

**Symposium:**  
**International Trade and the Environment**

# **Should Trade Agreements Include Environmental Policy?**

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## **Introduction**

Back in 1992, Jagdish Bhagwati and Robert Hudec led a research project to analyze whether the scope of trade negotiations should be expanded to include negotiations over a country's domestic policies, such as labor and environmental standards (see Bhagwati and Hudec 1996). It is a testament to the interest in this question that the resulting collaboration lasted three years and culminated in the publication of an almost 900-page, two-volume collection of papers titled *Fair Trade and Harmonization: Prerequisites for Free Trade?* Nearly fifteen years later, it is useful to analyze the economics literature to see whether more recent research has shed additional light on this question.

The current regulatory framework of the General Agreements on Tariffs and Trade (GATT) contains an interesting asymmetry in the treatment of trade policy and environmental policy. With respect to trade policy, the GATT is an *instrument-based* agreement, in that World Trade Organization (WTO) members negotiate over tariff concessions, and are then required by the agreement to respect the binding tariff ceilings resulting from these negotiations. In addition, the agreement generally prohibits member countries from using quantitative trade restrictions or direct export subsidies. In contrast, with respect to environmental policy, the GATT is a *rules-based* agreement, in that WTO members are allowed discretion in the setting of their environmental standards, with the exception that the resulting standards must adhere to certain GATT rules (principally the national treatment provision in Article III).<sup>1</sup> Recent attention on the environment has led to calls to expand the WTO to include

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<sup>1</sup>Article III states that imported products should be treated no less favorably than "like domestic products" (i.e., regulations or taxes should not discriminate between domestic and foreign products and thus afford disguised protection to the domestic industry).

negotiations over environmental policy, which could result in a set of binding minimum standards for WTO members.<sup>2</sup> Such a transition to an instrument-based agreement with respect to environmental policy would be a highly ambitious undertaking, both legally and logistically, and thus requires careful and thorough analysis before being undertaken.

This article, which is part of a three-article symposium on international trade and the environment,<sup>3</sup> examines the extent to which environmental and trade policies should be treated equally, or symmetrically, in international negotiations. I review the recent economics literature on trade and the environment to address two questions. First, should trade negotiations include negotiations over environmental policies and the setting of binding environmental standards?<sup>4</sup> Second, if there are grounds for international environmental negotiations, should environmental agreements be explicitly linked to existing trade agreements in the world trading system?

With these questions in mind, the next section discusses the recent economic arguments and empirical evidence for and against negotiating over environmental policy. I argue that the empirical case for environmental policy negotiations (i.e., empirical evidence of the existence of pollution haven effects) is actually quite strong. However, I also argue that recent theoretical work suggests that it may not be necessary to explicitly bind environmental policy to address such pollution haven concerns. The following section assesses whether environmental agreements should be linked to existing trade agreements (e.g., the GATT/WTO), in particular whether environmental and trade negotiations should be combined into a single forum and whether environmental policy obligations should be enforced through the threat of trade sanctions. I argue that, based on current economic research, the theoretical case for linkage, as a means of enforcing existing agreements, is stronger than many trade economists would expect. The final section summarizes the findings and presents some conclusions.

## Should We Negotiate over Environmental Policy?

This section analyzes the arguments for and against including environmental policy in trade negotiations. That is, should domestic policies and trade policies be treated asymmetrically (i.e., binding a country's trade policy while allowing countries discretion in the setting of their environmental policy) or symmetrically (i.e., binding both trade and environmental policies) in international negotiations. Of course one can identify situations where international negotiations over environmental policy would not be beneficial. For example, in the neoclassical world where all environmental pollution is local, all competition is perfect, and all countries are small (i.e., no country can influence world prices), there would be no justification for including environmental policy in international negotiations since any single

<sup>2</sup>Although much of the attention has focused on establishing a set of minimum standards that are common to all countries, this article does not consider the issue of harmonization. The inefficiency of requiring all countries to adopt identical environmental standards is fairly uncontroversial and is not repeated here.

<sup>3</sup>The other two articles, by Levinson (2010) and Fischer (2010), focus on the impact of trade on the location of polluting industries and the conservation of natural resources, respectively.

<sup>4</sup>Clearly, when production in one country has a direct impact on the environmental quality of another country, there are grounds for mutually beneficial negotiation. Thus, when discussing the benefits of international negotiations over environmental policy, this article considers only environmental policies dealing with purely local pollution, not global or transboundary pollution.

country's environmental policy choices would neither be influenced by nor have an effect on any other country. In this case, however, there would also be no justification for including trade policy in international negotiations. Thus, in the following subsection, I review the economic basis for international trade negotiations and consider whether the same arguments apply to negotiations over domestic policies, such as environmental standards.

## The Economic Basis for Trade Negotiations

The economics literature contains two principal arguments for why international trade agreements can be mutually beneficial. The first is that international negotiations over trade policy are intended to mitigate the unilateral incentives for countries to pursue beggar-thy-neighbor trade policies (see, e.g., Johnson 1953; Bagwell and Staiger 1999). This argument has traditionally been modeled as a terms-of-trade story where countries are large, which means that their policy choices have a perceptible impact on other countries by influencing the world price of a good. For example, consider the case where a country imposes a tariff on a good imported from another country. This import tariff will tend to raise the domestic price of the good, which benefits domestic import-competing firms but hurts domestic consumers (while also generating tariff revenue for the government). However, the increase in the domestic price of the good is likely to be less than the full amount of the tariff. Thus a portion of the cost of the tariff is passed on to foreign exporting firms. Because, when setting policy unilaterally, the domestic government does not take into account the cost of its policy choices to foreign exporters, it will tend to set its tariff above the level that would be efficient from a global perspective. Given this tendency for unilateral tariffs to be higher than is globally optimal, international negotiations to reciprocally reduce trade barriers are mutually beneficial.

Turning to the issue of negotiations over domestic policy in general and environmental policy in particular, the assumption in the literature that countries can influence world prices implies that international negotiations could also apply to domestic policies, as domestic policies have the same cost-shifting implications (see Ederington 2001a). For example, consider the case where a country lowers an environmental standard for an import-competing industry. As in the tariff case above, such a policy change would have implications for domestic consumers and producers of the good (and perhaps even government revenue). However, in this case, the policy would likely reduce the domestic price of the good, which, as in the tariff case, would create an additional cost to foreign exporting firms. Once again, when setting policy unilaterally, a domestic government would fail to internalize these foreign costs and would thus tend to lower standards on import-competing industries below what would be globally efficient. Given this discrepancy between unilateral policies and policies that are optimal from a global perspective, it appears that international negotiations over environmental policy could be mutually beneficial, even in the absence of transboundary pollution concerns.<sup>5</sup>

<sup>5</sup>Indeed, Ederington (2001a) makes an even stronger argument in this regard, noting that when limited enforcement power prevents an international agreement from achieving the globally optimal policies, an optimally designed agreement will relax cooperation in trade policy *before* it relaxes cooperation in environmental policy.

The above discussion mirrors much of the public debate on the inclusion of environmental policy in trade agreements, which centers on concerns about a “race-to-the bottom”—that countries that have entered into trade agreements will weaken their environmental standards in order to achieve a measure of competitive advantage with respect to their trading partners. As discussed above, there is, in fact, an economic justification for these concerns, as large countries have an incentive to utilize tariffs to restrict the market access of foreign producers, which results in an inefficiently low volume of trade from a global perspective. However, if countries enter into trade agreements to bind their trade policy, they have an incentive to use environmental policy to tilt the competitive relationship in favor of domestic producers and restrict the market access of foreign producers (see Copeland 1990; Ederington 2001a). Indeed, several studies, for example, Markusen (1975) and Barrett (1994), show that when trade policies are bound, the globally optimal level of environmental policy differs from what countries would choose when setting their policies unilaterally, and that these differences often mimic race-to-the-bottom concerns.<sup>6</sup>

For these race-to-the-bottom concerns to be relevant, countries must actually set environmental policy with trade concerns in mind. There is, in fact, some anecdotal evidence to support this proposition. For example, the earliest national environmental legislation (such as the U.S. Federal Water Pollution Control Act of 1970) mandated studies of the effects on U.S. competitiveness of environmental regulations on U.S. firms. More recently, U.S. presidents Ronald Reagan and George H. W. Bush both established committees (the Task Force on Regulatory Relief and the Council on Competitiveness, respectively) with the stated goal of relaxing domestic regulations that adversely affect U.S. trade competitiveness. Empirical evidence that countries distort environmental policy because of competitiveness concerns is harder to find, although Ederington and Minier (2003) do find evidence that an increase in imports is correlated with a subsequent weakening of environmental regulations across U.S. manufacturing industries.

While the main justification for international negotiations is to prevent countries from pursuing beggar-thy-neighbor policies, a secondary economic argument in support of international trade agreements is that such agreements help governments maintain commitments to the private sector (see Staiger and Tabellini 1987; Maggi and Rodriguez-Clare 2007). That is, a trade agreement that binds trade policies allows member governments to “lock in” preferred policies, enabling these governments to tell interest groups seeking policy changes that such changes would violate international commitments and possibly trigger foreign retaliation. Such a commitment device is especially valuable when optimal policy is “time-inconsistent” (i.e., the government has an incentive to surprise the private sector with unexpected policy changes). Of course, if international agreements are solely concerned with providing participating governments commitment power in their negotiations with domestic interest groups, then there is no reason why such agreements should not be extended to include domestic policies such as environmental regulations. In fact, there is an extensive literature on time-consistency in the setting of environmental policy (e.g., see Marsiliani

<sup>6</sup>It should be noted that in both Markusen (1975) and Barrett (1994), the incentive to distort environmental policy away from globally efficient levels only arises when countries’ trade policies are constrained. In addition, the discrepancy between unilateral and globally optimal policies does not always involve inefficiently weak environmental standards; in some cases countries have an incentive to distort standards upward.

and Renstrom 2000; Gersbach and Glazer 1999). Given the tendency for time-consistency issues to apply to environmental policy, countries could gain from reciprocal environmental agreements as well because they would make optimal environmental policy more credible.

Thus, a quick review of the economics literature on the theory of trade agreements indicates that international negotiation over environmental standards could potentially be mutually beneficial, even in the absence of transboundary pollution concerns.<sup>7</sup> That is, the main justifications for international negotiation over trade policies appear to apply to domestic policies as well, which suggests that trade policy and environmental policy should be treated more symmetrically than allowed under the current GATT structure. However, many trade economists are quite skeptical of any approach involving international negotiations over environmental policy in the absence of transboundary pollution concerns. The next three subsections consider three arguments against explicit negotiations over environmental policy (i.e., against treating trade policy and environmental policy more symmetrically) that have been raised in the recent economics literature.

### The Pollution Haven Effect: Do Environmental Regulations Affect Trade Flows?

As discussed above, the substitutability of trade and domestic policy has led to concerns that international trade agreements may be undermined if countries distort environmental regulations as a secondary means of protection. However, the validity of this concern depends not only on whether countries use domestic regulations as a means of manipulating trade flows, but also on whether environmental regulations have a significant effect on trade flows (i.e., the existence of a pollution haven effect).<sup>8</sup>

The traditional approach to examining the pollution haven effect was to look at the variation in pollution abatement costs and net trade flows across a cross-section of industries at a single point in time. The basic hypothesis is that if stringent environmental regulations are a source of competitive disadvantage, then a country's most regulated industries should have the highest levels of import penetration. A host of cross-sectional empirical studies (e.g., Leonard 1988; Kalt 1988; Tobey 1990; Grossman and Krueger 1993; Low and Yeats 1992) found no correlation between the pollution abatement costs of an industry and trade flows. This lack of evidence of a relationship between environmental stringency and trade flows led many researchers to conclude that concerns about a "race to the bottom" were overstated since countries appeared to lack the ability to affect trade by manipulating environmental standards. Indeed, much of the skepticism on the part of trade economists about the necessity

<sup>7</sup>It should be noted that some economists argue that international trade agreements cannot be understood based on economics, but are instead the product of mercantilist reasoning in which exports are good and imports are bad (see Krugman 1997). However, even the mercantilist approach provides a justification for international negotiations over environmental policy to the extent that environmental policies are distorted for mercantilist reasons.

<sup>8</sup>As discussed in several studies (e.g., Antweiler, Copeland, and Taylor 2001), evidence of a "pollution haven effect" (that a tightening of environmental regulations deters exports [or stimulates imports]) does not necessarily imply the validity of the "pollution haven hypothesis" (that when trade barriers are reduced, pollution-intensive industries will shift toward low-income countries). It is evidence on the pollution haven effect that is relevant here, since if countries have the ability to affect trade flows by changing their environmental standards, then they might use environmental policy as a secondary trade barrier.

of international negotiations over environmental policies can be traced directly to skepticism about the empirical importance of pollution-haven effects (see, e.g., Krugman 1997).

However, this traditional approach to examining the pollution haven effect has been criticized on two counts: (a) failure to account for unobserved heterogeneity across industries; and (b) failure to account for the endogeneity of pollution abatement cost measures (see Levinson and Taylor 2004). The issue of unobserved heterogeneity can be addressed by using more disaggregated data (i.e., four-digit SIC instead of three-digit SIC) and panel data, which allows us to observe whether changes in environmental stringency are correlated with changes in net trade flows over time. In fact, when the Grossman and Krueger (1993) regression is repeated using more disaggregated data (i.e., four-digit SIC) and panel data, a small but statistically significant pollution haven effect is found (see the Appendix). That is, there is evidence that a weakening of environmental standards over time is correlated with a decrease in net imports. Although this finding suggests that countries have the ability to affect trade flows by manipulating their environmental policy, the magnitude of the cross-elasticity between environmental policy measures and trade flows is rather small.

However, the use of more disaggregated data and panel data does not address the issue of endogeneity of pollution abatement costs. As discussed in both Levinson and Taylor (2004) and Ederington and Minier (2003), there are strong reasons for treating pollution abatement costs as endogenous. Levinson and Taylor (2004) note that the construction of pollution abatement costs causes them to be determined simultaneously with trade flows. Ederington and Minier (2003) point out that political-economy concerns may cause governments to endogenously relax environmental regulations on industries facing high levels of net imports. For example, an increase in foreign competition (i.e., an increase in import volume) might cause a country to respond by weakening its environmental regulations, which would make it difficult to measure the trade effect of environmental policy by simply observing the correlation between environmental policy and trade flows over time. An instrumental variable approach is required to disentangle the simultaneous effects of environmental policy on trade and trade on the setting of environmental policy. That is, one needs variables that are correlated with the stringency of environmental regulation of an industry, but that do not directly affect trade (see, e.g., Ederington and Minier 2003; Levinson and Taylor 2004). As shown in the Appendix, the use of an instrumental variable approach yields an implied elasticity between environmental stringency and net imports of 5.8 (i.e., a 1 percent decrease in pollution abatement costs results in a 5.8 percent decrease in net imports), indicating a quantitatively and statistically significant pollution haven effect.

Thus, while early studies using cross-sectional data were unable to identify a relationship between trade flows and abatement costs, more recent research has consistently found evidence of pollution haven effects.<sup>9</sup> Indeed, there is now an extensive literature, based on panel data and instrumental variable techniques, that documents a connection between environmental regulations and multiple measures of trade and industrial activity (see, e.g., Levinson

<sup>9</sup>In a sense this research parallels the literature on environmental regulations and plant openings or “births.” While previous studies had generally concluded that environmental regulations do not affect plant location decisions, newer research using panel data and new estimators consistently finds a negative relationship between the severity of environmental regulations and measures of industry health such as plant births (e.g., see Becker and Henderson 2000).



1999; Becker and Henderson 2000; Greenstone 2002; Keller and Levinson 2002; Ederington and Minier 2003; List et al. 2003; Ederington, Levinson, and Minier 2005; Levinson and Taylor 2004). These empirical results are important because they suggest that governments do have the ability to affect trade by manipulating environmental standards, thus strengthening the argument for including environmental policy in international negotiations.

## The Impact of Contracting Costs

The empirical evidence presented above suggests that when international agreements bind a country's trade policy, countries can, and may, use domestic measures, such as environmental policy, as a secondary means of pursuing their trade goals. However, does this imply that international agreements should be expanded to include all trade-relevant policies? One argument that has been made for leaving domestic policies to the discretion of governments (while binding trade policies) can be found in the literature on the cost of contracting (see Horn, Maggi, and Staiger 2008). Given the vast number of products, countries, and policy instruments involved, designing an international agreement that can specify, in advance, how member countries should behave in every conceivable contingency (a "complete" contract) is simply not economical. Thus, the costs of designing and implementing a viable agreement are likely to shape the nature of the agreement.

The starting point of Horn, Maggi, and Staiger (2008) is that governments have a wide array of instruments—both trade and internal domestic policies—with which to pursue their policy objectives. Following Johnson (1953) and Bagwell and Staiger (1999), Horn, Maggi, and Staiger (2008) assume that a country's policies affect world prices and thus that trade agreements are necessary to prevent countries from acting opportunistically in their trade relations. Since there are multiple policy instruments, an optimal agreement would be comprehensive and cover all trade-relevant policies. If contracting were costless, enacting a comprehensive agreement would not be a problem. However, as Horn, Maggi, and Staiger (2008) point out, contracting is, in fact, costly, and these costs are likely to increase as the agreement becomes more detailed (i.e., as the number of policies it includes increases). One way to reduce the cost of contracting is to allow governments participating in trade agreements discretion in the setting of some policy instruments.

As Horn, Maggi, and Staiger (2008) note, to the extent that internal, or domestic, measures (e.g., environmental policies) are more costly to contract over than border measures (i.e., trade policies), the benefits of environmental policy cooperation may not outweigh the extensive costs of contracting over environmental policy. This argument is supported by the nontransparency of environmental policy. For example, while it may be relatively simple to bind countries' environmental policies in theory, it would be extremely difficult to observe how a country interpreted and enforced these policies in practice. Thus, ensuring that such policies are also *de facto* consistent with an international agreement might be close to impossible. Trade policy is more straightforward and transparent (i.e., observable) and thus more likely to be bound in an optimally designed agreement.

However, even if contracting costs are assumed to be symmetric across domestic and trade policy instruments, an optimal agreement may still allow discretion over domestic policies (see Horn, Maggi, and Staiger 2008). This is because the underlying rationale for the international agreement is trade-related (the terms-of-trade externality). Thus, while

governments may use environmental policy as a secondary trade barrier when their trade policy is constrained, such domestic policies are inherently imperfect substitutes. That is, they are a less efficient means of pursuing a country's trade objectives. This means that when contracting is costly, contractual completeness will vary across policy instruments, with the "most important" policies (border measures) being contracted over first, and the "less important" policies (domestic measures) being contracted over only as contracting costs fall.

Thus, the costly contracting literature's justification for including trade policy instruments but not domestic policies in an optimal agreement simply reflects the fact that trade policies are the "first-best" means of pursuing terms-of-trade gains (the underlying rationale for the agreement), while domestic policies are a "second-best" policy instrument. Indeed, given the logistical difficulties of binding environmental and other domestic policies, the contracting cost argument seems to offer an obvious rationale for the WTO's current asymmetric treatment of domestic policies. However, it is important to note several caveats to this argument. First, the Horn, Maggi, and Staiger (2008) model implies that, as contracting costs fall, more policy instruments should be included in the agreement. Thus, leaving environmental policy to government discretion is optimal only when contracting costs are "sufficiently high," but the empirical question of whether current contracting costs are high enough remains unanswered. Second, Horn, Maggi, and Staiger (2008) note that including domestic policy instruments in trade agreements becomes more attractive the more effective such instruments are at manipulating trade flows. Thus, recent empirical evidence on pollution haven effects suggests that including environmental policy in traditional trade agreements may be more desirable than previously thought. Third, Horn, Maggi, and Staiger (2008) note that increases in trade volume also increase the desirability of including additional policy instruments (such as environmental policy) in trade agreements. Intuitively, this is because there is a stronger incentive to distort environmental policy for trade-related reasons when trade volumes are larger. Thus, given the predicted high levels of future trade, the work of Horn, Maggi, and Staiger (2008) could also be interpreted as offering an argument in favor of including environmental policy in existing trade agreements in the future (even though their exclusion might have been optimal in the past).<sup>10</sup> Finally, the literature on contracting costs acknowledges that, in a first-best international agreement where contracting costs are irrelevant, international negotiations that include the binding of environmental policy would be desirable. Thus, the exclusion of environmental policy from the current WTO/GATT agreement makes the WTO an imperfect contract because countries can undermine their trade commitments in the agreement by unilaterally distorting their environmental policies. This lends credence to calls to alter the GATT/WTO agreement to minimize race-to-the-bottom concerns without resorting to explicit contracting.

<sup>10</sup>Although this argument states that as trade volumes rise, the benefits of including additional policy instruments in the agreement rise as well, it does not necessarily imply that environmental policy is the instrument that should be added first. In fact, some might argue that labor or development policies are more important and should be given priority.



## Market Access and National Sovereignty

As discussed above, many proponents of more fully incorporating environmental policy into trade agreements express concern that as countries reciprocally increase trade flows through negotiated tariff concessions, they will degrade domestic standards so as to lower the production costs of domestic firms, and thus reduce the level of market access provided to trading partners (i.e., the race-to-the-bottom issue). The ability to distort domestic standards as a secondary trade barrier was well understood by the drafters of the GATT and is partially addressed through the prohibitions against “discriminatory” standards contained in the GATT’s national treatment rules (Article III). However, GATT national treatment rules only prevent discriminatory treatment of “like” foreign products, which means governments cannot set different standards on products within the same tightly defined industry (typically interpreted as the same tariff classification code). GATT rules do not prevent countries from setting different environmental standards on products in different industries, and thus national treatment rules would not prevent countries from weakening environmental standards on all industries facing high levels of foreign competition (the race-to-the-bottom concern). Thus, as pointed out by Bagwell, Mavroidis, and Staiger (2002), the GATT/WTO is an imperfect contract: it encourages the expansion of market access through tariff bindings, but does not prevent unilateral infringement of these commitments by countries weakening their standards for import-competing industries.

A key contribution of Bagwell and Staiger (2001) is that these race-to-the-bottom concerns can also be addressed through “nonviolation” complaints provided in Article XXIII of the GATT. Specifically, if a WTO member can show that the market access commitments that it had previously negotiated are being offset by an unanticipated change in the environmental policies of another member country, it has a right to seek redress even if the policy change was nondiscriminatory and thus broke no explicit WTO rule. Thus, the right to bring nonviolation complaints may discourage governments from using their domestic policies as secondary trade barriers. In this sense, race-to-the-bottom concerns can be addressed through the current GATT/WTO framework, even in the absence of explicit negotiations over the setting of domestic policy.

In their analysis, Bagwell and Staiger (2001) assume that governments have multiple policy instruments and that countries’ policy choices affect world prices. Thus, they offer a terms-of-trade explanation for trade agreements in that international negotiations are intended to prevent countries from acting opportunistically in setting policy (they also assume that contracting is costless). Bagwell and Staiger (2001) first show that an agreement that involves direct negotiations over tariff levels but allows countries to maintain autonomy over domestic policy would be inefficient because it would result in governments distorting their domestic standards as a secondary means of reducing the market access achieved through tariff liberalization. They then consider the effect of adding to the agreement the right to bring nonviolation complaints. That is, they consider a two-stage negotiating game in which governments first use tariff negotiations to achieve an efficient level of market access (i.e., trade volume) and then are allowed sovereignty in the setting of domestic policy, provided that such policy does not undermine the market access commitments previously agreed upon. Bagwell and Staiger (2001) show that such an agreement is efficient even though it does not require explicit negotiation over domestic policy. This is because the underlying problem

the agreement seeks to correct is the level of market access, not the policy mix chosen by governments. Thus, once the level of market access has been negotiated and specified in the agreement, countries may unilaterally choose the efficient mix of trade and domestic policies to achieve that level of market access.

It is important to note that although the Bagwell and Staiger (2001) study provides a justification for not negotiating directly over domestic policy, implementing this type of flexibility into existing agreements would require some rewriting of the current WTO structure. Indeed Bagwell, Mavroidis, and Staiger (2002) describe ways that WTO principles and procedures could be augmented, such as allowing countries to bring nonviolation complaints when the negotiated level of market access is undermined by changes in a country's domestic standards. Although Bagwell and Staiger (2001) convincingly argue that current WTO rules provide sufficient flexibility, the nonviolation provisions are actually quite ambiguous. More specifically, to impose discipline on the use of nonviolation complaints, WTO panels require nonviolation cases to meet certain criteria: (a) that a measure attributable to the foreign government exists; (b) that such a measure could not have been reasonably anticipated at the time of negotiation; and (c) that the measure damaged the competitive position of the plaintiff country. However, key concepts within the nonviolation clause and their interpretation by the WTO have never been clarified.<sup>11</sup> For example, would the decision by a foreign government to reduce enforcement of environmental provisions in an industry constitute a "measure" that is subject to complaint under Article XXIII? Likewise, would the relaxation of environmental standards in an importing industry that reduces only the rate of growth of imports (not the level) constitute a "nullification of a benefit" in the view of the WTO? Finally, there is the conceptual and practical problem of determining exactly when market access has been limited.

Bagwell and Staiger (2001) also show that as currently structured, the GATT/WTO achieves efficiency only when a government has an incentive to lower environmental standards as a means of reducing the market access provided to foreign countries. However, suppose instead that a government wished to strengthen its environmental standards and, in doing so, provided greater market access to its trading partners. Under current WTO rules that country would be prevented from unilaterally raising its tariff in order to reestablish the former level of market access. Thus, to the extent that improvements in environmental standards would result in levels of market access that are higher than desirable, it could be argued that the WTO tariff bindings might make governments less willing to undertake such improvements. Solving this problem would require rewriting WTO rules to allow governments that undertake such improvements to unilaterally raise their tariffs in order to maintain market access at negotiated levels, an addendum that is likely to be quite contentious.

Finally, Bagwell and Staiger (2001) assume both perfect information (policy and economic conditions are all perfectly observable) and perfect agreements (there are no enforcement issues or contracting costs involved in international negotiations). However, do their results apply when the policy choices of foreign governments and the effects of those policy choices are less than perfectly observable? Obviously, the inability to determine the trade effects of

<sup>11</sup>This is mostly due to the fact that nonviolation complaints are rare, and thus rarely adjudicated. As Bagwell and Staiger (2001) note, only fourteen cases were brought up during 1947–1995.

domestic policy changes would impact the smooth functioning of a nonviolation complaint system. However, would such a situation also eliminate the desirability of allowing countries sovereignty in their policy choices? In a recent study, Bajona and Ederington (2008) suggest that such a result is possible. Bajona and Ederington (2008) assume both that domestic policy is unobservable (which means that a reduction in market access could be due to either unobserved trade shocks or the use of domestic policy for protection) and that the enforcement power of the international agreements is limited. With limited enforcement, the agreement must now be structured so that no country has an incentive to deviate from the agreement. Bajona and Ederington (2008) show that, under conditions of imperfect information, allowing countries full sovereignty in choosing policy levels (subject to a negotiated level of market access) actually makes the agreement more difficult to enforce and thus limits the amount of cooperation that can be sustained. Thus, while the nonviolation complaint system holds the promise of addressing race-to-the-bottom concerns while allowing countries greater sovereignty in the setting of policy, more research is needed concerning the effects of asymmetric or imperfect information.

## Should Environmental Agreements Be Linked to Existing Trade Agreements?

Even if one believes there are grounds for international environmental negotiations, should they necessarily be linked to trade agreements? Linkage has two meanings in the trade and environment literature. The first meaning concerns *negotiation linkage*: whether new negotiations over environmental policy and trade policy should be combined to occur in a single forum (e.g., under the auspices of the WTO). This definition includes the possibility of making membership in one agreement conditional on joining the second agreement (e.g., using the threat of trade sanctions to induce countries to join a new multilateral environmental agreement). The second meaning concerns the issue of *enforcement linkage*; that is, whether the WTO should enforce environmental policy obligations within an existing international agreement through the threat of the suspension of trade concessions (e.g., employing the WTO's dispute settlement procedures to enforce cooperation with existing international environmental agreements). Each of these linkage issues is examined in more detail below.

### Negotiation Linkage

The first issue concerning linkage is whether negotiations over environmental policy and trade policy should be combined and occur in a single forum. When the underlying issue is similar (e.g., market access concerns), then the logistical gains of combining negotiations within a single forum are straightforward. However, when the policies deal with different issues (e.g., transboundary pollution and facilitation of trade), it is less obvious that combining negotiations into a single forum makes sense. One potential gain from combining negotiations is that it allows greater flexibility to negotiators in achieving an agreement since they can trade concessions over a greater range of policy instruments and issues. Indeed, such an approach has been advanced as a way to both allow cross-issue bargaining and eliminate

free-riding by making membership in a trade agreement conditional on entering into an environmental agreement.

The linkage of negotiations over different issues was initially proposed in the economics literature in order to address asymmetries across countries (see, e.g., Cesar and de Zeeuw 1996; Abrego et al. 2001; Limao 2007). For example, if cooperation on a particular issue provides extra benefits to country A, but imposes extra costs on country B, then the agreement would require a side payment in the form of either a monetary transfer to country B or cooperation on a different issue that benefits country B. Of course, exchanging trade concessions for environmental concessions is not the only means of making side payments between countries.<sup>12</sup> Thus, the force of this argument as a case for the *efficiency* of linked negotiations is limited.

Another issue with linking trade and environmental negotiations in a single forum is that it would increase the complexity of negotiations. Although including additional issues in negotiations will typically increase the ability of countries to achieve consensus, as they have more issues to bargain over, Conconi and Perroni (2002) argue that adding additional issues to WTO negotiations can result in a breakdown of the agreement. Conconi and Perroni (2002) show that increasing the number of issues can facilitate the formation of an agreement by providing negotiators greater flexibility in structuring an agreement that prevents the formation of a blocking coalition. However, they show that it is also possible that the introduction of additional issues will lead to the formation of new blocking coalitions, thus preventing a multilateral agreement from being achieved at all. Given the current problems with achieving agreement in the Doha round, this is not a concern to be taken lightly.

## Enforcement Linkage

The second issue concerning linkage is whether, once countries have entered into an international environmental agreement that binds their environmental policies, such an agreement should be enforced with the explicit threat of trade sanctions (including the withdrawal of trade concessions made in WTO negotiations). It should be noted that the extent to which current WTO rules allow trade sanctions to be used as a means of enforcing international agreements concerning separate issues/policies has not yet been fully determined. WTO rules currently permit cross-retaliation for the range of trade pacts negotiated under WTO auspices (e.g., tariff code, service accords, investment accords, and intellectual property accords). That is, failure to observe an obligation in one negotiating area could result in the suspension of concessions in another area. However, the extent to which WTO rules allow the use of trade sanctions as a means of enforcing cooperation with international agreements outside those negotiated within the WTO remains unclear (see Horn and Mavroidis 2008; Bhagwati and Mavroidis 2007). Thus, it is helpful to consider the costs and benefits of using trade sanctions (i.e., cross-retaliation) to enforce international agreements.

<sup>12</sup>Bagwell, Mavroidis, and Staiger (2002) make the point that countries have some flexibility to exchange trade concessions for environmental concessions outside of their formal involvement in the WTO. For example, a developed country could encourage a developing country to raise its environmental standards by either promising favored treatment in future trade negotiations or providing favorable treatment through the Generalized System of Preferences (GSP), neither of which would require formal WTO involvement.

The obvious benefit of allowing enforcement linkage is its potential to encourage cooperation within the agreement. Specifically, in the absence of a supranational authority that can require cooperation, to be effective, an international agreement must be designed so that it is self-enforcing (i.e., that continued cooperation is in the interest of member countries). This means ensuring that any international agreement contains an implicit incentive constraint requiring that the gains from deviating from the agreement are less than the ensuing losses from retaliation. The issue here is whether allowing linkage can make satisfying this incentive constraint easier, resulting in the agreement being able to sustain greater cooperation. This issue is addressed in several recent studies, including Spagnolo (1999), Ederington (2002), and Limao (2005). Ederington (2002) and Limao (2005) consider the familiar case of an international trade agreement driven by terms-of-trade considerations, which would require international cooperation over both trade and domestic policy, since countries would have an incentive to act opportunistically with respect to their domestic policies once their trade policies were bound. Both studies compare the effectiveness of a linked agreement (where noncooperation with *either* policy can trigger punishment in *both* policies) to a nonlinked agreement (where punishment is limited to the policy where the deviation occurred).

The question analyzed by Ederington (2002) and Limao (2005) is whether the greater threat of punishment offered by linking agreements (e.g., threatening trade sanctions for violations of the environmental agreement) is actually necessary to induce cooperation. Basically, both studies find that there are no enforcement gains from linkage when pollution is purely local. However, it should be noted that neither Ederington (2002) nor Limao (2005) find that linking enforcement regimes is *harmful*, only that it is not *necessary*. Indeed, it is instructive to note that a common result in the large and growing game-theoretic literature on linkage is that a linked regime is always a weakly optimal punishment strategy. Intuitively, this finding is due to the fact that the literature typically assumes perfect information (i.e., any deviations are perfectly observed), and so the punishment phase is never triggered (since the agreement is designed to be self-enforcing). Thus, using trade sanctions as a means of enforcement will always be weakly preferred to forbidding their use since, with perfect information, there is no cost to threatening the strongest possible punishment to potential deviators.

However, the assumption of perfect information (i.e., perfectly observed policy) assumes away a standard objection to linkage: that it will lead to an escalation of trade disputes and thus undermine the world trading system (see Anderson 1998). Thus, analyzing trade disputes requires investigating policy linkage in a model of imperfectly observable policy, as is done in Bajona and Ederington (2008). As noted above, Bajona and Ederington (2008) include both unobservable domestic policy and unobservable foreign trade shocks, which means that trade disputes occur, and reversion to the punishment phase occurs randomly (even in the absence of cheating on the agreement). Bajona and Ederington (2008) find that linkage remains weakly optimal even in a setting of imperfect monitoring where punishment is randomly triggered, and that the assumption of imperfectly observable domestic policy actually increases the enforcement gains to linkage. Since countries have the ability to deviate from the agreement without being caught by using domestic policy as a form of hidden trade protection, the incentive constraint with respect to deviation in domestic policy becomes more relevant, and linkage, which threatens tougher trade sanctions for domestic policy deviations, can actually relax this (now) binding incentive constraint and create enforcement gains. This means that although integrating domestic policy into trade agreements may increase the number of trade

disputes (when domestic policy cannot be perfectly monitored), it may actually increase the benefits of linkage. Thus, in the presence of imperfect information (and given the potential for disputes over environmental policy to result in trade sanctions), linkage is weakly preferred, and in some cases strictly preferred, to nonlinkage, even in the absence of transboundary pollution.

The argument for enforcement linkage becomes even stronger when there are transboundary pollution concerns. The main lesson of Spagnolo (1999) is that linkage can create enforcement gains when policy issues are substitutes (that is, the value of an agreement on one issue falls when agreement on the other issue is reached). Limao (2005) and Ederington (2004) find that in this situation linkage results in enforcement gains when there is both a terms-of-trade externality and a transboundary pollution concern. Thus, at least from a game-theoretic standpoint, the current economics literature suggests that linkage is weakly optimal under either perfect or imperfect information, and that the efficiency case for enforcement linkage becomes even greater in the presence of transboundary pollution.

Given the optimality of linkage as a means of enforcement, it is instructive to look at the current interpretation of GATT rules and how they relate to the question of enforcement linkage. In a recent study, Horn and Mavroidis (forthcoming) argue that while a GATT panel would look askance at the use of trade sanctions to induce membership in a new multilateral environmental agreement (i.e., negotiation linkage), it would be much more sympathetic to the use of trade sanctions to enforce cooperation with an existing multilateral environmental agreement especially if such usage had been previously agreed to by the member countries (i.e., enforcement linkage). This legal distinction between using the threat of trade sanctions as a means of inducing membership in new agreements versus enforcing existing agreements actually parallels the recent economics literature, where linkage as a means of enforcement has more theoretical support than linkage at the negotiation stage.

If linkage is not inefficient from an enforcement standpoint, then why do many trade economists have concerns with linkage? The answer may be related to the distributional effects of linkage. More specifically, as shown in Limao (2005), linkage may increase the degree of environmental cooperation at the expense of trade policy cooperation. That is, linkage may reallocate enforcement across the policy issues, which implies that the linked agreement may result in higher trade taxes than its nonlinked counterpart. Thus, to the extent that one believes that the government overvalues the environmental pollution externality and undervalues the gains to trade, linkage could result in a reallocation of cooperation away from one's preferences. However, this is not an argument that linkage would be inefficient or welfare-reducing. Rather it is simply a statement that such linkage could slow global cooperation toward reducing trade barriers—a result that many economists (who do not always share government priorities) would find unfortunate.

## Summary and Conclusions

Should international trade agreements be expanded to include negotiations over environmental policy? This article has examined the recent trade and environment literature for insights and answers to this question. Two points of emphasis emerge from this



literature. First, recent empirical evidence on the pollution haven effect suggests that leaving environmental policy to governmental discretion (i.e., not including environmental policy in international negotiations) does create potential problems in the international sphere. Specifically, recent empirical research that uses fixed effects and instrumental variable estimation has consistently provided evidence that environmental regulations and standards do have an appreciable impact on trade flows. This evidence suggests that concerns about a potential race to the bottom might be justified, as countries have the ability to respond to the binding of their trade policy by relaxing their environmental standards in order to provide a competitive advantage to domestic industry. Such actions could lead to both suboptimal environmental standards (as least from a global perspective) and reduced trade (as countries undermine market access commitments by weakening standards in import-competing industries). Thus, international negotiations over environmental policy would be beneficial in preventing countries from using such policies as a second-best instrument of protection. However, it does seem quite possible that the current costs of contracting over environmental policy may make it logistically infeasible to convert the GATT to an instrument-based agreement with respect to environmental policy. There is a need for more research and analysis on how to restructure the GATT agreement to prevent countries from limiting market access by distorting environmental policy. One intriguing line of research suggests that using current GATT rules, specifically nonviolation constraints, may offer a means of responding to these concerns without expanding negotiations to include a host of domestic policy instruments (see Bagwell and Staiger 2001).

The second point of emphasis in the literature is whether, to the extent that it is considered beneficial to negotiate directly over environmental policy, these environmental agreements should be linked directly to current trade agreements such as the GATT/WTO. The economic argument for linking negotiations over trade policy to negotiations over global environmental problems (i.e., negotiation linkage) seems limited. However, the argument for using trade sanctions as a means of enforcing existing international environmental agreements (i.e., enforcement linkage) is much stronger. Specifically, the recent theoretical literature suggests that, at least from a game-theoretic standpoint, linking the enforcement of environmental policy and trade policy agreements would be beneficial. However, the welfare benefits of enforcement linkage come with the caveat that enforcement linkage could result in higher trade barriers worldwide, as such linkage may increase environmental cooperation at the expense of trade cooperation.

## Appendix

To further examine evidence of the pollution haven effect, I follow Grossman and Krueger (1993) and run a simple cross-section regression of U.S. industry-level net imports ( $M_i$ ) for the year 1980 on a vector of industry characteristics, including a measure of the severity of environmental regulations ( $t_i$ ):

$$M_i = \beta_1 \cdot t_i + \beta_2 \cdot \tau_i + \beta_n \cdot F_i^n + \eta_i \quad (1)$$

The dependent variable ( $M_i$ ) is U.S. net imports scaled by total U.S. shipments in industry  $i$ . The stringency of environmental regulations ( $t_i$ ) is measured by the ratio of pollution

abatement costs (from the Census Bureau's Pollution Abatement Costs and Expenditures [PACE] survey) to total costs of materials in industry  $i$ . The industry tariff rate ( $\tau_i$ ) is estimated by dividing duties by import volume to give a measure of average ad valorem tariffs for each industry. The factor intensity variables ( $F_i^n$ ) measure the human and physical capital intensity of each industry.<sup>13</sup> The estimates from this specification are presented in column 1 of Appendix Table 1. The coefficient of interest is the correlation between environmental compliance costs and net trade flows ( $\beta_1$ ). Note that, as is common in these types of cross-sectional regressions, there is no correlation between the pollution abatement costs of an industry and trade flows (that is,  $\beta_1$  is negative and not statistically significant).

The problem of unobserved heterogeneity in the cross-sectional regression can be addressed by using both more disaggregated data (i.e., four-digit SIC instead of three-digit) and panel data. This allows the inclusion of time- and sector-fixed effects to soak up unobserved sector-specific or time-specific excluded variables. Thus, the next specification uses panel data on four-digit SIC U.S. manufacturing industries from 1978–1992 to estimate the following equation:<sup>14</sup>

$$M_{it} = \mu_i + \mu_t + \beta_1 \cdot t_{it} + \beta_2 \cdot \tau_{it} + \beta_n \cdot F_{it}^n + \eta_{it}. \quad (2)$$

Note that this specification includes industry ( $\mu_i$ ) and time ( $\mu_t$ ) fixed effects. The estimates from this specification, which are presented in column 2 of Appendix Table 1, indicate that controlling for unobserved heterogeneity across industries reveals a small but statistically significant pollution haven effect (i.e.,  $\beta_1$  is positive and statistically significant).

However, this specification still fails to account for the potential endogeneity of pollution abatement costs. To address this concern, I follow Levinson and Taylor (2004) and Ederington and Minier (2003) and adopt a fixed-effects instrumental variables approach. Specifically, I follow Ederington and Minier (2003) and instrument for pollution abatement costs using a vector of political-economy variables ( $P_{it}^n$ ):<sup>15</sup>

$$M_{it} = \mu_i + \mu_t + \beta_1 \cdot t_{it} + \beta_2 \cdot \tau_{it} + \beta_n \cdot F_{it}^n + \eta_{it} \quad (3)$$

$$t_{it} = \alpha_i + \alpha_t + \delta_1 \cdot \tau_{it} + \delta_2 \cdot M_{it} + \delta_n \cdot P_{it}^n + \varepsilon_{it}. \quad (4)$$

The results of this specification, presented in column 3 of Appendix Table 1, show that when the level of environmental regulation is modeled as an endogenous variable, the estimated pollution haven effect is both quantitatively and statistically significant.<sup>16</sup>

<sup>13</sup>Data on trade volume and import duties are taken from the NBER Trade Database, while industry data are provided by the Census of Manufacturers. To calculate the (direct) factor shares of both types of capital, we employ a method proposed by Grossman and Krueger (1993).

<sup>14</sup>Because of missing environmental cost data for 1979 and 1987, these years are excluded from the analysis.

<sup>15</sup>Instruments are drawn from empirical studies on endogenous protection (see Trefler 1993) and include the four-firm concentration ratio, the number of firms in the industry, industry size, unionization, unemployment, total trade volume, and recent changes in trade flows and industry growth to capture recent economic shocks. See Ederington and Minier (2003) for more details. In contrast, Levinson and Taylor (2004) construct instrumental variables utilizing the geographic distribution of “dirty” industries in the United States.

<sup>16</sup>In addition, the Hausman specification test rejects the null hypothesis that the level of environmental regulation is exogenous.

**Appendix Table 1: Regression Results**

|                          | (1)<br>OLS – 1980                 | (2)<br>Panel                      | (3)<br>3SLS                      |
|--------------------------|-----------------------------------|-----------------------------------|----------------------------------|
| Dependent variable       | Net imports                       | Net imports                       | Net imports                      |
| Environmental regulation | –0.129<br>(1.25)<br><i>0.918</i>  | 0.531<br>(0.193)<br><i>0.006</i>  | 34.95<br>(7.61)<br><i>0.000</i>  |
| Tariff                   | –.427<br>(0.361)<br><i>0.242</i>  | –2.59<br>(0.170)<br><i>0.000</i>  | –2.56<br>(0.595)<br><i>0.000</i> |
| Human capital            | –0.367<br>(0.354)<br><i>0.305</i> | –0.784<br>(0.141)<br><i>0.000</i> | –2.45<br>(0.621)<br><i>0.000</i> |
| Physical capital         | –0.459<br>(0.223)<br><i>0.044</i> | –0.529<br>(0.099)<br><i>0.030</i> | –1.21<br>(0.340)<br><i>0.000</i> |
| R <sup>2</sup>           | 0.085                             | 0.934                             | 0.185                            |
| Observations             | 66                                | 3,188                             | 3,188                            |
| Industries               | 66                                | 374                               | 374                              |

Notes: Data for the OLS regression (column 1) are U.S. three-digit SIC manufacturing industries for the year 1980. Data for the panel regression and 3SLS regression (columns 2 and 3) are U.S. four-digit SIC manufacturing industries over the period 1978–92. Constant terms vary by time periods and by industry. Standard errors appear in parentheses; p-values are in italics. 3SLS reported R<sup>2</sup>s are computed using actual, not instrumented, values of environmental cost and net imports, and so are not constrained to be greater than zero. Columns 2 and 3 are reproduced from Ederington and Minier (2003).

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