Nash equilibrium of the tariff game. And such an equilibrium is not Pareto Optimal from a global perspective.

GLOBAL POLLUTION

III. <u>Small Country: Global Pollution</u>

We begin, in Sections III and IV, with <u>national welfare</u> maximization, and then consider in Sections V-VIII questions relating to global Pareto Optimality (i.e. "<u>world welfare</u>").

Assume now that the pollution is global, i.e. its effect cuts across (some or all) national borders. In this case, the pollution function may be rewritten as $P(F(X_2,\overline{K}-K_a,\overline{L}-L_a)+ X_1^*, \ X_2+X_2^*, \ K_a + K_a^*, \ L_a + L_a^*)$ where the starred variables

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[83]Of course, the precise values of the optimum tariff and subsidy would in general differ depending on whether or not abatement is feasible.

X_2^*, K_a^*, L_a^* respectively denote the output of good i (i=1,2) and the capital and labour devoted to abatement in the rest of the world.

Implicit in this formulation are two strong assumptions: first, only global levels of outputs, and not their distribution between countries, affect global pollution; second, only global expenditure of resources on abatement, and not their distribution between countries, matters. The latter in effect postulates the <u>same technology</u> of abatement among countries in the sense that at any level of <u>aggregate</u> resources devoted to abatement, the marginal reduction in pollution achieved by a marginal increase in <u>domestic</u> resources devoted to abatement is the same as that achieved by a marginal increase in <u>foreign</u> resources devoted to abatement. But of course this does not necessarily imply that the same amount of resources will be devoted to abatement at home and abroad in any equilibrium. In section VIII below we relax these assumptions.

Since by assumption a small country cannot affect the prices at which it trades with the rest of the world through its trade policy, there is no channel by which it can affect the commodity or factor prices in the rest of the world.[84] If we assume Cournot behaviour in that the small country takes the rest of the world's outputs and pollution abatement resources as given, it is easily shown that the results of case IB continue to hold: free trade is optimal

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[84]Even though the trade flows of a small economy by definition have no influence on the terms at which the flows take place, such flows could influence the output in the rest of the world. This is best seen in a Ricardian model in which the small open economy specializes in producing its exportable while the rest of the world (ROW) is incompletely specialized and the equilibrium world prices are the autarky prices of the ROW. With the opening of trade with the small economy, ROW still consumes its autarky consumption bundle while its production adjusts to accommodate the trade flows from the small economy. Although policy-induced changes in the trade flows of the small economy do not affect equilibrium world prices, they do affect the production in ROW and, hence, pollution, if pollution is a by-product of production.

and the domestic marginal rate of substitution between capital and labour should be the same in goods production and pollution abatement.

However, the assumption of Cournot behaviour is rather artificial in this case. It is more natural to assume that if the country is 'small', it will behave as if its shares of global outputs and global resources devoted to abatement are negligible. Thus it will treat pollution P as if it is a constant $\bar{P}$ that cannot be influenced by its action. Clearly, it is optimal for such a country not to devote any resources to pollution abatement, i.e. it will free-ride on the rest of the world's expenditure of resources for abatement. It follows that if the trading system consisted a large number of small countries in this sense, no country will spend any resources on abatement: this is the analogue of the "tragedy of the commons" in the use of common property resources.

IV. Large Country: Pollution Global: Cournot behaviour with respect to both tariffs and resource allocation for abatement abroad.

For simplicity consider a trading world of two countries. For any given level of foreign tariff T^* and resource allocation for abatement K_a^*, L_a^*, the home economy's terms of trade π depends on its own exports E_2. Thus the direct utility of the home economy could be written as

$$U[F(X_2, \bar{K} - K_a, \bar{L} - L_a) + E_2\pi(E_2, T^*), X_2 - E_2, P]$$

where $P = P[F(X_2,\bar{K}-K_a,\bar{L}-L_a) + X_1^*, X_2 + X_2^*, K_a + K_a^*, L_a + L_a^*]$. Note that, since the pollution is now global, the utility function is different from that in case IB in so far as it additionally includes <u>foreign outputs</u> that generate pollution and <u>foreign inputs</u> that abate it (since both determine the amount of foreign pollution).

The first order conditions for an interior maximum of U with respect to X_2, E_2, K_a, L_a are:

$$U_1F_1 + U_2 + U_3 (P_1F_1 + P_2) = 0 \tag{10}$$

$$U_1(\pi_1E_2 + \pi) - U_2 = 0 \tag{11}$$

$$-(U_1 + U_3P_1)F_2 + U_3P_2 = 0 \tag{12}$$

$$-(U_1 + U_3P_1)F_3 + U_3P_4 = 0 \tag{13}$$

As is to be expected, given Cournot behaviour (concerning both foreign tariffs and resource abatement expenditures), these are exactly the same algebraically as equations (6) - (9). In other words, corresponding to each specified $(X_1^*, X_2^*, T^*, K_a^*, L_a^*)$, we have a home output $X_2(X_1^*, X_2^*, T^*, K_a^*, L_a^*)$, optimal tariff $T(X_1^*, X_2^*, T^*, K_a^*, L_a^*)$ and home expenditure of resources $K_a(X_1^*, X_2^*, T^*, K_a^*, L_a^*)$, $L_a(X_1^*, X_2^*, T^*, K_a^*, L_a^*)$. These three represent the <u>home</u> reaction functions to foreign outputs X_1^* and X_2^*, (X_1^* and X_2^* are on the foreign transformation function, so that only one of them is independent) tariff T^*, and resources K_a^*, L_a^* allocated for abatement. It should be noted that, unless the utility function is additively separable in pollution, the domestic MRS U_2/U_1 will be a function of foreign outputs and abatement resources. As such, from (11), it follows that the domestic optimal tariff will be a function not only of foreign tariff as usual, but also of foreign outputs and abatement resources.

Analogously one defines <u>foreign</u> reaction as function of given values of the home outputs, tariff and resource allocation for abatement. The 'intersections' of the home and foreign reaction functions represent the Nash equilibrium values of outputs in the two countries and T^N, T^{*N}, K_a^N, K_a^{*N}, L_a^N, L_a^{*N}. As is well-known,

such Nash equilibria are not Pareto Optimal.[85]

V.   Global Pareto Optimal Allocations

Pareto Optimal allocations, on the other hand, are derived by maximizing a non-negatively weighted sum of the welfares of the two countries. It is more convenient to write the two utility functions as $U[C_1, C_2, P]$ and $U^*(C_1^*, C_2^*, P)$ where C_i, C_i^* represent the consumption of commodity i (i = 1,2) and pollution

$$P = P[X_1+X_1^*, \ X_2+X_2^*, \ K_a+K_a^*, \ L_a+L_a^*] \tag{14}$$

$$X_1 = F(X_2, \ \overline{K}-K_a, \ \overline{L}-L_a) \tag{15}$$

$$X_1^* = F^*(X_2^*, \ \overline{K}^*-K_a^*, \ \overline{L}-L_a^*) \tag{16}$$

Market clearance implies

$$C_1 + C_1^* = X_1+ X_1^* \tag{17}$$

and

$$C_2 + C_2^* = X_2 + X_2^* \tag{18}$$

Maximization of $\alpha U + (1-\alpha)U^*$ (where $0 \leq \alpha \leq 1$) with respect to C_1, C_2, C_1^*, C_2^*, X_2, X_2^*, K_a, K_a^*, L_a, L_a^* subject to (17) and (18) after substituting (14), (15), (16) into U and U^* yields the following first order conditions for an

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[85]Since the home (resp. foreign) country takes the foreign (resp. home) country's outputs and resources allocated for abatement as given, each country's reaction function with respect to the variables it chooses (X_2^*, K_a and L_a for the home country and X_2^*, K_a^*, L_a^* for the foreign country) are functions of the values of the variables for the other country taken as given. Nash equilibrium is a mutually consistent set in the sense that each country's choices as obtained by substituting the other country's choices in its reaction function, when substituted into the latter's reaction functions yields the latter's choices. Thus $X_2(X_1^{*N}, X_2^{*N}, T^{*N}, K_a^{*N}, L_a^{*N})$ etc. when substituted in the reaction function X_2^* () will yield back X_2^{*N} and vice versa. We are assuming that such Nash equilibria exist. The existence issue is a complex one.

interior maximum[86]:

$$\alpha U_1 - \lambda_1 = 0 \tag{19}$$

$$\alpha U_2 - \lambda_2 = 0 \tag{20}$$

$$(1-\alpha)U_1^* - \lambda_1 = 0 \tag{21}$$

$$(1-\alpha)U_2^* - \lambda_2 = 0 \tag{22}$$

$$[\alpha U_3 + (1-\alpha)U_3^*](P_1F_1+P_2) + \lambda_1 F_1 + \lambda_2 = 0 \tag{23}$$

$$[\alpha U_3 + (1-\alpha)U_3^*](P_1F_1^*+P_2) + \lambda_1 F_1^* + \lambda_2 = 0 \tag{24}$$

$$[\alpha U_3 + (1-\alpha)U_3^*]P_3 - (\lambda_1+\alpha U_3 P_1)F_2 = 0 \tag{25}$$

$$[\alpha U_3 + (1-\alpha)U_3^*]P_4 - (\lambda_1+\alpha U_3 P_1)F_3 = 0 \tag{26}$$

$$[\alpha U_3 + (1-\alpha)U_3^*]P_3 - (\lambda_1+(1-\alpha)U_3^* P_1)F_2^* = 0 \tag{27}$$

$$[\alpha U_3 + (1-\alpha)U_3^*]P_4 - (\lambda_1+(1-\alpha)U_3^* P_1)F_3^* = 0 \tag{28}$$

From (19)-(22), it follows that the marginal rate of substitution (MRS) between goods 1 and 2 in consumption is the same in the two countries, i.e. $U_2/U_1 = U_2^*/U_1^* = \lambda_2/\lambda_1$ regardless of the value α. Thus, from a consumer perspective, there is free trade in a Pareto Optimum.

However, from (23) and (24), it is seen that the marginal rate of transformation (MRT) between goods 1 and 2 at home, $-F_1$ equals $\lambda_2/\lambda_1 + 1/\lambda_1 [\alpha U_3 + (1-\alpha)U_3^*][P_1F_1+P_2]$; and abroad, $-F_1^*$ equals $\lambda_2/\lambda_1 + [1/\lambda_1][\alpha U_3 + (1-\alpha)U_3^*][P_1F_1^* + P_2]$. Thus MRT at home (resp. abroad) differs from the common MRS by $[1/\lambda_1] [\alpha U_3 + (1-\alpha)U_3^*][P_1F_1 + P_2]$ (resp.

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[86]λ_1 and λ_2 are the Lagrangean multipliers associated with constraints (17) and (18) respectively; these are shadow prices in global welfare units of good 1 and 2 respectively.

$[1/\lambda_1]$ $[\alpha U_3 + (1-\alpha)U_3^*][P_1 F_1^* + P_2]$). This term is easily interpreted: $[\alpha U_3 + (1-\alpha)U_3^*]$ is the global welfare effect of a marginal increase in pollution, i.e. shadow price of a unit of pollution again in global welfare units; λ_1 is, as noted earlier, the shadow price of good 1. Thus the ratio of these two terms represents the global shadow 'price' of a marginal unit of pollution in units of good 1 and at a Pareto Optimum it is the <u>same</u> in the two countries. The term $(P_1 F_1 + P_2)$ is the net pollution effect of a marginal increase in the production of good 2 at home. The product of all three terms is thus in units of good 1 per unit of good 2 and represents the trade-off between the pollution of the two goods at home through the relative global welfare effects they have through pollution. Thus, at a Pareto Optimum, the home MRT between the two goods must equal the sum of their relative welfare effects through their consumption, i.e. λ_2/λ_1, and their relative welfare effects through pollution which is the second term. An analogous condition applies in the foreign country.

If we interpret the difference between MRS and MRT as a shadow production tax or subsidy on good 2 it is seen from (23) and (24) that this tax/subsidy would be the same in the two countries if $F_1 = F_1^*$ at an optimum, i.e. if the MRT is the same in the two countries. At the same time, it is evident from (25) - (28) that the marginal rate of substitution between capital and labour is the <u>same</u> in the two countries in <u>all</u> activities, whether production or abatement. Thus, if we interpret the marginal rate of substitution as the shadow wage-rental ratio, it is the same in the two countries. With shadow commodity prices the same, factor price equalization follows. If the available technology of production of goods is the same in the two countries, then with factor price equalization the shadow production tax/subsidy rates will be the same in the two

countries. The global Pareto Optimal solution will require tax harmonization!

The first order conditions relating to MRT in the two countries, taken together with the fact that MRS is the same in the two countries, imply that free trade combined with an appropriate production tax or subsidy is the appropriate policy associated with a Pareto Optimum. However, in general if the value of α is set <u>exogenously</u>, trade between the countries need not be balanced so that a lump sum income transfer from the country running the trade surplus to that running the deficit would be required to support the chosen Pareto Optimum. But α can be chosen <u>endogenously</u> to ensure that no transfers are needed, i.e. trade is balanced. A heuristic argument for the existence of such an α is as follows (the existence of such a unique α is shown for a special case in Section VIII). Set $\alpha = 1$ so that the foreign economy's welfare receives a zero weight. Clearly at the associated Pareto Optimum foreign economy in effect transfers its entire income to the home economy. The reverse happens when α is set at zero. Thus, by continuity, at some α between 0 and 1, the required transfer will be zero. However the implementation of the associated Pareto Optimum involves the use of information on the welfare effect of pollution in <u>both</u> countries for devising the appropriate tax-subsidies in each.

A comparison of the first order condition relating to home MRT with the analogous conditions in the Cournot-Nash case IV makes it clear that, in the latter, each country ignores the effect of its production choice on foreign welfare through pollution so that the resulting Nash equilibrium cannot be Pareto Optimal.

VI. <u>Deviant Behaviour by One Country and Global Pareto Optimality</u>

The implementation of the global Pareto Optimum with or without transfers

involves the use of a set of optimal production taxes or subsidies in each country and the expenditure of appropriate levels of resources on pollution abatement. Suppose for instance, however, that one of the countries, say the home country, is required to devote a positive amount of capital and labour to abatement in supporting the Pareto Optimum. If it deviates, and for example, does not spend any resources on abatement, we may ask whether a restricted Pareto Optimum is still attainable. Will it involve the use of trade policy?

Referring back to the first order condition (19)-(28) characterizing a Pareto Optimum, we see now that conditions (25) and (26) relating to the capital K_a and labour L_a devoted to abatement by the home country no longer apply. But the remaining conditions continue to hold. Therefore, free trade along with an appropriate set of production taxes and subsidies continues to support a restricted Pareto Optimum.

Of course, the reason why a restricted Pareto Optimum is achievable with free trade in spite of the home economy devoting no resources for abatement is obvious: since by assumption the externality of pollution arises from production, no deviation from free trade with respect to consumption is called for.

Indeed this argument goes even further. Suppose, for instance, that for whatever reason the home economy not only devotes no resources for abatement but also chooses production levels different from those associated with an unrestricted Pareto Optimum. This means that conditions (23), (25) and (26) no longer apply. However, (19)-(22) continue to apply so that free trade with respect to consumption continues to be optimal. And since (24) still applies, the foreign economy has to levy an optimal production tax or subsidy to sustain this further restricted Pareto Optimum. The home economy can of course sustain its deviant behaviour through a variety of means.

It should be noted that, from the perspective of a global Pareto Optimum, countries are symmetric. As such which country, namely the home or the foreign country, deviates in its behaviour is immaterial to the characterization of the restricted Pareto Optimum. In the above analysis, if the foreign, rather than the home, country does not devote as much resources as it should in supporting an <u>unrestricted</u> Pareto Optimum, conditions (27) and (28) rather than (25) and (26) no longer apply. But this does not affect the conclusion that free trade along with an appropriate set of production taxes and subsidies support a <u>restricted</u> Pareto Optimum.

VII. <u>Shadow Factor Price Equalization</u>

In the model of Section V, the shadow factor prices are equalized at the chosen Pareto Optimum: whether or not there is international factor mobility is therefore irrelevant. However, such shadow factor price equalization need not always occur. The considerations that lead to the shadow factor price equalization in Section V are:

(1) at a global welfare optimum in which a *positive* amount of each commodity is consumed in each country, the shadow commodity prices for consumers (in global welfare units) have to be the same in both countries;

(2) the shadow price of pollution (in welfare units) is also the same in both countries;

(3) if each country is devoting a positive amount of *each* factor to pollution abatement, then because one country's factor is a perfect substitute for the other country's in pollution abatement, and the price of pollution is the same in the two countries; the marginal value of each factor in pollution abatement must be the same in the two countries; and it follows then that the

shadow price of each factor in global welfare units is equalized between countries; also, because the consumer shadow price of each commodity in welfare units is the same in the two countries, we see by taking the ratio of shadow factor price to the shadow consumer price of either commodity that the equalization of shadow factor prices in commodity units follows.

Thus, shadow factor prices (in any commodity unit) cannot be equalized if any of the above considerations do not apply. For example, if consumers in the home country do not consume the first commodity while foreign consumers do, the marginal rate of substitution of the two goods in consumption at home will differ between countries. As such, factor prices in commodity units could differ between countries even if they are equalized in welfare units.

VII. Efficiency and Equity: Possible Conflicts

1. The Analytical Argument

A globally Pareto Optimal allocation of resources is efficient in two senses. It is distributionally efficient in the sense that there is no other feasible allocation that could make one country better off without making some other country worse off. It is also productively efficient in the sense that the allocation across countries of production, and hence of pollution generated by production, is such that there is no other feasible allocation that will increase the consumption of some commodity in a country without reducing the consumption of any other commodities anywhere or increasing pollution, or alternatively will reduce pollution without at the same time reducing the consumption of some commodity somewhere. The pure gain in moving to an efficient allocation from an inefficient one could be distributed among countries to make at least one country better off without hurting others.

While a Pareto Optimal allocation is thus <u>efficient</u>, it need not be <u>equitable</u>. For example, an allocation that uses all of the world's resources to maximize just one country's welfare is Pareto Optimal but hardly equitable. On the other hand, an equitable allocation in the sense of maximizing a <u>global</u> welfare function that incorporates equity considerations would also be Pareto Optimal as long as the global welfare function is increasing in each country's welfare. Thus, such an equitable allocation is necessarily Pareto Optimal and hence efficient in both senses.

The arguments above suggest that there needs to be no conflict between equity and efficiency. Indeed this would be the case if instruments exist that would sustain an equitable Pareto Optimal allocation. For example, a market mechanism for resource allocation, <u>supplemented</u> by lump sum <u>transfers</u> as needed between countries, could sustain such an allocation. However if transfers are infeasible, then an equilibrium market allocation (without transfers) need not be equitable. Then achieving a more equitable allocation will involve in this case the sacrifice of efficiency in one or both senses.

2. <u>Illustrations</u>

(1) A suggestive illustration of a possible conflict between efficiency and distributional equity is shown in Figure 1. The marginal cost of pollution abatement in the US is seen to be above that in Brazil at all levels of pollution to be abated up to $\bar{P}$. As such, it will be cost efficient for only Brazil to engage in pollution abatement up to $\bar{P}$. For Brazil also to bear the full cost of such abatement would be deemed (at least by Brazilians) as inequitable!

(2) Consider also the following simple version of the model of section V. Take two countries. The home (resp. foreign) country has $\bar{H}$ (resp. $\bar{H}^*$) hectares
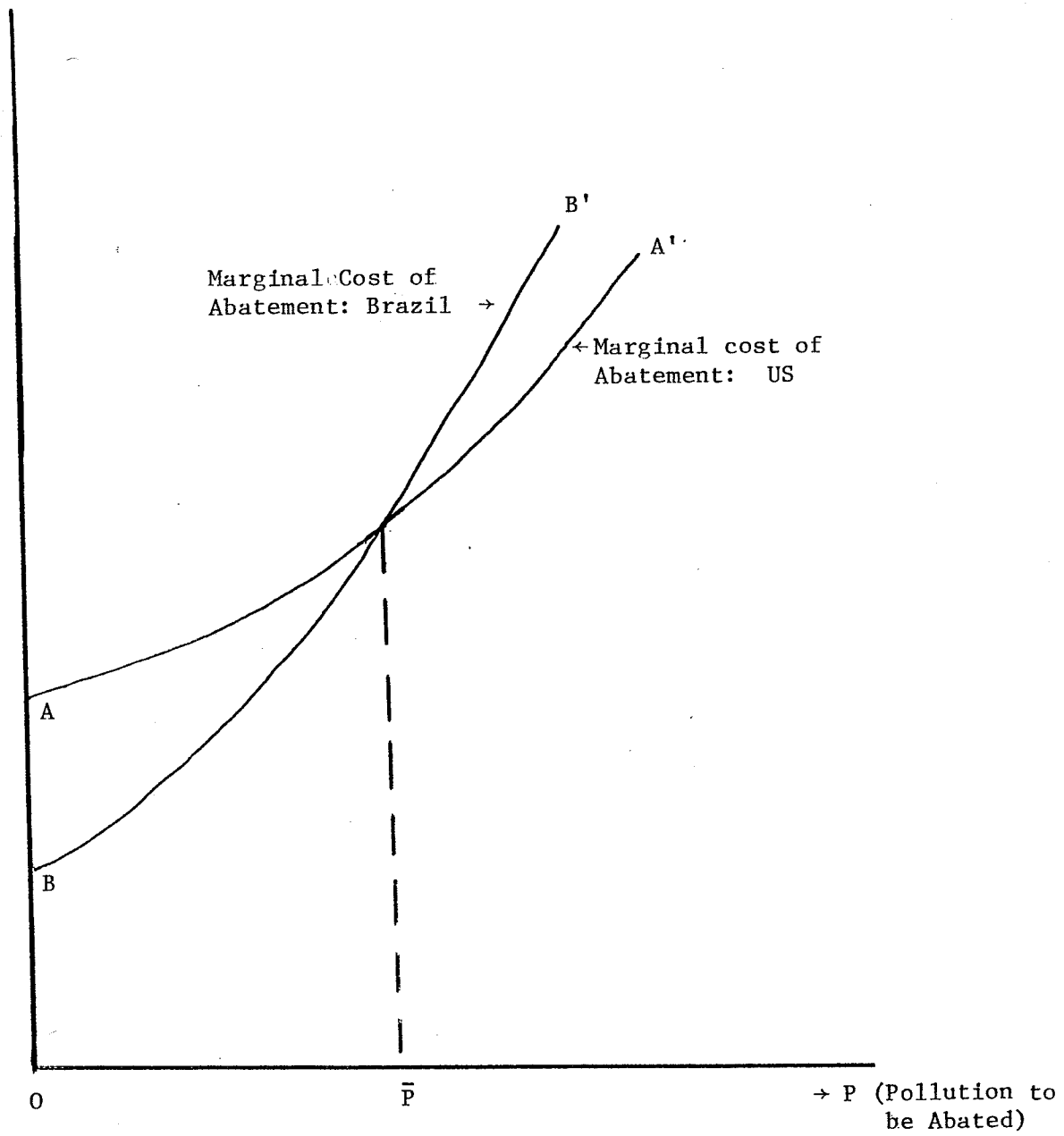
Figure 1

Efficiency and Equity With Global Pollution:

Partial Equilibrium

of virgin forest. A hectare of this forest, if cleared and planted with wheat (resp. rice), will produce 1 ton of wheat (resp. rice), and release μ (resp. μ^*) litres of pollutants into the environment. Left as forest land, on the other hand, that hectare would have removed γ (resp. γ^*) litres of pollutants from the environment.

Home utility U is given by

$$U = \theta_1 \text{Log } C_1 + \theta_2 \text{ Log } C_2 + \theta_3 \text{ Log } (\overline{P}\text{-}P) \tag{29}$$

where $1 \geq \theta_i \geq 0$, $\theta_3 \equiv 1 - \theta_1 - \theta_2$, C_1 is the consumption of wheat, C_2 is the consumption of rice, P is the quantity of (net) pollutants in the economy and $\overline{P}$ is the maximum amount of pollutants consistent with survival. Analogously, foreign utility U^* if given by

$$U^* = \theta_1^* \text{ Log } C_1^* + \theta_2^* \text{ Log } C_2^* + \theta_3^* \text{ Log } (\overline{P}\text{-}P) \tag{30}$$

where $1 \geq \theta_i^* \geq 0$, $\theta_3^* \equiv 1-\theta_1^* - \theta_2^*$.

Clearly, we have in this model:

$$C_1 + C_1^* = X_1 \equiv \text{ output of wheat} \tag{31}$$

$$C_2 + C_2^* = X_2^* \equiv \text{ output of rice} \tag{32}$$

$$P = \mu X_1 + \mu^* X_2^* - \gamma(\overline{H} - X_1) - \gamma^*(\overline{H}^* - X_2^*)$$

$$= (\gamma+\mu)X_1 + (\gamma^* + \mu^*)X_2^* - \gamma\overline{H} - \gamma^*\overline{H}^* \tag{33}$$

As in Section V, Pareto Optimal allocations are derived by maximizing $[\alpha U + (1-\alpha)U^*]$ for $0 \leq \alpha \leq 1$. The resulting production, pollution, consumption and welfare levels can be characterized as follows.

In this simple model, the efficient combinations of X_1, X_2^* and P (in the production sense) are given by (33) where obviously $0 \leq X_1 \leq \overline{H}$ and $0 \leq X_2^* \leq \overline{H}^*$.

It can be shown that the efficient values of X_1, X_2^* and P associated with the Pareto Optimum corresponding to α are given by[87]:

$$X_1 = \left[\frac{\alpha\theta_1 + (1-\alpha)\theta_1^*}{\gamma + \mu} \right] [\bar{P} + \mu\bar{H} + \mu^*\bar{H}^*] \qquad (34)$$

$$X_2^* = \left[\frac{\alpha\theta_2 + (1-\alpha)\theta_2^*}{\gamma^* + \mu^*} \right] [\bar{P} + \mu\bar{H} + \mu^*\bar{H}^*] \qquad (35)$$

$$\bar{P} - P = [\alpha\theta_3 + (1-\alpha)\theta_3^*] \ [\bar{P} + \mu\bar{H} + \mu^*\bar{H}^*] \qquad (36)$$

The consumption of wheat and rice in the two countries in the Pareto Optimum is given by:

$$C_1 = \left[\frac{\alpha\theta_1}{\alpha\theta_1 + (1-\alpha)\theta_1^*} \right] X_1; \quad C_1^* = \left[\frac{(1-\alpha)\theta_2^*}{\alpha\theta_1 + (1-\alpha)\theta_1^*} \right] X_1 \qquad (37)$$

$$C_2 = \left[\frac{\alpha\theta_2}{\alpha\theta_2 + (1-\alpha)\theta_2^*} \right] X_2^*; \quad C_2^* = \left[\frac{(1-\alpha)\theta_2^*}{\alpha\theta_1 + (1-\alpha)\theta_2^*} \right] \qquad (38)$$

The welfare levels U and U^* in the Pareto Optimum are given by:

$$U = (\theta_1 + \theta_2)Log \ \alpha + \theta_3 Log(\alpha\theta_3 + (1-\alpha)\theta_3^*) + \theta_1[Log \ \theta_1 - Log(\gamma + \mu)]$$

$$+ \theta_2[Log \ \theta_2 - Log(\gamma^* + \mu^*)] + Log(\bar{P} + \mu\bar{H} + \mu^*\bar{H}^*) \qquad (39)$$

$$U^* = (\theta_1^* + \theta_2^*)Log \ (1-\alpha) + \theta_3^* Log(\alpha\theta_3 + (1-\alpha)\theta_3^*) + \theta_1^*[Log \ \theta_1^* - Log(\gamma + \mu)]$$

$$+ \theta_2^*[Log \ \theta_2 - Log(\gamma^* + \mu^*)] + Log(\bar{P} + \mu\bar{H} + \mu^*\bar{H}^*) \qquad (40)$$

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[87]It is assumed that the parameters and endowments are such that the feasibility constraints $X_1 \leq \bar{H}$ and $X_2^* \leq \bar{H}^*$ hold.

The shadow prices (in global welfare units) of goods 1, 2 and 'clean' air (i.e. $\bar{P}$-P) for consumers are, respectively:

$$\lambda_1 = \left[\frac{(\alpha+\mu)}{\bar{P}+\mu\bar{H}+\mu^*\bar{H}^*}\right], \quad \lambda_2 = \left[\frac{\alpha^*+\mu^*}{\bar{P}+\mu\bar{H}+\mu^*\bar{H}^*}\right], \quad \lambda_3 = \frac{1}{\bar{P}+\mu\bar{H}+\mu^*\bar{H}^*} \tag{41}$$

Note that the shadow prices do not depend on α. Two further observations are in order.

(1) It can be easily shown now that as α increases from zero to 1, U increases and U^* decreases. Eliminating α between (39) and (40) yields the utility possibility frontier of U^* as a function of U. The value of consumption at home (resp. abroad) viz. $\lambda_1 C_1 + \lambda_2 C_2$ (resp. $\lambda_1 C_1^* + \lambda_2 C_2^*$) exceeds disposable income $\lambda_1 X_1$ (resp. $\lambda_2 \lambda_2^*$) by $\alpha\theta_2 - (1-\alpha)\theta_1^*$ (resp. $(1-\alpha)\theta_1^* - \alpha\theta_2$)). Thus an income transfer of $\alpha\theta_2 - (1-\alpha)\theta_1^*$ from country 2 to country 1 is implicit in the above Pareto Optimum. No transfer will be required only for $\alpha = \theta_1^*/\theta_1^* + \theta_2$. [The reason that consumer disposable income is the value of production at consumer prices is that lump sum tax or subsidy needed to finance the wedge between consumer and producer prices has to be subtracted (or added) to the value of production at producer prices (i.e. income at factor cost) to arrive at disposable income at market prices.]

(2) Inspection of (34) - (36) also reveals that if $\theta_i = \theta_i^*$ (i=1,2,3) so that both countries have identical tastes, efficient production and pollution levels (X_1, X_2^* and P) are independent of α. Thus the choice of α affects only the

distribution of the fixed outputs of X_1 and X_2^* between the two countries for consumption purposes. In this case, the utility possibility frontier is given by

$$U^* = (\theta_1 + \theta_2) \; Log \; [1 - e^{-(\delta - U)/(\theta_1 + \theta_2)}] + \delta, \; -\infty \leq U \leq \delta \qquad (42)$$

where $\delta = \theta_1[Log \; \theta_1 - Log(\gamma + \mu)] + \theta_2 \; [Log \; \theta_2 - Log(\gamma + \mu)] + \theta_3 + Log(\bar{P} + \mu \bar{H} + \mu^* * \bar{H}^*)$. It can be seen from (39) - (40) that as $\alpha \to 0$, $U \to -\infty$ and $U^* \to \delta$ and as $\alpha \to 1$, $U \to \delta$ and $U^* \to -\infty$. In fact U^* is a concave function of U as depicted in Figure 2 for the case $\delta > 0$. It is seen that δ represents the maximal utility that either country would achieve if global resources are used to maximize only its utility--in other words, the weight placed on the other country's utility in the global welfare function is zero. With the countries being identical in tastes, this maximal utility is the same for both countries.

We may now use this simple model, with the added simplification of identical tastes[88], to illustrate efficiency-equity conflicts in two different ways.

(1) Suppose first that income transfers between the countries are infeasible so that the only feasible Pareto Optimal allocation is that corresponding to $\alpha = \theta_1/(\theta_1 + \theta_2)$ (point N in Figure 2 which assumes identical tastes). If, say, the welfare U_N of the home economy at N is deemed too low and an increase of it to U_M is deemed desirable, had transfers been feasible, the point M on the utility possibility frontier would have been the optimal way (i.e. with the least loss of foreign welfare) of achieving such an increase. With transfers infeasible, the welfare of the foreign economy would have to be reduced

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[88]The more general case of different tastes is briefly discussed in item (2), however.
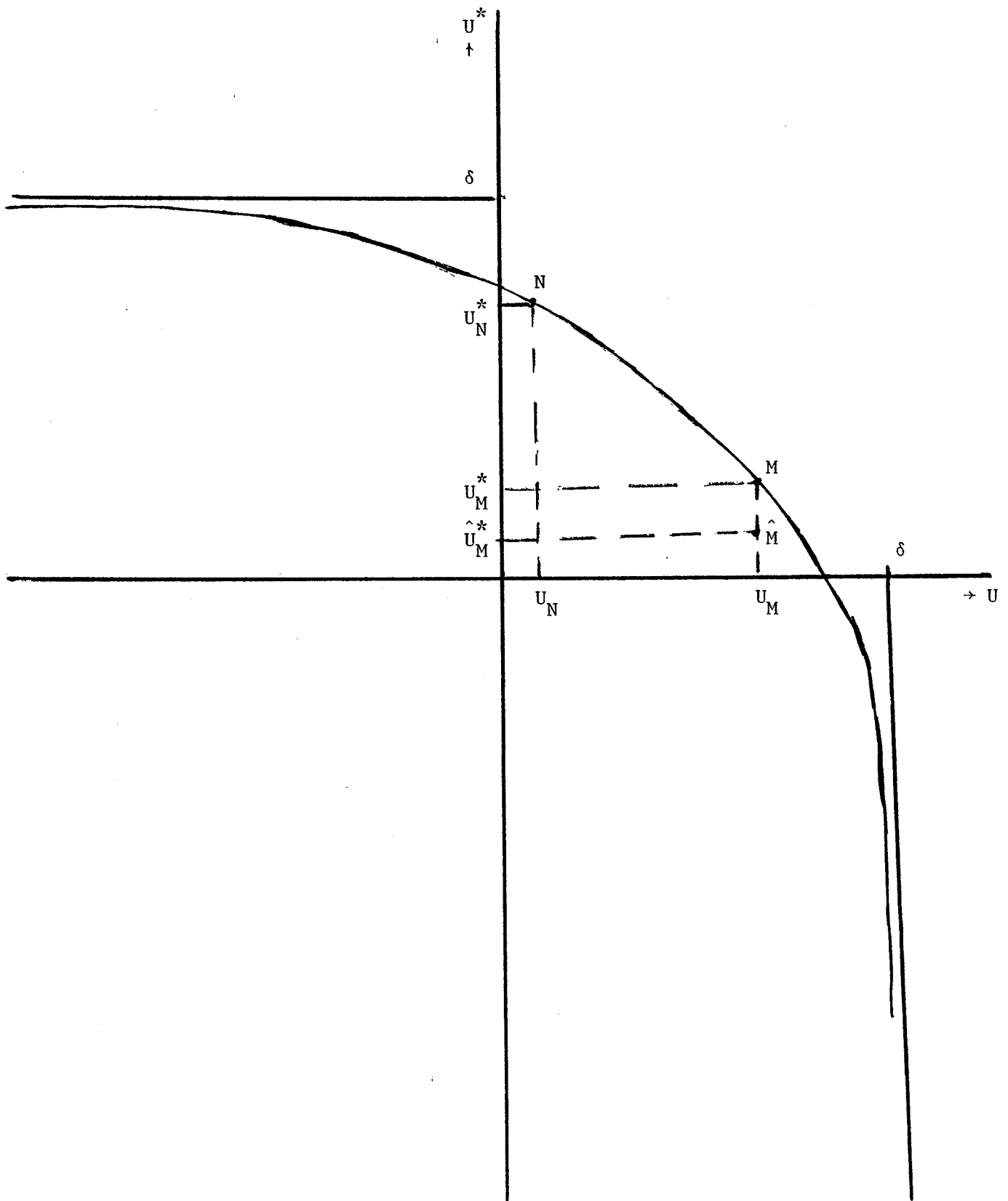
Figure 2

Efficiency and Equity in World Pollution:

General Equilibrium

below U_M^* (say to $\hat{U}_M^*$) for achieving such an increase. Thus the loss $(U_M^* - \hat{U}_M^*)$ is the loss from distributional inefficiency (in departing from Pareto Optimality) incurred in order to achieve equity, given that transfers are infeasible.

(2) However, the no-transfer Pareto Optimal allocation N might be deemed unsatisfactory for a reason other than its being inequitable; the associated global pollution levels may be viewed as "too high." This might happen if it is believed that one or both counties attach 'too low' a value to clean air in their preferences. In the context of out simple model, if preferences are the same in the two countries, a natural way to express this concern is to set an upper bound $\hat{P}$ on pollution levels. Now from (36) it is seen that $P = \bar{P} - (\alpha\theta_3 + (1-\alpha)\theta_3^*)(\bar{P} + \mu\bar{H} + \mu^*\bar{H}^*)$. If tastes are identical so that $\theta_3 = \theta_3^*$, then recall that P is independent of α and equals $\bar{P} - \theta_3(\bar{P} + \mu\bar{H} + \mu^*\bar{H}^*)$. If this exceeds $\hat{P}$, then there is no feasible Pareto Optimum with or without transfers that can achieve the upper bound $\hat{P}$. If it is less than or equal to $\hat{P}$, the upper bound is respected at all Pareto Optima.

Let us consider the case where $\bar{P} - \theta_3(\bar{P} + \mu\bar{H} + \mu^*\bar{H}^*) > \hat{P}$ so that the upper bound represents a binding constraint. Of course, if we give up all production and consumption, net pollution P will be negative since the pollutant-absorbing capacity of the virgin forests will come into full play then. As such, it is feasible to meet the bound $\hat{P}$ by reducing production relative to the levels at a Pareto Optimum. It can then be shown that the <u>efficient</u> way of achieving $\hat{P}$ without transfers is to <u>reduce</u> the output of X_1 and X_2^* by the same proportion so

that $X_1 = \beta X_1^0$, $X_2 = \beta X_2^{*0}$ where X_1^0 *and* X_2^{*0} are the values given by (34) and (35) and

$$\beta = \left[\frac{\hat{P}+\overline{\mu}\overline{H}+\mu^*\overline{H}^*}{\overline{P}+\overline{\mu}\overline{H}+\mu^*\overline{H}^*}\right](1-\theta_3).^{89}$$ Clean air, i.e. $\overline{P}-\hat{P}$, goes up relative to $\overline{P}-P^0$ by the

factor $\left[\dfrac{1-\beta(1-\theta_3)}{\theta_3}\right]$. This *reduces* the welfare of each country by the <u>same amount</u>

$-(\theta_1 + \theta_2)$ Log β - θ_3 [Log $(1-\beta(1-\theta_3))$ - Log θ_3]. While such a reduction is

efficient in meeting the bound $\hat{P}$ on pollution, the incidence might be viewed as

inequitable, if the post-reduction welfare level of one of the countries is

relatively low. Once again, meeting the bound and being equitable at the same

time will then mean deviating from efficiency.

What happens in the <u>general case</u> in which the two countries do not have

identical tastes so that $\theta_3 \neq \theta_3^*$? It is then seen from (36) that pollution P is

an increasing (resp. decreasing) function of α if $\theta_3^* > \theta_3$ (resp. $\theta_3^* < \theta_3$). This

is not surprising since θ_3 (resp. θ_3^*) is analogous to the 'share' of clean air

in the home economy's spending and, as α increases, the home economy's share in

world spending increases. Hence, if the 'share' of clean air in the home

economy's spending is less than that of the foreign economy, pollution increases

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[89]Its efficiency can be demonstrated by showing that this solution
satisfies the conditions for Pareto Optimality subject to the requirements
that pollution does not exceed $\hat{P}$ and there are no transfers. In particular,
we can show that shadow cost of pollution in global welfare units will be the
same in the two countries, though higher than its value at the no-transfer
Pareto Optimum without a binding upper-bound constraint on pollution.

as a greater share of world spending accrues to the home economy.

Now, for concreteness, assume that $\theta_3^* > \theta_3$ so that pollution increases with α. Then, as long as there exists an $\hat{\alpha}$ ($0<\hat{\alpha}<1$) at which pollution equals $\hat{P}$, pollution will be less than $\hat{P}$ for <u>all</u> α in the interval $0 \leq \alpha < \hat{\alpha}$. Of course, unless the no-transfer value of α, i.e. $\theta_1^*/(\theta_1^*+\theta_2)$ is less than $\hat{\alpha}$, the bound $\hat{P}$ cannot be met at a Pareto Optimal allocation if transfers are ruled out: efficiency will have to be sacrificed again in the interest of equity.

Our analysis of this model has then illustrated the following key propositions:

(i) As long as lump sum income transfers between countries are feasible, it is possible to achieve a resource allocation that is at the same time <u>distributionally efficient</u> in the sense that relative to it, any other allocation will make at least one country worse off in terms of consumer welfare, <u>productively efficient</u> in the sense that relative to it in any other allocation there will be less output of at least one commodity or greater pollution, and <u>equitable</u> in the sense of maximizing a global welfare function that incorporates distributional equity among countries while being an increasing function of each country's welfare.

(ii) If such transfers are infeasible, at least one of the above three desiderata have to be given up. For example, a distributionally and productively efficient allocation without transfers was shown to exist that was not deemed equitable. Achieving equity then involves a sacrifice of efficiency in both senses.

(iii) Equity was judged in (i) and (ii) by a global welfare function that was solely a function of the welfare of consumers in each country as perceived

by them. In other words, the welfare evaluations of each country's consumers were respected. If, for example, these evaluations are deemed inappropriate because they attach too little weight to global pollution, then an efficient allocation without transfers that is equitable [in the sense of (i)] may not be satisfactory from the perspective of a global welfare function which overrides consumer-weighing of global pollution. Once again, to achieve a satisfactory allocation, either efficiency or equity in the sense of (i) or both have to be given up.

VIII.   <u>Country-Specific Pollution Generation and Abatement</u>

As noted earlier, the analysis above of global pollution assumed that the outputs of two countries (resp. the resources devoted to pollution abatement) were perfect substitutes for each other in the generation of pollution (resp. in abatement). This assumption is easily relaxed. Consider again the case of global Pareto Optimality of Section V. Let the pollution function (14) be replaced by:

$$P = P[F(X_2,\overline{K}-K_a,\overline{L}-L_a),X_2,K_a,L_a,F^*(X_2^*,\overline{K}^*-K_a^*,\overline{L}^*-L_a^*),X_2^*,K_a^*,L_a^*] \qquad (43)$$

First order conditions (19) - (22) still hold, and as such free trade with respect to consumption continues to be optimal. Conditions (23), (25) and (26) still hold (recall that subscript i of P continues to denote the partial derivative with respect to its ith argument, except P now has eight, instead of four, arguments). Equation (24) is replaced by $[\alpha U_3+(1-\alpha)U_3^*][P_5F_1^*+P_6]+\lambda_1F_1^*+\lambda_2=0$. Equation (27) and (28) continue to hold with P_3 replaced by P_7 and P_4 by P_8.

The only significant result that is different from Case V is that while <u>within each country</u> the marginal rate of substitution between capital and labour

is the same in goods production and pollution abatement, this common rate is not in general the same in the two countries. As such, the factor price equalization result need no longer hold. Also, with the outputs and resources devoted to pollution abatement in the two countries not being perfect substitutes for each other respectively in pollution generation and abatement, the efficiency-equity conflict discussed in Section VII is more likely.

EARLIER LITERATURE

IX. Previous Contributions of Relevance to our Analysis

There is a significant volume of scholarly literature on trade and the environment, most of it in the last three years or so.[90] The literature is diverse in incorporating environmental considerations into economic models and in the policy questions addressed. It is beyond our scope to provide a critical survey and assessment of this literature.

Before discussing the two contributions most closely related to this paper, however, it is worth pointing out that we have mostly confined our analysis to "first best" policies in a context where environmental externalities or other distortions are present. We did so primarily because it is well known that (1) when a number of distortions are present, removing or reducing a subset of them need not be welfare-improving and that whether it is or not would depend on the specific circumstances; and (ii) when first-best policies are infeasible, other policies might exist which will improve welfare over laissez-faire, but in general the ranking of such policies according to the net welfare improvement

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[90]Among the important contributions, aside from those reviewed below, are Lloyd (1992), Snape (1992) and Baumol and Oates (1988). There are many others on issues such as the "race to the bottom", which are not addressed intensively in this paper but are the foci of other authors in this Project.

they bring about is not possible (while of course in particular circumstances it might be).

In the literature, a frequently-posed question is whether moving from autarky to free trade would be welfare-improving. In situations where trade-environment interactions are present and, of course, answers vary depending on assumptions about other policies. This is just another illustration of the first of the two well-known results stated above. After all, the welfare superiority of free trade over autarky depends on the absence of other distortions.

The contributions that come closest to our paper are by Markusen (1975) (1976). Markusen (1975) models pollution much in the same way as we do except that, in his case, the production of only one of the two commodities (the same one in each country) generates global pollution and no abatement is possible. His analysis of 'first-best' policies for maximizing national welfare is the same as for our case IV of a large country but without abatement possibilities: an optimum tariff combined with a production tax is first-best optimal.

He then considers the case when the first-best combination is infeasible and in turn examines the use of consumption taxes only, tariffs only and production taxes only, as second-best policy instruments. He finds that the formulae for the calculation of some second-best instrument contains components of opposite algebraic signs so that taken together they lead to an ambiguous sign for the instrument. This means, first, that whether the instrument will be a tax or subsidy or neither (i.e. laissez-faire) will depend on the numerical balance between the positive and negative components, a balance that can only be decided empirically. Second, even if a second-best instrument has an unambiguous sign, it does not mean that its use will produce a superior welfare outcome compared to another instrument whose second-best value is of ambiguous sign. This is an

illustration of the second of the well-known results stated above: second-best policy rankings are circumstance-dependent.

Markusen (1976) models pollution the same way as Markusen (1975). But now the policy issues are considered, not from the perspective of a single large country which faces no retaliation or ignores it even if it is possible, but in the context of two countries which are 'small' relative to the rest of the world from the perspective of commodity trade but whose production-generated pollution affects the welfare of both. Each government has production and trade taxes as policy instruments at their disposal.

Markusen first solves for the optimum tax structure for each when it takes the other's tax structure as given (Cournot behaviour) thus leading to a Cournot-Nash equilibrium tax structure in the usual fashion. The Cournot-Nash equilibrium is then compared with two types of cooperative equilibria--one without transfer payments and the other with transfer payments. Three conclusions are derived. First, for any distribution of world resources, there exists some set of allocations that make both countries better off relative to some sub-optimal equilibrium. Second, in the absence of transfer payments, there exists a set of cooperative solutions which achieve such an allocation. Third, if transfer payments are permitted, Pareto Optimal allocations that make both countries better off relative to the Cournot equilibrium are attainable. These conclusions are clearly similar to some of ours relating to Nash equilibria and global Pareto Optimality.

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