Environmental and Trade Interdependencies*

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*Presented at the annual meeting of the American Agricultural Economics Association, Baltimore, Maryland, August 8-12, 1992.

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Abstract

There is currently a perceived rift between environmental and free trade interests. This paper demonstrates a framework for analyzing the environmental and welfare effects of various pollution control and trade policies. We find little room for the perceived divergence in interests and recommend cooperation rather than antagonism on these global issues.

Environmental and Trade Interdependencies

As we move toward the 21st century, there are two issues which stand out on the global agenda. Environmental problems and pollution are threatening our planet and our base of natural resources. The environmental movement has become a powerful force, influencing national policy-making and initiating global agreements. At the same time, the world has become increasingly interdependent through trade. Achieving an open world economy offers the promise of growth and prosperity, despite the substantial current frictions among trading partners.

Both the environmental and free trade visions embrace the concept of a common spaceship earth on which we are mutually interdependent. It appears, however, that conviction toward one of these visions often blinds its proponents to the other. Environmentalists frequently view free trade as a detriment to sustainable resource use. Free traders commonly see national environmental policies as barriers to an open world economy.

It is a matter of record that many environmentalists are opposed to free trade. Jay Hair, president of the National Wildlife Federation expresses the concern, for example, that "the United States' more stringent health and environmental standards could be overridden" in the current GATT talks. He recommends instead that import and export restrictions "central to a sound conservation policy" be allowed. Other environmentalists draw similar conclusions and have lobbied against trade liberalization. However, this solution is one-dimensional and is inconsistent with maximizing long-run global welfare.

Free traders, on the other hand, are often insensitive to environmental

degradation. For example, in the recent revision of his seminal 1973 statement of the case for free agricultural trade, World Agriculture in Disarray, D. Gale Johnson fails to address environmental issues. Free traders observe that conservation arguments often have been used to justify supply controls with price support objectives and that obtrusive health and environmental regulations have been used as implicit trade barriers. This observation may explain the insensitivity of free traders to environmental concerns. But it does not lessen the importance of real environmental problems.

Building a Bridge

Developing a sense of commonality between environmentalists and free traders is an important challenge for the 21st century. Toward this end, we draw on a simple framework to evaluate the environmental and welfare effects of alternative pollution control and trade policies.

For exposition, we assume there are two countries, an importer (A) and an exporter (B), producing and trading in a partial equilibrium framework. Production in either country creates an externality that pollutes the environment. Thus, the social marginal cost of production exceeds the private marginal cost of production if the expenses of cleaning up the pollution, or of using an alternative non-polluting technology, are not borne by private firms. This drives a wedge between the supply curve based on social costs and that based on private costs.

Within this simplified set-up, we consider how environmentalists and free traders might evaluate four alternative policy scenarios. The policies for each case and their effects are summarized in the accompanying table and a graphical analysis of the cases is given in the afterword.

In the first case, both countries A and B internalize the environmental costs into

their private production functions, and there is free trade between the countries. These policies are optimal from an environmental point of view because all social costs are being accounted for. Both countries also receive the full benefits of free trade and world welfare is maximized. Hence, there should be no disagreement between environmentalists and free traders that this is a desirable choice of policies.

In the second case, both countries are ignorant of the social costs of production, or simply choose not to internalize these costs, but there is still free trade between the countries. This leads to a production distortion (too much output). The outcome is undesirable from an environmental perspective and environmentalists should object. It is also suboptimal from a welfare standpoint, with welfare lower than in the first case. Free traders will be indifferent between the policies pursued in the first and second case if they only care that there are no barriers to trade. If they also care about welfare, then they should not consider the second case desirable.

Now suppose country A becomes aware of the environmental costs and makes producers account for them, while country B remains ignorant of these costs or chooses not to internalize them. Free trade is still occurring. The policies of country A assume that, despite domestic environmental concerns, it respects B's sovereignty or is not concerned about pollution there (perhaps because the environmental effects are contained within a country, as with groundwater contamination or the loss of open spaces). World pollution is lower than in the second case, and world welfare remains lower than in the first case.

If environmentalists are only concerned about reducing pollution in country A, then they will prefer the policies in the third case over those in the second case, but not necessarily over those in the first. Free traders will be indifferent again only if they are

concerned solely with open trade channels, not with world welfare.

Finally, suppose that country A also cares about environmental degradation in country B. This concern could arise because of an altruistic global vision of the world environment or because environmental effects are global (examples include global warming and ozone depletion, or, in a multicountry context, subglobal transfrontier pollution such as acid rain and toxic dumping). Now country A may try to influence environmental policy or production in country B.

If country A cannot convince country B to internalize the social costs, the most it can do to reduce worldwide environmental degradation is to internalize the costs domestically and impose a complete ban on trade. This causes a state of autarky, and comes, in our example, at a high cost in lost world welfare. In this case, the interests of environmentalists and free traders diverge. Environmentalists may be happy with the policies, because they lower global pollution as much as possible given that country A cannot dictate environmental policies in country B. But free trade advocates will oppose these policies because both countries are losing the benefits from trade. Further, the first case remains the optimal policy. If forcing a state of autarky is detrimental to reaching global environmental agreements, environmentalists will be myopic to favor this use of trade barriers.

Moderating the Conflict

In our analysis of the environmental and welfare effects of various pollution control and trade policies, we find little conceptual room for the perceived divergence in interests between environmentalists and free traders. The best policy mix lies in our first case, with all countries internalizing environmental costs and trading freely. In this case, we have shown that the maximization of world welfare is consistent with world pollution

control. Neither environmentalists nor free traders should be satisfied in the second and third cases, in which environmental externalities are ignored. In particular, free traders should temper their focus on the benefits of trade with concern for the environment. Likewise, the potentially high welfare cost of using trade barriers as environmental policy tools, as in our fourth case, should be mutually recognized. This recognition should temper the arguments of some environmentalists.

While movement toward optimal environmental and trade policies can come either through independent national decisions or international agreements, it is likely that continuing and expanded efforts will be needed on an international front if global environmental and trade problems are to have long-term solutions. Recognition that there are environmental problems that cannot be solved by individual countries is vital. Less, rather than more, barriers to trade are also needed. Environmental and trade problems require nations to look at the full picture of the effects of their policies on the environment and welfare. The connections between environmental policy and international trade policy are becoming clearer. In the world economy, these interests can be compatible, and should not be conflicting. If we are to survive and prosper in the twenty-first century, we must all work together. We share only one spaceship earth and the sooner we recognize it, the better.

AFTERWORD - GRAPHICAL ANALYSIS OF THE FOUR CASES

The following analysis presents the graphical background used to obtain the results in our essay. Each country has a private marginal cost curve (PMC), which does not account for the externality, and a social marginal cost curve (SMC), which includes the costs of the externality. Welfare is measured by the sum of producer and consumer

surplus less social costs from the externality.

Case 1: Environmental Costs Internalized, Free Trade

Both country A and country B have internalized the environmental costs of production and are operating on the SMC curves. The equilibrium world price is P_1. World welfare, measured by the sum of producer and consumer surplus in countries A and B, is maximized.

Case 2: Environmental Costs Not Internalized, Free Trade

In this case, neither country is accounting for the environmental costs of production. Firms in both countries are operating on the PMC curves. Because the true costs of production are not being accounted for, equilibrium world price is at P_2, a lower price than in case 1. This lower world price is achieved at the expense of environmental degradation.

Comparing case 2 with case 1, there is welfare gain in the importing country A as a result of the lower world price, which raises consumer surplus. There is also a welfare loss as the social cost from the production distortion negates some of the previous consumer surplus. In country B, welfare losses arise from a combination of the loss of producer surplus, due to lower world price, and the social cost from the production distortion. World welfare is lower than in case 1 since the gain in country A is less than the quantity of imports at P_2 multiplied by the price difference P_1-P_2, while the loss in country B is greater.

Case 3: Environmental Costs Internalized in Country A Only, Free Trade

In this case, only country A internalizes the environmental costs of production. The equilibrium world price, P_3, is lower than P_1 because country B is on the PMC curve, but is higher than P_2 because, for any given price, the demand for imports by country A

has increased compared to case 2. There is less pollution being created in the world than in case 2 since world production has fallen and some of the output is produced without a pollution externality. World welfare is again lower than in case 1.

Case 4: Environmental Costs Internalized in Country A Only, No Trade

In this case, country A is operating on its SMC curve, while not allowing trade with country B. The price in country A rises to P_A, and all of the product consumed in country A is supplied domestically. This forces the price in country B to P_B. As shown in the figure, consumer surplus in country A and producer surplus in country B are reduced significantly as compared with case 1. While some of these reductions result in transfers between consumers and producers, there is a large overall loss in world welfare.

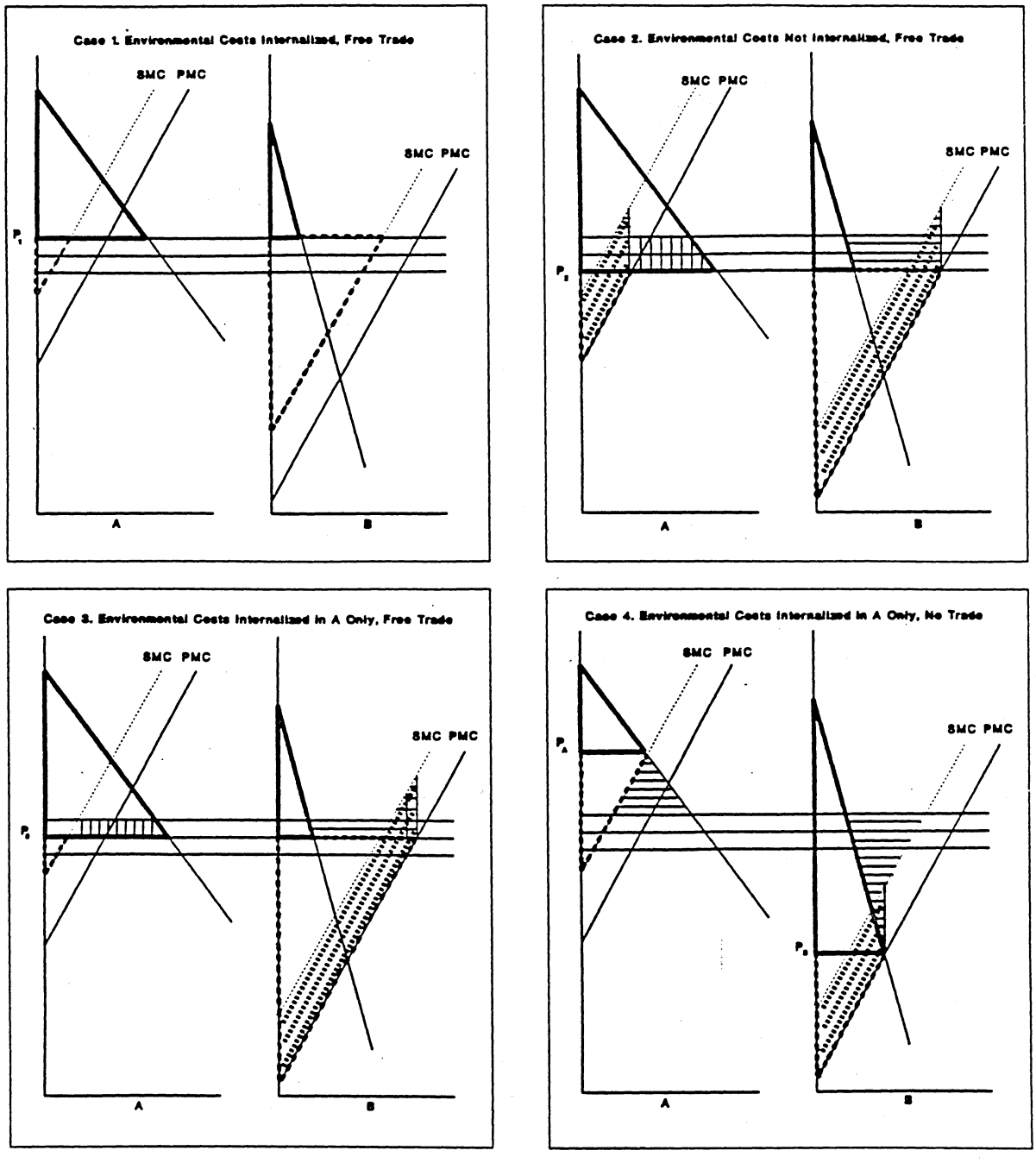
References

Hair, Jay D. "Trade Talks Could Take Environmental Toll." National Wildlife. Fall 1990, p. 30.

Johnson, D. Gale. World Agriculture in Disarray, second edition. New York, New York: St. Martin's Press, 1991.

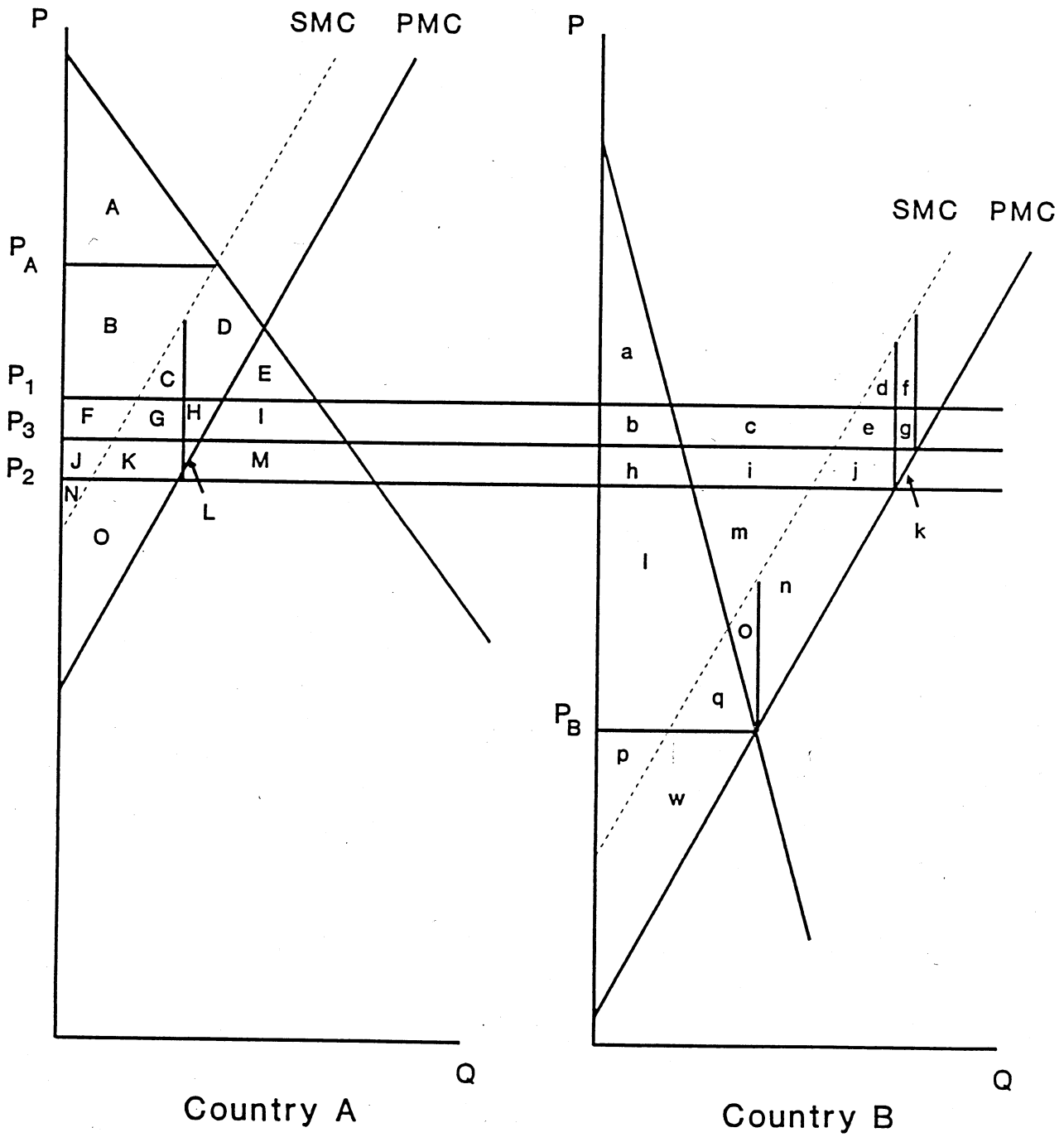
Table 1. Summary of Policies and Their Environmental, Trade, and Welfare Effects

Policy	Implicit Objective Function	Effects On: Environment	Trade	Welfare
Case 1 Environmental Costs Internalized, Free Trade	Global environmental quality and welfare	No degradation	No barriers	Maximized
Case 2 Environmental Costs Not Internalized, Free Trade	Private comparative advantage	Most degradation	No barriers	Reduced
Case 3 Environmental Costs Internalized in Country A Only, Free Trade	Environmental quality in Country A	Some degradation	No barriers	Reduced
Case 4 Environmental Costs Internalized in Country A Only, No Trade	Global Environmental quality (constrained)	Little degradation	No trade	Lowest



Alternative Environmental and Trade Policies

Appendix A. Welfare Effects



Appendix A. Welfare Effects

Case 1: Environmental Costs Internalized, Free Trade (Price at P_1)

	Country A
Consumer Surplus	A+B+C+D+E
Producer Surplus	F+J+N
Social Cost	none
Net Welfare	A+B+C+D+E+F+J+N

	Country B
Consumer Surplus	a
Producer Surplus	b+c+h+i+l+m+p
Social Cost	none
Net Welfare	a+b+c+h+i+l+m+p

Case 2: Environmental Costs Not Internalized, Free Trade (Price at P_2)

	Country A
Consumer Surplus	A+B+C+D+E+F+G+H+I+J+K+L+M
Producer Surplus	N+O
Social Costs	C+G+K+O
Net Welfare	A+B+D+E+F+H+I+J+L+M+N

	Country B
Consumer Surplus	a+b+h
Producer Surplus	l+m+n+o+p+q+w
Social Cost	d+e+j+n+o+q+w
Net Welfare	a+b+h+j+l+m+n+o+p+q+w

Change in net welfare from Case 1

Country A	Country B
H+I+L+M-C	-c-d-e-i-j

Case 3: Environmental Costs Internalized in Country A Only, Free Trade (Price at P_3)

	Country A
Consumer Surplus	A+B+C+D+E+F+G+H+I
Producer Surplus	J+N
Social Cost	none
Net Welfare	A+B+C+D+E+F+G+H+I+J+N

	Country B
Consumer Surplus	a+b
Producer Surplus	h+i+j+k+l+m+n+o+p+q+w
Social Cost	d+e+f+g+j+k+n+o+q+w
Net Welfare	a+b+h+i+l+m+p-d-e-f-g

Change in net welfare from Case 1

Country A	Country B
G+H+I	-c-d-e-f-g

Case 4: Environmental Costs Internalized in Country A Only, No Trade (Price in A at P_A, Price in B at P_B)

	Country A
Consumer Surplus	A
Producer Surplus	B+F+J+N
Social Cost	none
Net Welfare	A+B+F+J+N

	Country B
Consumer Surplus	a+b+h+l+q
Producer Surplus	p+w
Social Cost	o+q+w
Net Welfare	a+b+h+l+p-o

Change in net welfare from Case 1

Country A	Country B
-C-D-E	-c-i-m-o