

Trade and the Environment

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Abstract

As the world's economies become more integrated and subsequently the global economy grows, there is increasing concern regarding how such trends will affect the environment. In fact, the relationship between trade and the environment has become quite contentious in the political realm. In part in response to these controversies, a burgeoning amount of academic attention. While there have been significant advances in the thinking about these relationships, significant challenges remain. Moreover, the gains achieved in our understanding of the trade/environment nexus have fallen far short of influencing policy discussion on these issues. This paper provides a critical taxonomy that will help scholars better understand the overwhelming literature on the subject and also outlines three key challenges that scholars and policy makers will face for a second wave of thinking on the subject.

I. Introduction

The world economy is witnessing a new wave of *economic globalization*, defined as the integration of the world's economies through an increasing array of multilateral, regional, and bilateral trade and investment agreements, as well as numerous examples of governments who unilaterally are reducing the role of the state in economic affairs—and the subsequent increase in the flow of goods, services, and information across the globe. There have indeed been large increases in the volumes of international trade and investment in the world economy. According to the World Bank, trade (exports plus imports) as a percent of world gross domestic product (GDP) was 24 percent in 1960, 38 percent in 1985, and 52 percent in 2005. In other words, over half of all economic activity in the world economy that is close to 50 trillion dollars in size, is traded.

The environment is also experiencing profound change. According to the recent Millennium Ecosystem Report conducted by 1,300 experts from 95 countries, “60 percent of the ecosystem services that support life on Earth – such as fresh water, capture fisheries, air and water regulation, and the regulation of regional climate, natural hazards and pests – are being degraded or used unsustainably” (1). Such degradation is proving to be costly in economic terms. The World Bank and other international agencies estimate that the economic costs of environmental degradation can range from 6 to 10 percent of GDP on an annual basis.

How close are these trends related? In other words, to what extent is the integration of the world's economies and the subsequent rise in world trade and investment affecting environment quality and the politics and policies of environmental mitigation? Early political debates in the late 1980s and 1990s were rife with contention over this issue. In what is now seen as rather simplistic depictions of a very complex set of interactions many argued that trade would automatically improve the environment,

while others said that trade automatically makes the environment worse off. At this writing it is generally understood that trade has had both positive and negative impacts on the environment, and that public policies are needed to ensure that trade works for the environment. However, what form those policies take and the extent to which those policies are obtainable in a globalizing world is a topic still rife with contention.

This article provides a critical review of the burgeoning field of interdisciplinary research and policy analysis that has emerged surrounding trade and the environment. Scholarly work on trade and environment, mirrored in part by policy discussions on the subject, can be divided into three sub-categories:

1. **Trade and Environmental Quality:** to what extent to which trade and investment flows, and the policies that lead to increases in such flows, affect environmental quality both positively and negatively. This literature consists of work largely conducted (but not exclusively) by economists and natural scientists.
2. **Trade and Environmental Policy:** the conclusion of the previous literature is in the absence of effective public policy, trade can adversely affect environmental quality. Such a conclusion spawns a discussion of the policy and governance necessary to ensure that trade and environmental quality are both positive. This sub-field examines the extent to which new trade rules affect the ability of nations and the global governance institutions outside the trade regime to deploy effective environmental policy. There also is a literature on the extent to which new environmental policies will affect the ability of firms to compete internationally. This literature is often conducted by legal scholars, economists, and political scientists.
3. **Trade and Environmental Politics:** Both the impacts of trade on the environment, and the politics of public policy to mitigate such impacts are highly controversial in the political realm. It should thus come as no surprise that a cadre of political scientists has arisen that examines the political economy of environmental aspects of trade policy and conversely the trade aspects of environmental policy. This work is largely conducted by political scientists.

After almost twenty years of research that includes countless volumes, special journal issues, articles, testimony and so forth a number of the more contentious issues that arose in the beginning of debates over trade and environment have reached close to consensus. A number of issues however are as controversial as ever. After providing a background to the three sub issues, this paper will demonstrate where consensus lies and then critically determines the current shortcomings in theoretical, empirical, and policy aspects of the field. Following this brief introduction the paper will have four parts addition parts. Part II will examine the relationship between trade and environmental quality, Part III trade and environmental policy, and Part IV will discuss the environmental politics of trade. The final part, IV, will summarize the findings of this work and suggest directions for future research and policy.

II. Trade and Environmental Quality

Political and policy debates over trade and environment stem from conceptions regarding the impact that increasing trade and investment flows will have on environmental quality. Since the early 1990s some have contended that trade liberalization would lead to economic growth and once nations reached a certain level of income they would begin to reduce negative impacts on the environment. Others countered with the opposite argument: trade liberalization would lead to a mass migration of pollution intensive firms to nations with weaker environmental laws. This would lead to increases in pollution in the developing world and put downward pressure on environmental regulations in nations with stringent norms. Such debates jump started what has become a substantial literature on these questions. Ironically, there is now an emerging consensus in academic thinking regarding these questions yet the policy community is often still mired in older debates.

The Theory of International Trade

In theory international trade and the can be mutually compatible, and perhaps even reinforcing. According to independent theories of international trade on the one hand, and environmental economics on the other, trade liberalization can bring economic benefits that can be distributed in a manner to reduce poverty and protect the environment.

The economist David Ricardo showed that because countries face different costs to produce the same product, if each country produces, and then exports, the goods for which it has comparatively lower costs, then all parties benefit. The effects of comparative advantage (as Ricardo's notion became called) on factors of production were developed in the "Heckscher-Ohlin" model. This model assumes that in all countries there is perfect competition, technology is constant and readily available, there is the same mix of goods and services, and that factors of production (such as capital and labor) can freely move between industries.

Within this rubric, the Stolper-Samuelson theorem adds that international trade can increase the price of products (and therefore the welfare) in which a country has a comparative advantage. In terms of foreign direct investment (FDI), FDI can contribute to development by increasing employment and by human capital and technological "spillovers" where foreign presence crowds in new technology and investment. In theory, the gains from trade accruing to "winning" sectors freed to exploit their comparative advantages have the (Pareto) possibility to compensate the "losers" of trade liberalization. Moreover, if the net gains from trade are positive there are more funds available to stimulate growth and reduce poverty. In a perfect world then, free trade and increasing exports could indeed be unequivocally beneficial to all parties.

These theories have been extended to conceptualize the trade and environment relationship. The impacts on the environment can be seen as direct affects and indirect affects.

Direct effects are the least studied but can be the most grave in the short term. Trade is conducted through transportation, namely through shipping, trucking, and aviation. Increased transportation can have negative effects on environmental quality unless the techniques by which we transport goods and services are altered. Direct impacts of trade and environment of this sort are very under analyzed. This is ironic given that international transportation is one of the most under regulated sectors of economic activity. The work to date is concerning. Two clusters have arisen around the shipping industry—global shipping and increases in air emissions, and shipping and the introduction of alien-invasive species.

Global shipping accounts for 14 percent of nitrous oxide (NO_x) emissions from all global fossil fuels, and 16 percent of sulfur from all petroleum fuel (. In the U.S. alone, shipping accounts for up to 4 percent of transportation-related NO_x emissions, and 8 percent of sulfur dioxide (SO₂) emissions . The environmental effects of shipping emissions are local, national and global in nature. Three of the busiest ports in the United States reside in California and Texas (Houston, Long Beach, and Lost Angeles) and are non-attainment areas for some of these pollutants. EPA estimates that marine diesel engines entering California and Texas account for 15 and 17 percent of the NO_x emissions on summer days in these regions. Emissions of these gases can also contribute to global climate change.

A recent study found that total emissions from ships are largely increasing due to the increase in foreign commerce (or international trade). The economic costs of SO₂ pollution from ships range from \$697 million to \$3.9 billion during the period examined, or \$77 to \$435 million on an annual basis. The bulk of the cost is from foreign commerce, where the annual costs average to \$42 to \$241 million. For NO_x emissions the costs are \$3.7 billion over the entire period or \$412 million per year. Because foreign trade is driving the growth in US shipping, we also estimate the effect of the Uruguay Round on emissions. Separating out the effects of global trade agreements reveals that the trade agreement-led emissions amounted to \$96 to \$542 million for SO₂ between 1993 and 2001, or \$10 to \$60 million per year. For NO_x they were \$745 million for the whole period or \$82 million per year. Without adequate policy responses, we predict that these trends and costs will continue into the future (4).

Shipping can also bring alien-invasive species from one region of the world to another. Alien-invasive species are species that out-compete native species for resources and become pests. The introduction of invasive can take three forms—the invasive is an actual traded product such as with horticultural stocks, the invasive enters by accident through packing materials and tourists, and when they enter as “stowaways in vessels that transport goods, such as ship ballast water with zebra mussels (5). In a January 2000 article in the journal *BioScience*, noted scientist David Pimentel and his colleagues

estimated that the annual economic costs of alien invasive species in the United States could amount to \$137 billion. According to Pimentel et al., roughly 90 percent of these invasives enter the U.S. through trade. Therefore, the trade-related economic costs are approximately \$123 billion (6). Indeed, according to Pimentel and colleagues annual spending to combat zebra-mussels alone is \$1 billion.

A useful framework for thinking about the *indirect effects* trade and the environment has been proposed by Gene Grossman and Alan Krueger (7). They identify three mechanisms by which trade and investment liberalization affect the environment: scale, composition, and technique effects. Scale effects occur when liberalization causes an expansion of economic activity. If the nature of that activity is unchanged but the scale is growing, then pollution and resource depletion will increase along with output. Composition effects occur when increased trade leads nations to specialize in the sectors where they enjoy a comparative advantage.

When comparative advantage is derived from differences in environmental stringency then the composition effect of trade will exacerbate existing environmental problems in the countries with relatively lax regulations. Race to the bottom discussions are perfectly plausible in economic theory. The Heckscher-Ohlin (H-O) theory in trade economics postulates that nations will gain a comparative advantage in those industries where they are factor abundant. Applying the H-O theory to pollution then, it could be argued that a country with less stringent environmental standards would be factor abundant in the ability to pollute. Therefore, trade liberalization between a developed and a developing nation where the developed nation has more stringent regulations may lead to an expansion in pollution intensive economic activity in the developing country with the lesser regulations.

Technique effects, or changes in resource extraction and production technologies, can potentially lead to a decline in pollution per unit of output for two reasons. First, the liberalization of trade and investment may encourage multinational corporations to transfer cleaner technologies to developing countries. Second, if economic liberalization increases income levels, the newly affluent citizens may demand a cleaner environment.

Table 1

Stolper-Samuelson and Sustainable Development

	<u>Economic</u>	<u>Environmental</u>
<u>Winners</u>	<i>export sectors</i>	<i>export sectors</i> pollution haloes composition effects
<u>Losers</u>	<i>import sectors</i>	<i>export sector</i> scale and composition effects worker health and safety <i>import sector</i> liabilities genetic diversity

The economic and environmental dimensions of trade and environment are outlined in Table 1. The first column exhibits the “winners” and “losers” of trade liberalization. The second column outlines the economic dimensions, the third outlines the environmental dimensions.

From an economic perspective, when liberalization occurs and nations trade where they have a comparative advantage the “winners” are those sectors which can now export more of their goods or services. Theoretically this will not only cause expansion of exports but also of employment and wages in such sectors as well. The “losers” of the liberalization are those sectors that will find it harder to face an inflow of newly competitive imports. In those sectors one would expect a contraction of that sector, layoffs, and wages decreases. If the gains to the export sector outweigh the losses to the import sector the net gains are positive. This leaves the “possibility” that the winners can compensate the losers or of the gains from trade being used to stimulate pro-poor growth.

Drawing on the framework on trade and environment outlined above, the third column in Table 1 outlines potential environmental winners and losers. There can possibly be environmental benefits from being an economic winner as well. First, this can occur if trade liberalization causes a compositional shift toward less environmentally degrading forms of economic activity. Second, there is also the possibility of environmental improvements in relatively environmentally destructive sectors if those sectors attract large amounts of investment from firms that transfer state of the art environmental technologies to the exporting sector.

Trade liberalization can also have negative effects. Of course, trade liberalization can cause a composition effect where the economy moves toward more pollution intensive industry. Edward Barbier (8) shows that trade can shift the composition of exports from a country back toward resource intensive industries and accentuate “dutch disease” whereby a resource export boom will increase the value of a domestic currency,

crowd out other export sectors and deepen the composition of exports toward an environmentally unsound extractive industry while at the same time pushing the poor into more marginal existences that can also harm the environment. As shown in Table 2, there are numerous developing countries that suffer from this.

Table 2: Low and Middle-Income Countries and Patterns of Resource Use

	Share of Population on Fragile Land \geq 50%	Share of Population on Fragile Land 30-50%	Share of Population on Fragile Land 20-30%
Primary Product Export Share \geq 90%	Burkina Faso (61.2) Chad (67.0) Congo Dem. Rep. (NA) Laos (53.0) Mali (72.8) Niger (66.0) Papua New Guinea (NA) Somalia (NA) Sudan (NA) Yemen A.R. (19.2)	Algeria (30.3) Angola (NA) Benin (33.0) Botswana (NA) Cameroon (32.4) Comoros (NA) Eq. Guinea (NA) Ethiopia (31.3) Gambia (64.0) Guyana (NA) Iran (NA) Mauritania (57.0) Nigeria (36.4) Rwanda (51.2) Uganda (55.0)	Ecuador (47.0) Congo, Rep. (NA) Liberia (NA) Zambia (88.0)
Primary Product Export Share 50-90%	Egypt (23.3) Zimbabwe (31.0)	Central Af. Rep. (66.6) Chad (67.0) Guatemala (71.9) Guinea (40.0) Kenya (46.4) Morocco (27.2) Senegal (40.4) Sierra Leone (76.0) Syria (NA) Tanzania (51.1)	Bolivia (79.1) Burundi (36.2) Côte d'Ivoire (32.3) El Salvador (55.7) Ghana (34.3) Guinea-Bissau (48.7) Honduras (51.0) Indonesia (15.7) Madagascar (77.0) Mozambique (37.9) Myanmar (NA) Panama (64.9) Peru (64.7) Togo (32.3) Trinidad & Tobago (20.0)
Primary Product Export Share < 50%		Costa Rica (25.5) Haiti (66.0) Lesotho (53.9) Nepal (44.0) Pakistan (36.9) South Africa (11.5) Tunisia (21.6)	China (4.6) Dominican Rep. (29.8) India (36.7) Jamaica (33.9) Jordan (15.0) Malaysia (15.5) Mexico (10.1) Sri Lanka (20.0) Vietnam (57.2)

Source: Barbier, 2005 (8)

It is often overlooked that there can also be adverse environmental effects of being a trade “loser.” Some analysts argue that the shrinking of a sector that is environmentally degrading is a beneficial for an economy because by definition less economic activity will equal less pollution. On the other hand, a shrinking sector can bring with it environmental liabilities that may cost taxpayers increased funds. Moreover, from a political economy perspective, shrinking sectors may put pressure on governments to turn a blind eye to environmental performance in order to maintain an economic presence (in other words causing a worsening technique effect).

Losing economic comparative advantages can also hurt the environment when losing sectors are those related to positive externalities. In Mexico, small holder maize growers are finding it hard to compete with a flood of U.S. corn imports after the North American Free Trade Agreement (NAFTA) was signed. Mexico is the center of origin for maize and the cradle of maize crop genetic diversity. Thus, pressure to leave the land or convert it to other crops is threatening such diversity and global food security. Small holders cultivating maize are generating positive externalities of protecting a global public good and maintaining diversity. Yet, such prices are not reflected in their goods(see 9, 10).

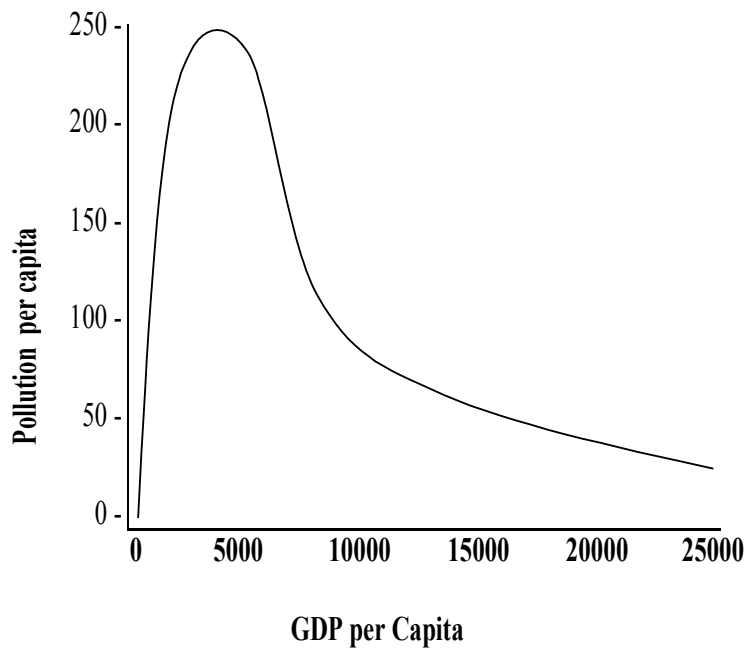
In theory then, trade liberalization can benefit the environment but only if winners compensate the social and environmental losers with the gains from trade in the form of institution building for sustainable development. This is very difficult in developing countries for political, cultural and economic reasons. On the political level, trade liberalization costs a great deal of political capital to begin with. It is then very difficult to get the winners of a trade policy to then agree to give away a portion of their gains. What’s more, many in developing countries may not accept compensation for losing. Indigenous groups see themselves as having ancient rites to land and resources and may not be willing to be “bought off.” (11). Even if they could be bought off, at what price? The fields of ecological and environmental economics have made great strides in recognizing that there are values for the environment that need to be incorporated into the price scheme to allocate resources in a more socially optimal manner. However, the methodologies for identifying the exact prices for those values are very much in their infancy, controversial, and many times inappropriate—especially in developing country contexts (12).

The Environmental Kuznets curve literature attempts to examine the aggregate impact of these three effects. In 1992, the World Bank’s *World Development Report* made the case that while trade-led growth may cause sharp increases in environmental degradation during the early stages of economic development, such degradation would begin to taper off as nations reached “turning points” ranging between \$3,000 to \$5,000 GDP per capita (13). The Bank was generalizing from a landmark 1991 paper by economists Gene Grossman and Alan Krueger. This article examined the relationship between ambient concentrations of criteria air pollutants and GDP per capita. When they

plotted their regression results they found that lower income nations had higher rates of pollution per capita where the reverse occurred for higher income nations (7).

Figure 1.

The Environmental Kuznets Curve



This relationship became known as the EKC, borrowing its name from the landmark article by Simon Kuznets that found a similar relationship between income inequality and GDP per capita in a cross-section of countries in the 1950s (14). For the developed countries, the three factors described earlier (scale, composition, and technique effects) are seen to be interacting—as income has grown the composition of industry has shifted toward relatively less pollution intensive economic activity while at the same time improvements in technology and environmental regulation have occurred. Although overall levels of growth (scale) have vastly increased, they have been offset by composition and technique effects.

To this day, generalizations of these findings have been used to make the claim that nations should grow now through trade liberalization and worry about the environment later. EKC studies have become a cottage industry, with close to one hundred articles published since the original 1991 piece (15, 16). What is ironic is the fact that as the policy community has rushed to generalize the EKC in the political realm the consensus in the peer-reviewed academic literature on the EKC has become

much more cautious. Most importantly, the literature shows that the empirical evidence for the EKC is relatively weak and limited (for a comprehensive review see 17). One example is warranted: as East Asian “miracle” nations grew, they indeed polluted the environment significantly. They show that over time these nations began to improve environmental governance and performance, but this did not happen automatically. Indeed, it was conscious orchestration by the state who integrated environmental policy into industrial and innovation policies that led to success (18).

Whereas trade enthusiasts argue (through the EKC) that trade automatically will eventually improve environmental conditions, opponents of trade often claim that it will result in a mass migration of pollution intensive industry from developed countries with stringent environmental regulations to developing countries with lax environmental standards. Not only will such migration cause increases in pollution in developing countries, they argue that pressure will then be exerted on developed country standards in the name of competition—effectively creating a “race to the bottom” in standards.

Like the EKC literature, it is also ironic that the majority of the peer-reviewed literature has found very limited evidence for pollution havens but that some in the policy community continues to cite it as a dire consequence of trade liberalization (19). Very recently however, a handful of studies have indeed found evidence of pollution havens in the world economy. A study by Cole (20) examines North–South trade flows for ten air and water pollutants. Cole finds evidence of a pollution haven effects, but finds that such effects are quite small relative to other explanatory variables. Another study, by Kahn and Yoshino (21) looks at bilateral trade data over the years 1980 to 1997 for 128 nations for 34 manufacturing industries, and examines how low-, middle-, and high-income nations differ regarding their income elasticity in exporting pollution intensive products. They find that among nations outside of regional trade blocs there is general support for the pollution haven hypothesis. As national incomes rise, exports of pollution intensive products decrease relative to its exports of “cleaner” goods. Nations participating in regional trading arrangements have slightly weaker pollution haven effects than those observed outside of regional trading blocs.

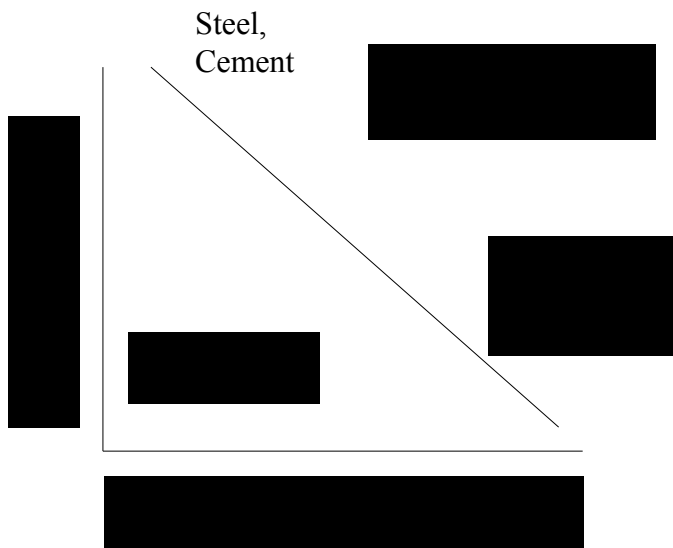
The reason why the majority of studies fail to find evidence for pollution havens (or find small effects) in developing countries is that the economic costs of environmental degradation are relatively much smaller than many other factors of production—especially those that determine comparative advantage. In general, the developing world is factor abundant in un-skilled labor that takes the form of manufacturing assembly plants. On average, such manufacturing activity is relatively less pollution intensive than more capital laden manufacturing activities such as cement, pulp and paper, and base metals production. full review of this literature is beyond the scope of this essay (See 22, 23 for comprehensive reviews of this literature).

Another misconception put forth by some in policy circles is that since there is weak evidence of a pollution haven that there is no rationale for linking trade and environmental policy. However, such claims overlook that the pollution haven

hypothesis is a theory of firm location, and does not provide a framework for analyzing the environmental impacts of firms when they do move to another country, albeit for other reasons. Zarsky (24) provides an overview of the interaction between foreign investment and environment, showing that firms have the promise to be “pollution haloes” whereby they bring better environmental practices to developing nations and can help developing nations “leapfrog” to higher standards. Indeed, Zarsky also cites numerous cases where this has occurred, such as in the petrochemicals industry, electronics, and in steel. Sims Gallagher however shows that in the auto sector US firms brought dated cars without catalytic converters to China (25).

Gallagher (26) has put forth a framework on examining the relationship between investment and environmental quality, as depicted in Figure 2. When pollution is a function of plant vintage, new investment will more often than not lead to environmental improvement. When pollution is a function of end-of-pipe technologies and such technologies are not required or enforced, new investment’s effects on the environment will be ambiguous.

Figure 2: Economics of Investment and Pollution Intensity



Here the Y axis is the capital-labor ration (K/L), and the X axis is the ratio of byproduct emissions to total emissions. The hypothesis could be defined as follows: in industries where pollution is a function of energy combustion technology, new investment will yield cleaner production; in industries where pollution is a function of end-of-pipe technologies, the effects of new investment are more ambiguous. The hypothesis is depicted in Figure 1. The pattern implicit in the hypothesis are those industries that fall along the trend line. The question is, if the data to adequately test the hypothesis were available, would sectors like pulp and paper, or even apparel, fit the pattern? Pulp and paper production is highly energy intensive and creates a significant

amount of byproduct waste. Also, would more sectors like apparel, which not very energy or pollution intensive at all?

If the hypothesis is correct, end-of-pipe technology innovation and transfer are a special case. In the absence of environmental regulations that require end-of-pipe technologies, or in the absence of regulations that are not enforced, such technologies will not automatically be deployed because they are not part of the core vintage of the technology. For innovation or deployment for environment, change must be a function of vintage, labor-management relations, and firm-state (or civil society) relations. In the case of China, it was found that U.S. car manufactures transferred basic car models to China but did not transfer catalytic converters that were used in the same models in the U.S. and Europe because there was no sufficient air pollution law that would make the catalytic converter necessary .

This section on trade and environmental quality shows that scholars have come a long way from thinking about trade as generally “good” or “bad” for the environment. Indeed, research now focuses on the conditions under which a multitude of aspects of the trade affect environmental quality by environmental medium and/or economic sector. What’s more, a useful framework has arisen (direct and indirect effects) that helps analysts pinpoint the trade and environmental interactions. At least at the level of national debate however, politicians and interest groups continue to frame this debate at a very simplistic level.

III. Trade and Environmental Policy

The potentially adverse impacts of trade on the environment underscores the need to couple economic integration with social and environmental policy at the local, national, and/or international level. The fact that there is limited evidence for the EKC- shows that economic integration cannot be relied on for automatic environmental improvements. Indeed, the evidence shows that the lack of effective institutions in the presence of economic integration has exacerbated longstanding problems in the developing world. This section of the paper discusses takes the need for policy as a starting point. Attempts to deploy effective environmental policies in a globalizing world have given rise to two major challenges. First, how does the formulation of environmental policy affect the ability of firms to compete in a globalizing world? Second, to what extent do the institutions deployed to facilitate trade limit the “policy space” for nations to deploy effective environmental policy? Such concerns have been addressed to varying degrees in recent (and ongoing) regional and global trade agreements.

Concerns over Competitiveness

Perhaps a silver lining lies in the fact that there is little evidence of pollution havens. Such evidence suggests that strengthening environmental institutions and standards in developing and developed countries alike may not deter foreign and domestic investments. Because the abatement costs of pollution are so small relative to other key costs, firms will not move to or from developing countries as regulations rise (at least to U.S. levels). Some have argued that deploying optimal policies to internalize market failures may even increase firm competitiveness (27). Well designed regulation has been shown, in some cases, to inspire innovations that can lead to reduced costs and therefore increased global competitiveness. According to this hypothesis, environmental regulation can lure firms to seek ways of increasing resource productivity and therefore reduce the costs of inputs. Such “innovation offsets” can exceed the costs of environmental compliance. Therefore, the firm that leads in introducing cleaner technologies into the production process may enjoy a “first-mover advantage” over those industries in the world economy that continue to use more traditional, dirtier production methods.

The initial empirical work on this was largely in the form of business school case studies and was scrutinized by economists who found little evidence of such phenomena in aggregate-level econometric analyses (28). Rhys Jenkins and colleagues (29) has conducted a comprehensive assessment of the so-called Porter Hypothesis and finds that regulation is more likely to lead to “innovation offsets” under three conditions. Note that each condition requires that a firm has substantial market power in an industry in which there is substantial innovative activity. First, because cost reductions are more likely to occur where new clean technologies are developed rather than in industries that adopt end-of-pipe solutions, the level of R&D is likely to be a factor in determining the impact on competitiveness. Second, innovation offsets are more likely in industries or firms that have the ability to absorb environmental costs, which is most often determined by profit margins and firm size. Finally, they are more likely in firms that have the ability to pass increased costs on to consumers in the form of higher prices.

Concerns over ‘Policy Space’

In addition to the possibility that environmental policies to mitigate the impacts of trade and economic activity in general may affect global competitiveness there is also concern that new environmental regulations will bump up against existing and proposed global trade and investment rules that govern the world economy. These three concerns are manifest on two levels: the extent to which national environmental policy will conflict with world and regional trade and investment treaties; and the extent to which multi-lateral environmental agreements are in conflict with the World Trade Organization (WTO).

Since the late 1980s, there has been a longstanding controversy regarding the extent to which WTO laws restrict the ability of nations and the world community to establish effective environmental policy. At the national level, numerous cases have

gone before the WTO claiming that national environmental policies have served as unfair trade barriers to member nations. Two famous cases involving tuna and shrimp respectively occurred when developing country governments challenged US laws that restricted imports these fish when they were caught by using techniques that also killed dolphins or sea turtles. Developing countries saw such laws as unfair trade barriers. The WTO has ruled that it does not object to environmental policy per se, but to environmental policies that are trade restrictive. The US has since amended these laws (23).

The U.S. Marine Mammal Protection Act (MMPA) enabled the U.S. to impose sanctions on nations whose fishing practices harm dolphins and other protected marine life. Indeed, this is one of the effective forms of domestic internationalization discussed in the work of DeSombre. However, in the late 1980s, under MMPA the U.S. imposed an embargo on Mexico and Venezuela because their fishing practices were ensnaring dolphins in the process of catching tuna. Mexico filed a complaint under the GATT, arguing that GATT rules forbid nations from restricting the import of a product on the basis of how it is produced. Later that year a GATT panel ruled that the tuna embargo violated the U.S. GATT obligations. Environmentalists argued that as environmental policy was moving increasingly toward focusing on the environmental impacts of products through their life-cycle --including production, distribution, use and disposal-- the world trading regime was moving in the opposite direction (30).

Environmental regulations have led created conflicts with regimes over investment rules. Most treaties that cover foreign investment (most “trade” treaties at the bilateral and regional level conducted with western nations also have these clauses) have clauses that restrict the ability of host nations to expropriate investments without compensation. In recent times these clauses have been interpreted by firms who claim that the costs of implementing new environmental regulations are “tantamount to expropriation.” Examples of some of these claims are:

- Occidental Petroleum against Ecuador for the cancellation of oil leases due to allegations of environmental degradation and human rights abuses;
- a suit by Texas farming interests claiming that the Mexico has infringed on their water rights.
- Methanex corporation claimed that a fuel additive ban to reduce air pollution was an expropriation;
- a suit against Canada for banning the pesticide Lindane;
- and a case against the United States targeting environmental measures imposed by the state of California on an open pit gold mining operation licenced to a Canadian mining company (31).

Frequently the damages sought, and in several recent cases awarded, have been in excess of a \$100 million (31). Environmentalists decry these suits as tilted in favor of multinational corporations and choking the sovereignty of nations to deploy effective environmental laws.

While thus far the clash over environment and trade regimes has occurred over national environmental laws, many are concerned that the key compliance mechanisms in many MEAs will be deemed illegal under the WTO. At least seven MEAs have actual trade provisions in their text: the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); the Montreal Protocol on Substances that Deplete the Stratospheric Ozone Layer; the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal; the Convention on Biological Diversity and the Cartagena Protocol on Biosafety; the Framework Convention on Climate Change and its subsequent Kyoto Protocol; in addition to the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC) (32). The trade provisions of these MEAs, such as the threat of sanctions under the Montreal Protocol and CITES, have in some cases to be key to their success (33, 34). Although a provision of a specific MEA has not yet been called into question by the WTO, some scholars argue that the possibility of such questioning is “chilling” the regimes of MEAs to carry out their mandates effectively. Indeed certain export bans in the Basel Convention have been seen as an unsound precedent by the trade community, and it is possible that this is affecting the development of newer MEAs (35).

From a legal perspective, these conflicts can be boiled down to two issues that can violate a core norm in the trade regime, that of “non-discrimination.”--treating producers in a domestic economy in the same manner as producers that one relies on for imported goods. The two issues are those over the tools to enforce environmental policies and environmental policies aimed at the production methods of environmentally degrading products. Many of the policies that have been the subject of WTO conflict are over attempts to enhance national (or international) environmental protection through government intervention of various forms. Interventions that use subsidies, quantitative restrictions, and of course sanctions, often fall into question as not being the “least trade restrictive” measures to achieve environmental goals. Another set of conflicts have been over the production processes of various goods and services. Environmental policy is often concerned about processes in the “life-cycle” of a product that could harm or benefit the environment. What causes problems in trade law is when government measures are seen as being “discriminatory”. That is, pertaining to one set of producers (for example those wishing to sell in a domestic market) but not others (such as domestic producers) (36). The Technical Barriers to Trade (TBT) agreement under the WTO prohibits the discrimination of products on the basis of their production methods. Again, non-discrimination is the principal norm of the trade regime (37).

Some scholars and policy makers argue that more needs to be done, that indeed a “World Environmental Organization” should be established in order to serve as a counterweight to the WTO (38, 39). Indeed, such an institution has also been proposed by none other than former WTO head Renato Ruggerio:

I would suggest that we need a similar multi-lateral rules-based system for the environment- a World Environment Organization to also be the institutional or legal counterpart to the WTO (40).

Discussion of a World Environmental Organization has become quite controversial, with many in the environmental community arguing against it on numerous grounds. Some say that the existing global environmental regime (surrounding such bodies as the United Nations Environment Program) has not been able to fulfill its mandate and the focus should be reforming the existing architecture, not creating new institutions that could become plagued with the same problems (41).

State of Play

Many of these issues are currently evolving. On the world stage, the WTO has a Committee on Trade and the Environment (CTE), that serves as a study group for potential conflicts regarding trade and the environment. The CTE is made up of representatives of member states. Because the CTE works on a consensus basis there have been relatively few clear recommendations to the WTO from the CTE. In the current round of WTO negotiations, an official part of the agenda is for the WTO to examine the relationship between the WTO and MEAs, though concrete proposals have thus far been limited to the possibility of having observers from the secretariats of multilateral environmental institutions.

There is much variation in how nations deal with trade and the environment at the regional level. On the one hand the European Union (EU) has a very deep set of linkages between integration and sustainable development, trade arrangements negotiated by the United States are more limited.

The EU has made decreasing economic, social, and environmental disparities a cornerstone of its regional integration strategies. According to Anderson and Cavanagh (42) the EU made \$324 billion in development grants to this end between 1961 and 2001. Annual aid for a new member of the EU can be as high as four percent of GDP. As a result, the relatively less well off European countries have improved their social and environmental situations as well as having benefited economically from integration. Coupled with development funds the EU has established regional social and environmental ministries that establish independent standards and allow for civil society participation and monitoring as well.

In its regional arrangements, the US allows for a much more limited level of linkages between trade and sustainable development. The majority of regional trade arrangements (such as the US agreements with Chile, Jordan, Morocco, Singapore, Central America and others) have text concerning environmental matters but leave out social concerns completely, set up no institutions, and have very limited avenues for civil society participation. Indeed, according to Anderson and Cavanagh (42) EU development funds are approximately ten times the amount of U.S. economic assistance grants to all of Latin America. In the largest US regional arrangement, the North

American Free Trade Agreement (NAFTA), a parallel agreement set up an environmental institutions called the Commission for Environmental Cooperation. With an annual budget of \$9 million the institution can do little more than provide technical assistance to the parties involved, but it does allow interesting levels of civil society participation. NAFTA does not include any mechanism to address regional inequality. Thus, the experience of Ireland, Spain and Greece with EU development funds has resulted in increasing standards of living as well as social and environmental improvements, Mexico has become worse off since NAFTA—incomes have grown a mere one percent annually and poverty and inequality of worsened. What's more, the economic costs of environmental degradation have reached 10 percent of GDP annually (43).

In terms of investment rules, in response to political pressure the United States has changed the language on expropriation and creates a “test” that is intended to ensure that expropriation does not occur in the presence of bona fide environmental regulations (44). Such language has appeared in the trade agreement with the Dominican Republic and Central American Countries (DR-CAFTA), and in an agreement with Peru.

Creative policy does not have to be designed by governments. Conroy (45) analyzes how advocacy organizations have used certification processes to reward firms that produce and trade goods that use high social and environmental standards in their production processes. Through such efforts, the Forest Stewardship Council certified 60 million acres of forest between 1995 and 2001, accounting for more than five percent of the world's working forests. Working on the demand side of the equation, advocacy groups set up market campaigns to pressure firms to buy these products. Indeed, some retail giants are now actually *seeking* to participate in these processes. When governments or citizens' groups recognize more sustainable practices in the developing world, there are avenues to gain market access for production processes that would be deemed inefficient by an unfettered marketplace.

Trade and Environmental Politics

It should now be clear why protestors at various WTO meetings are often dressed as turtles. The environment is very much a part of trade politics. Why do some agreements and institutions that govern trade have environmental provisions and others do not? This is largely the result of a classic two-level game between domestic and national politics. Those nations that have pushed for the negotiation of environmental provisions into economic integration institutions have done so because environmental interests in those nations have been able to put together coalitions that have ensured that environment has become a national priority in such negotiations. However, such provisions only end up in the final agreement when the nation with the environmental interest succeeds in negotiating environmental provisions with its negotiating partners. The latter has been least successful in negotiations between developed and developing countries.

The analysis that is thus far the most comprehensive in scope has been conducted by David Vogel and his graduate students. Vogel primarily draws from theories of political power (realist) and domestic politics to argue that trade liberalization and environmental protection are not incompatible. In an investigation of the EU, the WTO, and the NAFTA he notes that, by and large, trade liberalization has strengthened rather than weakened the ability of nations to protect the environment. Importantly however, he acknowledges that this did *not* happen automatically. Indeed, he concludes that the impact of trade liberalization on regulatory standards is a function of the preferences of powerful states (which are in part informed by domestic politics) and the level of economic integration (in other words the stronger the trade institution) between the negotiating partners. According to Vogel, “California effects” occur when powerful (often correlating with wealthy) nations prod their trading partners to strengthen their policies in the integration process. “Delaware effects” arise when the opposite occurs.

In this light, Vogel concludes that a “trade” occurs: market access is granted by powerful states in exchange for raising consumer and environmental standards. It was the EU’s strong commitment to integration that empowered Germany (which was empowered by its environmental community) to influence the environmental policies of other European states. Whereas, in the case of the GATT, which is a much weaker institution, the ability of strong and wealthy countries to influence its partners was more diffuse. To Vogel, NAFTA falls in the middle. While it allows the US to influence Mexican environmental policy more than they could under the WTO, it does not go as far as the EU. Evoking the work of Albert Hirschman, a former student of Vogel as added that the key condition that powerful countries use to lure weaker ones into protecting their environment is access to the powerful countries’ markets (46).

The role of domestic politics is key to the formation environmental preferences of the powerful state. Interestingly, Vogel explains how “baptist and bootlegger” coalitions are formed to push hegemony toward advocating environmental policy in trade agreements. During prohibition in the United States, two constituencies had an interest in keeping the southern states “dry.” First were Baptists, who had a moral case to outlaw alcohol. Second were bootleggers, who stood to gain from keeping alcohol sales illegal. In a trade and environment setting, Vogel explains:

For producers who wish to maintain or increase trade barriers, the convergence of trade and regulatory policies provides them with two significant political benefits. First, it furnishes them with an argument for trade restrictions that has relatively wide political appeal: consumer or environmental regulation. They can argue against the removal of trade barriers on similar grounds. Second, it provides them with an important new source of political support, as consumer and environmental organizations enjoy considerable influence in a number of capitalist nations. (47).

Baptist and bootlegger coalitions can arise in various forms. DeSombre has shown how such coalitions form to increase the stringency of environmental regulations in other countries. In this case, industry is interested in such action because they fear that

since they are subject to such regulation, they will not be able to compete with firms that are not (48). So in this case industry supports trade liberalization. For NAFTA, baptist and bootlegger coalitions were also formed in opposition to trade liberalization –but the coalitions were formed for similar reasons to DeSombre’s. Under NAFTA certain industries allied with anti-NAFTA ngos in fear of having to compete with foreign firms that did not have to adhere to such regulation (47). This coalition was even broader under NAFTA, baptists and bootleggers were joined by conservatives political constituencies led by leaders such as Patrick Buchanan and Ross Perot who questioned NAFTA’s ability to uphold the sovereignty of U.S. regulation. Both of DeSombre and Vogel describe coalitions that form in fear of not being able to compete because firms overseas *do not* have to comply to stringent environmental standards.

Vogel’s work is an in-depth and pioneering cut at the politics of trade and environment. However, while Vogel eloquently shows how power, markets, institutions, and interest groups all play a role in the formation of trade and environment regimes, he falls short of weighting the relative importance of each of these variables. Such an effort has been undertaken in two studies of NAFTA. In a volume that describes the passage of NAFTA, Frederick Mayer devotes considerable attention to explaining the determinants of the trade and environment regime that arose as a result of NAFTA. To Mayer, the trade and environment regime that arose under NAFTA was a necessary condition to the passage of NAFTA as a whole. Where Vogel could be said to have drawn from primarily realist and institutional approaches to trade and environment, Mayer’s explanation simultaneously blends realist, liberal, and constructivist theories to explain the creation of a trade and environment regime. Drawing from game theory and process tracing through a gamut of confidential documents and interviews, Mayer outlines three major episodes that together led to the creation of a trade and environment regime under NAFTA: the need to secure fast-track negotiating authority in the United States, the negotiations themselves, and the ratification process. With political power as a constant force in all three stages, Mayer argues that it was institutional factors that determined the first stage of NAFTA, interests in the second, and constructionism in the third.

For Mayer, each stage of NAFTA was a process determined by interactions among institutions, interests, and social construction. From an institutional perspective, US fast-track and ratification policies loomed over the entire period. Interest groups saw that they would be key brokers in seeing that these institutional hurdles were left over and began linking their demands to the negotiations. During the elections of 1992, William Clinton both needed to support NAFTA but also had to distinguish himself from his opponent, then President George Bush. Seeing the support of interests such as environment and labor as seminal to his election campaign, he decided to support NAFTA *and* labor and environmental side agreements (49). By doing so he automatically opened the door to even more interest group involvement.

The campaign to finally ratify and pass NAFTA however, in Mayer’s view, lends itself to constructivist analysis. In the effort to win voters during the ratification process, clashing interests waged symbolic campaigns to make their points. The final debates

over NAFTA were not about its actual effect, but about what NAFTA symbolized. Those against NAFTA associated it with images of corporate greed and as triggering a “giant sucking sound” of jobs and environmental regulations going south of the border. Conversely, those for NAFTA attempted to create images of unanimous support by lining up all living ex-presidents with the chairs of many influential CEOs, and so forth (49). Peter Newell in this volume demonstrates how similar forces have come to play in clashes over trade and environment in social movements across Latin America.

In short, the particular institutional framework (U.S. elections and the fast-track process) in the United States that gives interest groups a number of opportunities to engage in trade policy, coupled with the ability of such interests (and the interests of the government) to wage symbolic campaigns both supporting and against NAFTA, led to a final outcome that included environmental provisions in the NAFTA text and in the form of formal and informal side agreements. For the other two parties involved, Mexico and Canada, who didn't have these constraints, NAFTA's environmental package was more of a formality.

The domestic game is only half the “battle.” Trade negotiators from developing countries have been extremely concerned that environmental protections in trade and investment agreements will take the form of veiled protectionism. They argue that developing country products are already having difficulty obtaining access to developed country markets and having to add environmental protections will only increase the cost of such access. Therefore, linking trade and the environment explicitly in trade agreements continues to favor domestic industries in developed countries (50). All it takes is an understanding of baptist and bootlegger coalitions to see that such concerns are definitely legitimate. The environmental policies deployed in the developed world in this realm are not always the most optimal from an efficiency standpoint, but those that were able to survive the political system. For them to get through, according to the literature, environmentalists often have to coalesce with industries that will most likely benefit the most from a regulation. The “losers” are competing firms in trading countries. Sometimes gridlock has been broken when nations grudgingly exchange market access for environmental provisions (46). Indeed, the agreements discussed above where the U.S. has included environmental provisions are largely due to the U.S. mandating that the environment be part of the negotiations and without environment market access to the U.S. will not be granted. Given the enormous size of the U.S. economy, this is an offer very few developing countries can refuse.

Another reason why some negotiations fall short of including environmental provisions is that environmental constituents in developing countries at times do not have the same access to government policy as is enjoyed in the developed world. Developing countries have very strong environmental movements and can also have stronger environmental practices than in developed countries (small scale agriculture in the developing world is enormously less environmentally degrading than in industrial agriculture settings in the developed world). However, political processes can be much less open in some developing countries and therefore the coalitions necessary to put environment on a trade agenda are more difficult. This partly explains why many

developing country civil societies are more fundamentally against all trade and investment arrangements from the beginning (51).

Summing Up and Looking Ahead

This paper has offered a critical taxonomy of the trade and environment issue. The burgeoning literature in this area can be divided into three areas, the extent to which 1) trade affects environmental quality; 2) global trade and investment rules affect the ability to deploy environmental policies; and 3) the politics of both trade and environmental policy. This final part of the paper will summarize what we clearly know about trade and the environment, what we still need to know, and what the key challenges are for future policy in this area.

What do we now know?

- Trade is not automatically associated with either positive or negative affects on environmental quality.
- Analysts have a useful framework for deciphering the relative affects of trade and the environment by examining the scale, composition, and technique effects.
- Environmental regulation does not always adversely impact global economic competitiveness. Indeed, we now know that there are clear conditions whereby environmental regulation can spur innovations that lead to both environmental improvement and export competitiveness.
- Environmental regulations and trade treaties need to be crafted so that they can affectively reduce environmental degradation while creating the fewest distortions in the trading system. Many current and proposed national and multilateral environmental policies are clearly in possible conflict with current and proposed trade and investment rules.
- When environmental policy and global trade and investment rules are linked it is often a function of both domestic politics and international politics.

What are the main challenges?

- The policy community needs to recognize that peer reviewed scholarly assessments of trade and environment have moved well beyond whether trade is good or bad for the environment.
- The majority of consensus on trade and the environment is derived from a large literature of ex-post studies. Yet, what policy-makers need are ex-ante assessments specific to the actual treaties or pieces of legislation under consideration. The methodologies and experience in this area is very much in its infancy (52).
- Research and policy is needed to mitigate the potentially adverse affects on competitiveness from environmental regulation for both smaller and medium-

- sized enterprises in developed countries and perhaps more importantly for developing country firms. What determines innovation offsets and how can they become more prevalent?
- Policy analysts need to design optimal environmental policies that do not distort the global economy or clash with global trade rules. However, political economy is just as important and policy design. Political processes will undoubtedly lead to policies that deviate significant from optimality and may as a result accentuate the very problems they seek to alleviate. Therefore, as many actors and stakeholders should take part in the policy design process from the beginning.

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