Does Trade Help or Hurt the Natural Environment: Perspectives from Lateral Pressure Theory

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Hotel Boulderado, Boulder, Colorado, April 6, 2002

Abstract

The question of whether trade helps or hurts the natural environment has led to a decade of dialogue between economists and environmentalists (Williams 2002). Its terms were stated concisely in the pages of *Scientific American* with economist Jagdish Bhagwati (1993) arguing that trade helps the environment and Herman Daly (1993) that it hurts. Its salience was established on the streets of Seattle in 1999, Prague in 2000, and Quebec City and Genoa in 2001 with the WTO, IMF, World Bank, and G7 taking the pro-trade position and environmental protesters the anti-trade. One explanation for the protests concerns the dialogue's lack of constructive engagement. Lofdahl (2002) establishes common ground by examining the economists' pro-trade and environmentalists' anti-trade positions using common economic tests. Empirical evidence organized by lateral pressure theory and complex models demonstrates that, contrary to accepted economic wisdom, international trade hurts the global natural environment.

This study furthers the dialogue by contrasting and comparing Lofdahl (2002) with Lomborg (2001) and Bhagwati (2002), which leads to several conclusions. First, complex models can capture and connect both social and natural systems allowing for studies that have proven problematic for economists. Second, crafting studies that encompass social and natural systems offers the possibility of moving beyond the current conversational impasse between economists and environmentalists toward a more constructive policy dialogue. Third, complex models differ from their economic counterparts by representing multiple variables separately; striving to balance competing concerns rather than optimizing an artificially reduced variable space leads to more sophisticated policy prescriptions. Lastly, complex computer models are controversial in the economic, environmental, and policy communities but will doubtless prove necessary in addressing the hard economic and environmental problems of the twenty-first century.

Introduction

The trade and environment debate has recently, almost by force of the media coverage, been defined by the anti-trade riots. The visual drama of the demonstrations in Seattle, Prague, Quebec City, Genoa, and a host of other cities has pushed aside and hidden the intellectual ideas and issues driving the disagreement. It would be advantageous for both the quality of the debate and the health of its participants to back away from the protests and move toward a respectful engagement of ideas. As with all debates, there are two sides: in this case, the economists who are pro-trade and the environmentalists who are anti-trade. While economists and environmentalists have traded views since the days of Ricardo and Malthus (Lofdahl 2002, 128--131), the debate heated up and took fresh form in the 1990s with the ascendancy of global environmentalism and the advent of more muscular environmentalists (Williams 2002).

For a true debate to exist, each side must listen to the other, which has not been the case recently with economists and environmentalists. Instead an ongoing impasse has led to exasperation and indignation on both sides, a development noted by World Trade Organization (WTO) President Michael Moore: "Sweeping generalizations are common from both the trade and environmental community, arguing that trade is either good for the environment, full stop, or bad for the environment, full stop, while the real-world linkages are presumably a little bit of both, or a shade of gray" (qtd. in Economist 1999). To get both sides talking and communicating in a constructive manner, Moore implies that each must see the truth and value in the other side's argument.

The first step towards better communication is to articulate clearly the respective positions. One of the earliest, clearest, and most concise articulations of the trade and environment debate appears in the pages of *Scientific American* with economist Jagdish Bhagwati (1993) taking the pro-trade position and environmental economist Herman Daly (1993) the anti-trade. *Environmental Impacts of Globalization and Trade,* or EIGT (Lofdahl 2002), was written to evaluate empirically whether trade helps or hurts the environment: it reports that international trade, contrary to common economic wisdom, hurts the natural environment. The inquiry engages and connects both sides of the debate by including the social and natural environments within the same analytic framework using lateral pressure theory and complex systems methodologies.

Within the framework of the trade and environment debate, EIGT is a statement from environmentalists to economists. Two recent works can be characterized as countervailing statements from economists to environmentalists: Lomborg (2001), a work of statistics, and Bhagwati (2002), a work of economics. So far Lomborg and Bhagwati have yielded more heat than light. It must be recognized though that both are responding in part to the aggressive methods employed by the anti-trade protesters, so an impassioned response is understandable. Be that as it may, protestors are at least partially motivated by a historical lack of conversational engagement and policy dialogue with economists. Moreover, environmental scientists are not the same as environmental protesters. Incorporating the results and findings of environmental scientists into the economic policy dialogue would go a long way towards diffusing the anger of the protesters and improving the quality of the debate.

Empirical Observations and Complex Systems

Bjorn Lomborg is a professor of statistics and political science at Denmark's University of Aarhus. His book, *The Skeptical Environmentalist* (Lomborg 2001), purports to check the data, sources, and citations of multiple environmental studies and finds them lacking. Fair enough – a review of the environmental policy literature tends to yield little in the way of sophisticated quantitative analysis, partly because environmental systems are complex and hard to measure and partly because environmentalists, especially in the policy community, do not have a taste for it. This shortcoming should be addressed, and to punctuate the point, the Economist (2001) selects the example of Canadian deforestation for extended examination, "just to get a flavour."

> The Worldwatch Institute has claimed that the world's forests have "declined significantly" in recent decades. In fact, the longest data series, gathered by a United Nations agency, shows that global forest cover grew between 1950 and 1994. In particular, the institute noted, Canada is losing 200,000 hectares of forest a year. On checking the quoted source, Mr. Lomborg finds that Canada's forests grew by 174,000 hectares a year. This is representative: the book exposes countless errors, evasions and distortions of this sort.

Were the disagreement limited to data veracity then the issue might simply be acknowledged with the discussion quickly turning to how best fix the problem. However, the reaction of Lomborg's critics goes a good deal beyond matters of empirical accuracy and citation quality. The titles used by Lomborg's respondents tell a more impassioned story: "Population: Ignoring its impact" (Bongaarts 2002), "Energy: Asking the wrong questions" (Holdren 2002), "Biodiversity: Dismissing scientific process" (Lovejoy 2002), and "Global Warming: Neglecting the complexities" (Schneider 2002). Rennie (2002) gets closest to the real problem with his article entitled, "Misleading math

about the Earth." Rather than address the whole of Lomborg (2001), a task that others are better positioned to undertake, let us continue with the Canadian forestation example, just to get a flavor.

To begin, nothing is said about the quality or type of Canadian forests in question: Lomborg confuses old growth, second growth, and commercial tree plantations (Lovejoy 2002, 71), and there is a difference. Monoculture tree plantations may look like forests but are not, both in terms of absent forms of attendant forest life and their very unsustainabily. After a few generations of trees have been harvested on a plantation, the soil becomes depleted of nutrients and the trees become stressed and sick, a phenomenon known as *Waldsterben* or "the dying forest" (Maser 1988, 69). Canada has an immense forest products industry, so the forest area discrepancy is conceivably due to environmentalists counting only the sustainable, natural forests while more optimistic, economic analysts include artificial forest monocultures. Answering this question requires a deeper understanding of forest types and differences, a task far harder than simply contrasting and comparing data sources.

Another explanation is offered that explicitly accounts for and explains Canadian forest growth. In the trade and environment literature there is a distinction between the rich, developed North and the poor, developing South. They are separable in terms of GNP and population with the North having a preponderance of GNP and the South a preponderance of population (Lofdahl 2002, 69), a distinction that can be verified empirically (Lofdahl 2002, 107). There are 40 Northern countries, Canada included, with

a total population of 1 billion people and 114 Southern countries with a total population of 4 billion as of 1992. Most importantly for the discussion at hand, Northern countries are gaining forests and Southern countries are losing them (Lofdahl 2002, 93). An understanding of the divisions within the international system leads to the prediction that high GNP, Northern countries like Canada will feature *increasing* forests. The study goes on to explain that growing Northern forests are made possible by the externalization of Northern environmental costs onto poorer, Southern nations through trade (Lofdahl 2002, chap. 4).

The Economist (2001) points out that Lomborg is an expert in numbers and sources, but it must be recognized that, "observations without theories to organize them tend to confuse more than they clarify" (Lofdahl 2002, xvi), and this seems to be the problem with *The Skeptical Environmentalist*. While numbers are manipulated and sources are checked, there is an underlying complexity to natural systems, social systems, and their interaction that is easy to get wrong in a facile analysis. Consequently it is easy to make unsupportable inferences without an understanding of the complex relationships that underlie and order such systems. Two such arguments were made here to explain Canadian forest growth: first, that different types of forests should be counted differently; and second, that the structure of the international system predicts growing forests in Canada but shrinking forests in the poorer and larger South. If Rennie (2002) is correct, Lomborg's errors in this regard extend beyond his analysis of forest growth to include population, energy, biodiversity, and global warming as well.

Economic Theory and Environmental Policy

Jagdish Bhagwati is a professor of international economics at Columbia University and a passionate defender of free trade (Bhagwati 1993; 2001; 2002). Unlike Lomborg, Bhagwati has a rich collection of economic theory to order his empirical observations, and he makes full use of it, although visceral appeals do appear:

> When I was at Seattle and facing a tough Chinese Red Guards-style female demonstrator who was blocking my way illegally down a road and threatening me with bodily harm if I persisted, my good friend … drew me away from the confrontation that would have surely left me bloodied, saying, "You are the foremost free trader today; we cannot afford to lose you!" It was meant to be funny, and it was. But it also was a pointed reference that there were not too many of us out there, fighting the fight for free trade. We need to change that. (Bhagwati 2002, 10)

Princeton economist Avinash Dixit, also responding to the excesses of the anti-trade protesters, defines a new type of actor, "`Seattle-person', the offspring of an alliance between forces of ignorance and special interests" (qtd. in Bhagwati 2002, back cover). Dixit captures the response by economists to trade's critics, that they are irrational and questionably motivated. In the past critics of free trade focused on unemployment; today they focus on the environment. From the economist's point of view, the tactics have changed, but the result is the same – trade is under attack and requires defense.

At stake is welfare of the world's poor who, Bhagwati and Dixit maintain, are the primary beneficiaries of free trade. According to them, trade is a mechanism that transfers the goods of the industrialized world to less-developed countries, and this view is supported by history. Throughout the twentieth century, and especially its second half, trade liberalization brought huge welfare benefits to Southern countries; Bhagwati

therefore argues that trade liberalization should continue. Environmentalists essentially agree that trade leads to economic growth and economic growth is good for populations. Where economists and environmentalists disagree is in the relationship between growth and the environment with economists arguing that growth helps the environment and environmentalists that it hurts, hence the controversy surrounding Lomborg (2001). If it is true that the environment is doing well, then economists can continue pursuing growth as usual. Environmentalists however maintain that the environment is not doing well and that it will not support continued, trade-driven growth of the global economy.

Bhagwati addresses the trade and environment debate in terms of market failures and cost-benefit analysis:

> I should state that the best solution need not produce a level of environmental damage that pleases environmentalists if the cost of producing a reduction in such damage exceeds the cost to national income at the margin. By setting the value attached to environmental improvement sufficiently high, this margin can be extended in favor of a higher environmental protection as desired. Thus, the environmentalists in the United States believe that the legislation for clean air and water cannot be subjected to cost-benefit analysis, by which they mean of course that the shadow price of environmental degradation on these two dimensions is set at infinity. (Bhagwati 2002, 62)

This economic style of argument leads to several related observations. First, Bhagwati places the trade and environment debate into an economic model and then criticizes environmentalists because it does not fit. This is implied when he states that the shadow cost of environmental degradation is set at infinity – within the economic model, such a price point is irrational as it precludes economic development thereby invalidating the model or at least rendering it useless. Second, there is an implicit criticism of the rich

North, as represented by environmentalists in the United States, as Bhagwati believes the North is attempting to deny the poor South the benefits of economic development, which is unfair because the South just wants to follow the development path to prosperity as defined and pursued by the North.

Third, consider the possibility that, with ever decreasing amounts of natural environment, the shadow price is accurate and really is moving to infinity, which is essentially the argument offered by environmentalists. Holdren (2002) goes so far as to say that the world is not running out of energy, "we are running out of environment." Restating the argument within Bhagwati's model, as the supply of environment runs out (cf. Lomborg 2001), then it is to be expected that environmental prices would rise, and if the very health of the planet is at stake, then the price should indeed be high. Fourth, Bhagwati states that cost-benefit analysis leads to a "best solution" in two dimensions, which is methodologically both problematic and revealing. The whole idea of setting a price on the environment is problematic: first because economics, economies, and economic actors all presuppose a healthy natural environment; second it is impossible to calculate environmental prices on the margin. An infinite environmental cost would accrue to the last acre of nature that, if developed, would push the global natural environment into an unrecoverable condition. Such an experiment is both infeasible and undesirable. But more than that, such questions and thinking naturally arise when arguing about tradeoffs in two dimensions. Economists tend to assign worth according to what somebody is willing to pay, but that kind of valuation does not really apply to the environment.

The natural environment is not a homogeneous quantity that can be subdivided and distributed into any configuration deemed necessary or convenient by the world economy. The natural environment is itself a multidimensional system that cannot be understood according to two-dimensional analysis. A more multidimensional and complex understanding would allow for more fruitful discussions in several respects. First, complex models differ from their economic counterparts by representing multiple variables separately; striving to balance competing concerns rather than optimizing an artificially reduced variable space leads to more sophisticated policy prescriptions. Second, the use of complex models allows for an understanding of environmental processes more sophisticated than that obtained by the economic calculation of shadow prices. Third, complex environmental models can be expanded to encompass both economic and environmental variables, which leads to a more profound policy conversation regarding trade and development tradeoffs. Economists are used to arguing in terms of supply and demand. However, the supply of goods is derived from nature, and once used the effluents return to nature. In earlier times such flows were costless and could be discounted. Some regions, such a London and Pittsburgh, learned through experience that the economic costs of air pollution could not be ignored indefinitely. This lesson is currently being learned anew on the international scale.

Conversational Conclusions

The policy conversation between economists and environmentalists is currently impoverished, with the former labeled overly optimistic and the latter over pessimistic (Wilson 2002), as if their ideological proclivities had some bearing on the workings of

the natural environment. Since there is little common ground between the two sides, perhaps the criticism of ideological predispositions is the best one can expect, but given the stakes of the debate, one hopes not. Williams (2002) gives a short history of the trade and environment debate, which is about 10 years old in its current form, and separates it into political, economic, and legal dimensions. Bhagwati (2002, front cover) states that, "free trade faces strong new challenges from a variety of groups, including environmentalists and human rights activists as well as traditional lobbies who wrap their agendas in the language of justice and rights." Bhagwati here implies that his environmental detractors are long on general complaints and short on empirical specifics; indeed, Williams (2002) offers little in the way of empirical or methodological support. EIGT attempts to fill this missing element in the trade and environment debate by providing empirical evidence that trade hurts the environment.

Showing that trade hurts the environment, while it may push the debate forward, by no means settles it. The key remaining question concerns trade policy: certainly trade will continue, but how best to arrange and shape it so that its environmental impacts are minimized? Nordstrom and Vaughan (1999) offer a range of trade policy prescriptions from an economic perspective (see Appendix A). Rather counter them with separate policies from an environmental perspective, a superior solution would be to evaluate the likely consequences of proposed policies from the economic and environmental perspectives simultaneously. This would lead not only to a more constructive dialogue between economists and environmentalists but also to better trade policies that would take into consideration the world's poor and the global environment.

Appendix A – Nordstrom & Vaughan (1999) Policy Prescription Synopsis

- Most environmental problems result from polluting production processes, certain kinds of consumption, and the disposal of waste products – trade as such is rarely the root cause of environmental degradation, except for the pollution associated with transportation of goods;

- Environmental degradation occurs because producers and consumers are not always required to pay for the costs of their actions;

- Environmental degradation is sometimes accentuated by policy failures, including subsidies to polluting and resource-degrading activities – such as subsidies to agriculture, fishing and energy;

- Trade would unambiguously raise welfare if proper environmental policies were in place;

- Trade barriers generally make for poor environmental policy;

- Not all environmental standards should necessarily be harmonized across countries;

- The competitiveness effects of environmental regulations are minor for most industries;

- A good environmental profile is often more of an asset for a firm than a liability in the international market-place, notwithstanding somewhat higher production costs;

- Little evidence bears out the claim that polluting industries tend to migrate from developed to developing countries to reduce environmental compliance costs;

- Yet, environmental measures are sometime defeated because of concerns about competitiveness, suggesting a need for improved international cooperation on environmental issues;

- Economic growth, driven by trade, may be part of the solution to environmental degradation, but it is not sufficient by itself to improve environmental quality – higher incomes must be translated into higher environmental standards;

- And not all kinds of economic growth are equally benign for the environment;

- Public accountability and good governance are essential to good environmental policy, including at the international level;

- Effective international cooperation is essential to protect the environment, especially in respect of transboundary and global environmental challenges.

- The cooperative model of the WTO, based on legal rights and obligations, could potentially serve as a model for a new global architecture of environmental cooperation.

- Meanwhile, even within its current mandate, the WTO could do a few important things for the environment. The most obvious contribution would be to address remaining trade barriers on environmental goods and services in order to reduce the costs of investing in clean production technologies and environmental management systems. Another contribution would be to seek reductions in government subsidies that harm the environment, including energy, agriculture and fishing subsidies.

References

Bhagwati, Jagdish. 1993. "The Case for Free Trade." *Scientific American* 269 (November): 42--49.

Bhagwati, Jagdish. 2001. "Targeting Rich-Country Protectionism: Jubilee 2010 et al." *Finance & Development* 38(3), September.

Bhagwati, Jagdish. 2002. *Free Trade Today*. Princeton, NJ: Princeton University Press.

Bongaarts, John. 2002. "Population: Ignoring its impact." *Scientific American* 286 (January): 67--69.

Daly, Herman. 1993. "The Perils of Free Trade." *Scientific American* 269 (November): 50--57.

Economist. 1999. "Embracing Greenery." *The Economist*, October 9.

Economist. 2001. "Doomsday Postponed." *The Economist*, September 6.

Holdren, John P. 2002. "Energy: Asking the wrong question." *Scientific American* 286 (January): 65--67.

Lofdahl, Corey L. 2002. *Environmental Impacts of Globalization and Trade: A Systems Study*. Cambridge, MA: MIT Press.

Lomborg, Bjorn. 2001. *The Skeptical Environmentalist: Measuring the Real State of the World*. New York: Cambridge University Press.

Lovejoy, Thomas. 2002. "Biodiversity: Dismissing scientific process." *Scientific American* 286 (January): 69--71.

Maser, Chris. 1988. *The Redesigned Forest*. San Pedro, CA: R.& E. Mills.

Nordstrom, Hakan and Scott Vaughan. 1999. *Trade and Environment*. Geneva: WTO.

Rennie, John. 2002. "Misleading Math about the Earth." *Scientific American* 286 (January): 61.

Schneider, Stephen. 2002. "Global Warming: Neglecting the complexities." *Scientific American* 286 (January): 62--65.

Williams, Marc. 2002. "Trade and Environment in the World Trading System: A Decade of Stalemate?" *Global Environmental Politics* 1(4): 1—9.

Wilson, Edward O. 2002. "The Bottleneck." *Scientific American* 286 (February): 82—91.