



HARVARD Kennedy School
JOHN F. KENNEDY SCHOOL OF GOVERNMENT

Harvard Environmental Economics Program

Discussion Paper 09-09

Global Environmental Policy and Global Trade Policy

Jeffrey Frankel

Harvard Kennedy School

The Harvard Environmental Economics Program

The Harvard Environmental Economics Program develops innovative answers to today's complex environmental issues, by providing a venue to bring together faculty and graduate students from across the University engaged in research, teaching, and outreach in environmental and natural resources economics and related public policy. The program sponsors research projects, develops curricula, and convenes conferences to further understanding of critical issues in environmental and resource economics and policy around the world.

Acknowledgements

The Enel Endowment for Environmental Economics, at Harvard University, provides major support for HEEP. The endowment was established in February 2007 by a generous capital gift of \$5 million from Enel, SpA, a progressive Italian corporation involved in energy production worldwide. HEEP enjoys an institutional home in and support from the Mossavar-Rahmani Center for Business and Government at Harvard Kennedy School. As its name suggests, the Center is concerned with the interaction of the public and private sectors, including with regard to environmental issues.

HEEP is grateful for additional support from: Shell, Christopher P. Kaneb (Harvard AB 1990); the James M. and Cathleen D. Stone Foundation; Paul Josefowitz (Harvard AB 1974, MBA 1977) and Nicholas Josefowitz (Harvard AB 2005); and the Belfer Center for Science and International Affairs at the Harvard Kennedy School. The Harvard Project on International Climate Agreements, co-directed by Robert N. Stavins and closely affiliated with HEEP, is funded primarily by a grant from the Doris Duke Charitable Foundation.

HEEP—along with many other Harvard organizations and individuals concerned with the environment—collaborates closely with the Harvard University Center for the Environment (HUCE). A number of HUCE's Environmental Fellows and Visiting Scholars have made intellectual contributions to HEEP.

Citation Information

Frankel, Jeffrey. "Global Environmental Policy and Global Trade Policy " Discussion Paper 2009-09, Cambridge, Mass.: Harvard Environmental Economics Program, April 2009.

The views expressed in the Harvard Environmental Economics Program Discussion Paper Series are those of the author(s) and do not necessarily reflect those of the John F. Kennedy School of Government or of Harvard University. Discussion Papers have not undergone formal review and approval. Such papers are included in this series to elicit feedback and to encourage debate on important public policy challenges. Copyright belongs to the author(s). Papers may be downloaded for personal use only.

Abstract

The global climate regime and the global trade policy regime are on a collision course. National efforts to reduce emissions of greenhouse gases (GHGs) instill among environmentalists fears of leakage and among businesspeople fears of lost competitiveness. Policy-makers respond to these fears. In 2008, legislative attempts in both Washington, DC, and Brussels to enact long-term targets for reduced emission of GHGs included provisions for possible penalties against imports from countries perceived as non-participating. Trade measures, if well designed, could in theory be WTO-compatible, in light of the precedent of the shrimp-turtle case, in particular. But the actual provisions emerging from the political process are likely to violate the rules of the WTO, which poses the scenario of a WTO panel rejecting a major country's climate change legislation. That would be a nightmare for the supporters of the WTO and free trade as much as for the supporters of the Kyoto Protocol and environmental protection. The issue is just the latest and largest instance of fears among many environmentalists that the WTO is an obstacle to their goals in general. For many critics, the WTO is a symbol of globalization, which they fear. The first part of this paper discusses the broader issue of whether environmental goals in general are threatened by the global free trade system. The paper then focuses exclusively on the narrower question of trade measures in the effort to implement climate change policy and whether they are likely to be successful. It concludes with specific recommendations for how border measures could be designed so that they were more likely to be true to the goal of reducing leakage and yet consistent with the WTO.

Global Environmental Policy and Global Trade Policy

Jeffrey Frankel
Harvard University

The author acknowledges useful input from Joe Aldy, Thomas Brewer, Steve Charnovitz, Gary Sampson and Rob Stavins.

The global climate regime, as represented by the Kyoto Protocol, may be on a collision course with the global trade policy regime, as represented by the WTO (World Trade Organization). Environmentalists fear that international trade will undercut reductions in greenhouse gas emissions as dirty production migrates to non-participating countries, a phenomenon known as leakage. Meanwhile businesspeople fear the effects on their own competitiveness of the same phenomenon. These fears have now become prominent in the policy-making process. In early 2008, legislation to enact long-term targets for reduced emission of greenhouse gases included provisions for possible barriers against imports from countries perceived as non-participating -- in both Washington, DC (where the bills have not yet passed) and in Brussels (where the EU Commission Directive has gone into effect). Such provisions could be interpreted as violations of the rules of the WTO, which poses the nightmare scenario of a WTO panel rejecting a major country's climate change legislation. In light of the hostile feelings that such a scenario would unleash, it would be a nightmare for the supporters of the WTO and free trade as much as for the supporters of the Kyoto Protocol and environmental protection.

The issue is just the latest and largest instance of fears among many environmentalists that the WTO is an obstacle to their goals in general. The issue transcends institutions. For the critics, the WTO is a symbol of globalization, and their fears attach also to that larger phenomenon.

The first part of this paper discusses the broader issue of whether environmental goals in general are threatened by free trade and the WTO. The second half of the paper focuses exclusively on the narrower question of trade aspects of nations' efforts to implement climate change policy and whether they are likely to come into conflict with the WTO.

1. The Environmental Kuznets Curve

Economic growth has both harmful effects on environmental quality (via the scale of industry) and beneficial effects (via shifts toward cleaner sectors and cleaner production techniques). What is the net outcome of these conflicting effects? A look at data across countries or across time allows some rough generalizations. For some important

environmental measures, a U-shaped relationship appears: at relatively low levels of income per capita, growth leads to greater environmental damage, until it levels off at an intermediate level of income, after which further growth leads to improvements in the environment. This empirical relationship is known as the Environmental Kuznets Curve. The World Bank (1992) and Grossman and Krueger (1993, 1995) brought to public attention this statistical finding for a cross section of countries.¹ Grossman and Krueger (1995) estimated that SO₂ pollution peaked when a country's income was about \$5,000-\$6,000 per capita (in 1985 dollars). Most developing countries have not yet reached this threshold.

For countries where a long enough time series of data is available, there is also some evidence that the same U-shaped relationship can hold across time. The air in major industrialized cities was far more polluted in the 1950s than it is today. A similar pattern holds typically with respect to deforestation in rich countries: the percentage of US land that was forested fell in the 18th century and first half of the 19th century, but rose in the 20th century.²

The idea behind the Environmental Kuznets Curve is that, although growth is bad for air and water pollution at the initial stages of industrialization, later on it reduces pollution as countries become rich enough to pay to clean up their environments. It would be inaccurate to portray the Environmental Kuznets Curve as demonstrating that if countries promote growth, the environment will eventually take care of itself. Only if pollution is largely confined within the home or within the firm does that Panglossian view apply.³ Most pollution, such as SO₂, NO_x, etc., is external to the home or firm. For such externalities, higher income and a popular desire to clean up the environment are not enough. There must also be effective government regulation, which usually requires a democratic system to translate the popular will into action (something that was missing in the Soviet Union, for example), as well as the rule of law and reasonably intelligent mechanisms of regulation. The empirical evidence confirms that the participation of well-functioning democratic governments is an important part of the process. That is at the national level. The requirements for dealing with cross-border externalities are greater still.

Another possible explanation for the pattern of the Environmental Kuznets Curve is that it works naturally via the composition of output. In theory, the pattern could result from the usual stages of economic development: the transition from an agrarian economy to

¹ Grossman and Krueger (1993, 1995) found the U-shaped pattern for urban air pollution (SO₂ and smoke) and several measures of water pollution; Selden and Song (1994) found it for SO₂, suspended particulate matter (PM), NO_x, and carbon monoxide; Shafik (1994) for deforestation, suspended PM, and SO₂; Hilton and Levinson (1998) for automotive lead emissions; Bimonte (2001) for the percentage of national territory that is protected land; and Bradford, Fender, Shore and Wagner (2005) for arsenic, COD, dissolved oxygen, lead and SO₂ (but not for PM and some other measures of pollution).

² Cropper and Griffiths (1994) find little evidence across countries of an EKC for forest growth. But Foster and Rosenzweig (2003) find supportive evidence in the time series for India.

³ Chaudhuri and Pfaff (2002) find a U-shaped relationship between income and the generation of indoor smoke, across households. In the poorest households, rising incomes mean more cooking and more indoor pollution. Still-higher incomes allow a switch to cleaner fuels. Government intervention is not required.

manufacturing, and then from manufacturing to services. Services tend to generate less pollution than heavy manufacturing.⁴ This explanation is less likely than the conventional view to require the mechanism of effective government regulation. If the Kuznets curve in practice resulted solely from this composition effect, however, then high incomes should lead to a better environment even when externalities arise at the international level, which is not the case. Importantly, no Kuznets curve has yet appeared for carbon dioxide, as we will see below.⁵ Even though emissions per unit of GDP do tend to fall, this is not enough to reduce overall emissions.

2. Effects of Openness to Trade

The topic of this chapter is the implications of international trade for the global environment. Some effects come via economic growth, and some come even for a given level of income. In both cases, the effects can be either beneficial or detrimental. Probably the strongest effects of trade are the first sort, via income. Much like saving and investment, technological progress, and other sources of growth, trade tends to raise income. As we have seen, higher income in turn has environmental effects that are initially adverse even though, according to the Environmental Kuznets Curve, they eventually turn favorable in the case of some environmental criteria such as SO₂.

What about effects of trade that do not operate via economic growth? They can be classified in three categories: systemwide effects that are adverse, systemwide effects that are beneficial, and effects that vary across countries depending on local “comparative advantage.”

Race to the bottom

The “*race to the bottom*” hypothesis is perhaps the strongest basis for fearing that international trade and investment specifically (rather than industrialization generally) will put downward pressure on countries’ environmental standards and thus damage the environment across the global system. Leaders of industry, and of the unions whose members are employed in industry, are always concerned about competition from abroad. When domestic regulation raises their costs, they fear that they will lose competitiveness against firms in other countries. They warn of a loss of sales, employment, and investment to foreign competitors.⁶ Thus domestic producers often sound the competitiveness alarm as a way of applying political pressure on their governments to minimize the burden of regulation.

The “race to the bottom” concern is that, to the extent that countries are open to international trade and investment, environmental standards will be lower than they would otherwise be. But how important is this in practice? Some economists’ research suggests that environmental regulation is not one of the most important determinants of firms’ ability to compete internationally. When deciding where to locate, multinational firms seem to pay

⁴ Arrow, et al, (1995); Panayotou (1993).

⁵ E.g., Holtz-Eakin and Selden (1995).

⁶ Levinson and Taylor (2001) find that those US industries experiencing the largest rise in environmental control costs have indeed also experienced the largest increases in net imports.

more attention to such issues as labor costs and market access than to the stringency of local environmental regulation.⁷

Once again, it is important to distinguish (1) the fear that globalization will lead to a race to the bottom in regulatory standards, from (2) fears that the environment will be damaged by the very process of industrialization and economic growth itself. Opening of national economies to international trade and investment could play a role in both cases, but the two possible channels are very different. In the first case, the race to the bottom hypothesis, the claim is that openness undermines environmental standards even for a given path of economic growth. This would be a damning conclusion from the standpoint of globalization, because it would imply that by limiting trade and investment in some way, we might be able to attain a better environment for any given level of GDP. In the second case, the implication would be that openness only affects the environment in the way that investment, or education, or productivity growth, or any other source of growth affects the environment, by moving the economy along the Environmental Kuznets Curve. Trying to restrict trade and investment would be a less attractive strategy in this case, because it would amount to deliberate self-improvement.

Gains from trade

While the possibility that exposure to international competition might have an adverse effect on environmental regulation is familiar, less widely recognized and more surprising is the possibility of effects in the beneficial direction, which we will call the *gains from trade hypothesis*. Trade allows countries to attain more of what they want, which includes environmental goods in addition to market-measured output.

How could openness have a positive effect on environmental quality, once we set aside the possibility of accelerating progress down the beneficial slope of the Environmental Kuznets Curve? A first possibility concerns technological and managerial innovation. Openness encourages ongoing innovation.⁸ It then seems possible that openness could encourage innovation beneficial to environmental improvement as well as economic progress. A second possibility is an international ratcheting up of environmental standards.⁹ The largest political jurisdiction can set the pace for others. Within the United States, it is called the “California effect:” When the largest state sets high standards for auto pollution control equipment, for example, the end result may be similar standards in other states as well. The United States can play the same role globally.

⁷ Jaffe, Peterson, Portney and Stavins (1995), Grossman and Krueger (1993), Low and Yeats (1992), and Tobey (1990). Other researchers, however, have found more of an effect of environmental regulation on direct investment decisions: Lee and Roland-Holst (1997) and Smarzynska and Wei (2001).

⁸ Trade speeds the absorption of frontier technologies and best-practice management. This explains why those countries that trade more than others are observed to experience higher sustained growth, rather than just the one-time increase in the level of real income predicted by classical trade theory.

⁹ E.g., Vogel (1995), Braithwaite and Drahos (2000), Porter (1990, 1991) and Porter and van der Linde (1995). This ratcheting up may be more effective for product standards than for standards regarding processes and production methods.

Multinational corporations (MNCs) are often the vehicle for these effects. They tend to bring clean state-of-the-art production techniques from high-standard countries of origin, to host countries where they are not yet known. The claim is not that all multinational corporations apply the highest environmental standards when operating in other countries. Rather the claim is that the standards tend on average to be higher than if the host country were undertaking the same activity on its own.¹⁰

Corporate codes of conduct offer a new way that residents of some countries can pursue environmental goals in other countries.¹¹ Formal international cooperation among governments is another way that interdependence can lead to higher environmental standards rather than lower.¹²

Attempts to evaluate the overall effects of trade on the environment

If a set of countries opens up to trade, is it on average likely to have a positive or negative effect on the environment (for a given level of income)? Which tend in practice to dominate, the unfavorable “race to the bottom” effects or the favorable “gains from trade” effects? Econometrics can help answer the question.

Statistically, some measures of environmental quality are positively correlated with the level of trade. For example, countries more open to international trade on average experience lower levels of SO₂ pollution.¹³ But the causality is complex, running in many directions simultaneously. One would not want to claim that trade leads to a cleaner environment, if in reality they are both responding to some other third factor, such as economic growth or democracy.¹⁴

A number of studies have sought to isolate the independent effect of openness.¹⁵ None of these studies makes allowance for the problem that trade may be the *result* of other factors rather than the cause. Antweiler, et al, point out this potential weakness. Frankel and Rose (2003) attempt to disentangle the various causal relationships. The study focuses on exogenous variation in trade across countries attributable to factors such as geographical location. It finds effects on several measures of air pollution (particularly SO₂ and NO_x concentrations), for a given level of income, that are more good than bad. This suggests that the “gains from trade” effects may be at least as powerful as the “race to the bottom” effect.

¹⁰ Esty and Gentry (1997, pp. 157, 161, 163) and Schmidheiny (1992).

¹¹ Ruggie (2002).

¹² Neumayer (2002).

¹³ E.g., Eiras and Schaeffer (2001, p. 4) or Frankel (2005b, Figure 1).

¹⁴ Barrett and Graddy (2000) is one of several studies to find that an increase in civil and political freedoms significantly reduces some measures of pollution.

¹⁵ Lucas, et al. (1992), study the toxic intensity implied by the composition of manufacturing output, and find that trade-distorting policies increase pollution in rapidly growing countries. Dean (2002) finds on net a beneficial effect of liberalization for a given level of income. Antweiler, Copeland and Taylor (2001) and Copeland and Taylor (2001, 2003a) also conclude that the net effect of trade liberalization on SO₂ concentrations is beneficial.

The findings are different for emissions of CO₂, however, which appear, if anything, to be exacerbated by trade.

3. Cross-border Institutions for Cross-border Problems

Even someone who does not care about trade at all should appreciate the role of international agreements and institutions. The reason is the increasing importance of major sources of environmental damage that cross national borders, and that would do so even if there were no such thing as international trade. Some externalities have long spilled over from each country to its neighbors -- such as SO₂ pollution, which is responsible for acid rain, or water pollution, which flows downriver. They can be addressed by negotiations between the two countries involved (e.g., U.S. and Canada). An increasing number of environmental externalities are truly global, however. The best examples are greenhouse gases. A ton of carbon dioxide creates the same global warming potential regardless where in the world it is emitted. Other good examples of direct global externalities are stratospheric ozone depletion, depletion of ocean fish stocks, and threats to biodiversity.

PPMs

Even localized environmental damage, such as deforestation, is increasingly seen as a valid object of international concern. A distinction is traditional between trade measures that target specific undesirable products, such as asbestos, and those that target *Processes and Production Methods* (PPMs), such as the use of prison labor in the manufacture of the commodity in question. It is clear that a country concerned about its own health or environment has the right to tax or ban products that it regards as harmful, so long as it does not discriminate against foreign producers. Indeed, such bans are less liable to become a vehicle for surreptitious protectionism, than are attempts to pass judgment on other countries' production methods that are unrelated to the physical attributes of the product itself. But is it legitimate for importing countries also to discriminate according to how a given product was produced? Some ask: what business is it of others whether the producing country wants to use its own prison labor, or cut down its own forests, or pollute its own environment?¹⁶

Often an international externality can be easily identified. Forests absorb carbon dioxide (a process called sequestration, or carbon sinks), so logging contributes to global climate change. An endangered species may contain a unique genetic element that someday could be useful to international scientists. Desertification can lead to social instability and political conflict, which can in turn produce problems for international security. Thus environmental damage in one country can have indirect effects on others.

¹⁶ See Charnovitz (2003a) on the history, law, and analysis of PPMs. He argues that the public failure to understand environment-friendly developments in the late 1990s within GATT/WTO jurisprudence regarding PPMs is now an obstacle to further progress (e.g., in the WTO Committee on Trade and Environment; p. 64, 103-04).

WTO panel cases

Environmentalists are keen to interject themselves into the WTO. Those who live in the world of international trade negotiations tell those who live in the environmentalist world that their concerns may be valid, but that they should address them outside the WTO, in their own, separate, negotiations, and their own multilateral agencies.¹⁷

In the post war period, the vehicle for conducting the multilateral negotiations that succeeded in bringing down trade barriers in many countries was the General Agreement on Tariffs and Trade. The GATT organization in 1995 was replaced with a real agency, the World Trade Organization. One reason why the change was important is that the new institution featured a dispute settlement mechanism, whose findings were to be binding on the member countries. Previously, a party that did not like the ruling of a GATT panel could reject it.

Why do so many environmentalists apparently feel that the still-young WTO is a hostile power? The allegation that the GATT and WTO are hostile to environmental measures could conceivably arise from the core provisions of the GATT, which prohibit a member country from discriminating against the exports of another, in favor of “like products” made either by a third country (that is the Most Favored Nation provision of Article I) or by domestic producers (the national treatment provision of Article III). But Article XX allows for exceptions to the non-discrimination principle for environmental reasons (among others), provided that the measures in question are not “a means of arbitrary or unjustifiable discrimination” or a “disguised restriction on international trade.”

Under the GATT, there was ambiguity of interpretation as to what was to happen when Article XX conflicted with the non-discrimination article. To clarify the matter, in the preamble of the Articles agreed at Marrakech establishing the WTO, language was added specifying that its objectives were not limited to promoting trade but included also optimal use of the world’s resources, sustainable development, and environmental protection. Environmental objectives are also recognized specifically in the WTO agreements dealing with product standards, food safety, intellectual property protection, etc.

How does one explain the common view in the protest movement that the WTO is actively harmful to the environment? When members of the protest movement identify specifics, they usually mention the rulings of WTO panels under the dispute settlement mechanism. The panels are quasi-judicial tribunals, whose job is to rule in disputes whether parties are abiding by the rules that they have already agreed to. Like most judicial proceedings, the panels themselves are not intended to be democratic. But the rulings to date do not show a pattern of having been dominated by any particular country or interest group. There have been three or four fairly prominent WTO panel rulings that concern the environment in some way. Many observers within the environmentalist and NGO community have at some point acquired the belief that these rulings told the United States,

¹⁷ The most prominent and articulate spokesman of the viewpoint opposing linkage between trade and unrelated issues is Jagdish Bhagwati (2000).

or other defendant country, that their attempts to protect the environment must be repealed. The mystery is why this impression is so widespread, because it has little basis in fact.

The four WTO cases that will be briefly reviewed here are Canadian asbestos, Venezuelan reformulated gasoline, U.S. hormone-fed beef, and Asian shrimp and turtles. We will also touch on the Mexican tuna-dolphin case. Each of the cases involves an environmental measure that the producer plaintiff alleged to have trade-distorting effects. The complaints were not based, however, on the allegation that the goal of the measure was not valid, or that protectionism was the original motivation of the measure. In most of the cases, the allegation was that discrimination against foreigners was an incidental, and unnecessary, feature of the environmental measure.

Canadian asbestos

One case is considered a clear win for the environmentalists. The WTO Appellate Body in 2001 upheld a French ban on asbestos products, against a challenge by Canada, who had been exporting to France. This ruling made real the WTO claim that its charter gives priority to health, safety and environmental requirements, in that for such purposes GATT Article XX explicitly allows exceptions to the Most Favored Nation and national treatment rules.¹⁸

Venezuelan reformulated gasoline

In the reformulated gasoline case, Venezuela successfully claimed that US law violated national treatment, i.e., discriminated in favor of domestic producers. The case was unusual in that the intent to discriminate had at the time of passage been made explicit by U.S. administration officials seeking to please a domestic interest group. If the WTO had ruled in the US favor, it would have been saying that it was fine for a country to discriminate needlessly and explicitly against foreign producers so long as the law came under an environmental label. Those who oppose this panel decision provide ready-made ammunition for the viewpoint that environmental activism is a false disguise worn by protectionist interests.

The United States was not blocked in implementing its targets under the Clean Air Act, as commonly charged. Rather, the offending regulation was easily changed so as to be nondiscriminatory and thus to be permissible under the rules agreed by members of the WTO. This case sent precisely the right message to the world's governments, that environmental measures should not and need not discriminate against foreign producers.

Shrimp-turtle

Perceptions regarding the WTO panel ruling on a dispute about shrimp imports and the protection of sea turtles probably vary more widely than on any other case. The perception among many environmentalists is that the panel ruling struck down a U.S. law to protect sea turtles that are caught in the nets of shrimp fishermen in the Indian Ocean. (The provision was pursuant to the U.S. Endangered Species Act.) In reality, the dispute

¹⁸ *New York Times*, July 25, 2000.

resembled the gasoline case in the respect that the ban on imports from countries without adequate regulatory regimes in place was unnecessarily selective and restrictive. The WTO panel and appellate body decided that the US application of the law, in a complex variety of ways, was arbitrarily and unjustifiably discriminatory against the four plaintiff countries). The US had unilaterally and inflexibly banned shrimp imports from countries that did not have in place for all production a specific turtle-protection regime of its own liking.

The case could in fact be considered a victory for the environmentalists, in that the WTO panel and the appeals body in 1998 explicitly stated that the US could pursue the protection of endangered sea turtles against foreign fishermen. The United States subsequently allowed more flexibility in its regulation, and made good-faith efforts to negotiate an agreement with the Asian producers, which it could have done in the first place. The WTO panel and appellate body in 2001 found the new US regime to be WTO-compliant.¹⁹ The case set a precedent in clarifying support for the principle that the WTO rules allow countries to pass judgment on other countries' Processes and Production Methods, even if it means using trade controls to do so, provided only that the measures are not unnecessarily discriminatory.²⁰

Tuna-dolphin

In an earlier attempt to protect another large flippered sea animal, the United States had banned imports of tuna from countries that allowed the fishermen to use nets that also caught dolphins. Mexico brought a case before the GATT, as this pre-dated the WTO, and the GATT panel ruled against the U.S. law, in part due to features that discriminated unnecessarily against Mexican fishermen in favor of US fisherman. The GATT report was never adopted. The parties instead in effect worked out their differences bilaterally, "out of court." The case was considered a setback for trade-sensitive environmental measures, at least unilateral ones. But the setback proved temporary.²¹ That the GATT ruling in the tuna case did not affirm the right of the US to use trade bans to protect the dolphins shows how much the environmentalist cause has progressed under the WTO, in the subsequent gasoline, shrimp-turtle, and asbestos cases.

¹⁹ Charnovitz (2003a).

²⁰ For a full explanation of the legal issues, see Charnovitz (2003a). Also Michael Weinstein, "Greens and Globalization: Declaring Defeat in the Face of Victory," *NY Times*, April 22, 2001. Charnovitz and Weinstein (2001) argue that the environmentalists fail to realize the progress they have made in recent WTO panel cases, and may thereby miss an opportunity to consolidate those gains. It is not only environmentalists who are under the impression that the GATT rules do not allow PPMs. Some developing countries also claim that PPMs violate the GATT. The motive of the first group is to fight the GATT, while the motive of the second group is to fight PPMs.

²¹ A system for labeling tuna in the US market as either "dolphin safe" or not was later found consistent with the GATT. The American consumer response turned out to be sufficiently great to accomplish the desired cessation of non-dolphin-safe imports.

4. The Kyoto Protocol and the Leakage/Competitiveness Issue

The Kyoto Protocol on Global Climate Change, negotiated in 1997, is the most ambitious attempt at a multilateral environment agreement to date. The task of addressing Climate Change while satisfying the political constraints of the various factions (particularly, the US, EU, and developing countries) was an inherently impossible task. Most economists emphasize that the agreement as it was written at Kyoto would impose large economic costs on the United States and other countries, while making only a minor dent in the problem. The Clinton Administration's interpretation of the Protocol insisted on so-called flexibility mechanisms, such as international trading of emission permits, to bring the economic costs down to a modest range. Without the flexibility mechanisms, the United States would be out of the Protocol, even if the subsequent administration had been a more environmentally friendly than it was. (Ironically, now that European and other countries are trying to go ahead without the United States, they are finding that they cannot manage without such trading mechanisms.)

Even most of those who for one reason or another do not believe that Kyoto was a useful step, however, must acknowledge that multilateral agreements will be necessary if the problem of Global Climate Change is to be tackled. The administration of George W. Bush, even after it got past its resistance to the science, was reluctant to face up to this. The point for present purposes is that a system in which each country insists, based on an appeal to national sovereignty, that it be left to formulate environmental policies on its own, would be a world in which global externalities like greenhouse gas emissions would not be effectively addressed.

The issues of leakage and competitiveness

Among countries making legislative attempts to limit emissions of greenhouse gases, are increasingly obsessed with twin problems related to international trade: the problems of leakage and competitiveness.²² Assume that a core of rich countries is able to agree for the remainder of the century on a path of targets for emissions of greenhouse gases (GHGs), following the lead of Kyoto, or to agree on other measures to cut back on emissions, and that the path is aggressive enough at face value to go some ways to achieving the GHG concentration goals that the environmental scientists say are necessary. Even under the Business as Usual scenario -- that is, the path along which technical experts forecast that countries' emissions would increase in the absence of a climate change agreement -- most of the emissions growth is expected to come from China and other developing countries. If they are not included in a system of binding commitments, global emissions will continue their rapid growth. But the problem of leakage is worse than it may appear. Leakage means that emissions in the non-participating countries would actually rise above where they would otherwise be, thus working to undo the environmental benefits of the rich countries' measures. Furthermore, not wanting to lose "competitiveness" and pay economic costs for minor environmental benefits, the rich countries would almost certainly lose heart and the entire effort would unravel. Thus it is essential to find ways to address concerns about competitiveness and leakage.

²² Frankel (2005a,b).

Developing countries, leakage, and competitiveness

We need developing countries inside whatever regime is the successor to Kyoto, for several reasons.²³

The developing countries will be the source of the big increases in emissions in coming years according to the Business-as-Usual path (BAU). China, India, and other developing countries will represent up to two-thirds of global carbon dioxide emissions over the course of this century, vastly exceeding the OECD's expected contribution of roughly one-quarter of global emissions. Without the participation of major developing countries, emissions abatement by industrialized countries will not do much to mitigate global climate change

If a quantitative international regime is implemented without the developing countries, their emissions are likely to rise even faster than the BAU path, due to the problem of leakage. Leakage of emissions could come about through several (interrelated) channels. First, output of energy-intensive industries could relocate from countries with emissions commitments to countries without. This could happen either if firms in these sectors relocate their plants to unregulated countries, or if firms in these sectors shrink in the regulated countries while their competitors in the unregulated countries expand. A particularly alarming danger is that a plant in a poor unregulated country might use dirty technologies and so emit more than the plant producing the same output would have in the high-standard rich regulated country, so that aggregate world emissions actually go up rather than down!

Another channel of leakage runs via world energy prices. If participating countries succeed in cutting back consumption of the high-carbon fossil fuels, coal and oil, demand will fall and the prices of these fuels will fall on world markets (other things equal). This is equally true if the initial policy is a carbon tax that raises the price to rich-country consumers as if it comes via other measures. Non-participating countries would naturally respond to declines in world oil and coal prices by increasing consumption. Conversely, demand for clean natural gas would increase in the rich countries, driving up the world price of LNG, and reducing reliance on it in non-participating countries.

Estimates vary regarding the damage in tons of increased emissions from developing countries for every ton abated in an industrialized country. Two important studies of leakage, and of the size of border adjustments or "green tariffs" that would be necessary if countries were legitimately to counteract the problem of leakage, concludes that they would be small on most traded goods.²⁴ But one authoritative survey reaches a less sanguine

²³ An additional reason we need developing countries in is to give the United States and other industrialized countries the opportunity to buy relatively low-cost emissions permits, which is crucial to keeping low the economic cost of achieving any given goal in terms of concentrations. Elaboration is available from Aldy and Frankel (2004), Frankel (2007), Seidman and Lewis (2008) and many other sources.

²⁴ And therefore "benefits produced by border adjustment would be too small to justify their administrative complexity or their deleterious effects in trade." -- McKibbin and Wilcoxon (2008). The other study is Hauser, et al.(2008). Researchers at the OECD, however, have larger estimates of leakage and corresponding necessary border taxes, especially on the part of the EU, if it is the only region that is seriously taxing carbon domestically, which is pretty much the current state of affairs (Braathen, 2008).

conclusion: “Leakage rates in the range 5 to 20 per cent are common.”²⁵ Another reports that studies’ estimates of leakage range from 8 to 11 percent.²⁶

Even more salient politically than leakage is the related issue of competitiveness: American industries that are particularly intensive in energy or otherwise GHG-generating activities will be at a competitive disadvantage to firms in the same industries operating in non-regulated countries.²⁷ Such sectors as aluminum, cement, glass, paper and steel will point to real costs in terms of lost output, profits, and employment.²⁸ They understandably will seek protection and are likely to get it.

5. Measures in Climate Change Legislation to Address Competitiveness and Leakage

The result of environmentalists’ leakage concerns and businessmen’s competitiveness concerns is that much of the legislation recently proposed at the national level includes provisions to apply certain measures to imports of carbon-intensive products from countries that are deemed not to be making sufficient efforts themselves to address climate change.

What is the right name for measures against imports from unregulated countries?

There are a variety of names for the sort of protection that carbon-intensive sectors are likely to get against imports from non-participating countries. The phrases vary widely in their connotations. Some, but not all of the variation, is semantic. Perhaps over the next few years, as the discussion of this new topic grows, the language will converge on one or two terms.

- Border adjustment taxes. Technically, this phrase applies not just to import tariffs but also equally to export subsidies, which are not under active contemplation
- Green tariffs. “Import tariffs” are the most accurate description of what we are talking about; the adjective “green” coverts a negative-sounding term into a positive one.
- Import barriers. The advantage of the word “barriers” is that it clearly includes the likely option of requiring importers to buy emission permits. For economists this is precisely equivalent to import tariffs, but others would not so readily make the jump. The disadvantage is that the word has the pejorative flavor of protectionism.
- Import penalties. “Penalties” are a bit like “barriers” in their generality. They have the added advantage of connoting a tie to behavior in the exporting country, that is, insufficient action on climate change, while yet being less extreme than “sanctions”.
- Import measures. “Measures” is the term that maximizes generality and neutrality.

²⁵ International Panel on Climate Change (2001), Chapter 8.3.2.3, pp. 536-544 .

²⁶ Bordoff (2008, fn. 4). One of the estimates, McKibben et al (1999), is that if the US had adopted its Kyoto target unilaterally, leakage would have been 10%.

²⁷ It is not meaningful to talk about an adverse effect on the competitiveness of the American economy in the aggregate. Those sectors low in carbon-intensity would in theory *benefit* from an increase in taxation of carbon relative to everything else. This theoretical point is admittedly not very intuitive. Far more likely to resonate publicly is the example that producers of renewable energy, and of the equipment that they use, would benefit.

²⁸ Hauser, et al. (2008).

- Carbon-equalization taxes. A well-designed policy to target leakage and competitiveness could be described as equalizing the effect tax on the carbon content of goods produced domestically or imported from abroad. One hopes this is not used as a euphemism for something else.
- Trade sanctions. An alternative function of import measures is to encourage those countries not participating in the post-Kyoto multilateral architecture to enlist.
- Trade controls. Trade controls fall only on environmentally relevant sectors. Trade sanctions, on the other hand, target products that are arbitrary and unrelated to the non-compliant act. They are used multilaterally only by the WTO and UN Security Council, and are not currently under consideration to address climate change.²⁹

Possible application of trade barriers by the United States

Of twelve market-based climate change bills introduced in the 110th Congress, almost half called for some border measures: either a tax to be applied to fossil fuel imports (unobjectionable, *provided* the same tax is applied to domestic production of the same fossil fuels; but distortionary and WTO-illegal otherwise) or a requirement that energy-intensive imports surrender permits corresponding to the carbon emissions embodied in them.³⁰ The Bingaman-Specter “Low Carbon Economy Act” of 2007 would provide “If other countries are deemed to be making inadequate efforts [in reducing global GHG emissions], starting in 2020 the President could require importers from such countries to submit special emission allowances (from a separate reserve pool) to cover the carbon content of certain products.” Similarly the Lieberman-Warner bill requires the president to determine what countries have taken comparable action to limit GHG emissions; for imports of covered goods from covered countries, starting in 2020, the importer must buy international reserve allowances.³¹

These requirements are equivalent to a tax on the covered imports. The presidential candidates in the US election campaign apparently support some version of these bills, including import measures in the name of safeguarding competitiveness vis-à-vis developing countries.

In addition, a different law that has already been passed and gone into effect poses similar issues: The Energy Independence & Security Act 2007 “limits US government procurement of alternative fuel to those from which the lifecycle greenhouse gas emissions are equal to or less than those from conventional fuel from conventional petroleum sources.”³² Canada’s oil sands are vulnerable. Since Canada has ratified the Kyoto Protocol and the US has not, the legality of this measure seems questionable.

Possible application of trade barriers by the EU

It is possible that many in Washington don’t realize that the US is likely to be the victim of legal sanctions before it is the wielder of them. In Europe firms have already entered the

²⁹ Charnovitz (2003b, page 156).

³⁰ Source: Resources for the Future.

³¹ S. 2191: America’s Climate Security Act of 2007. Sections 6005-6006.

³² Section 526. Source: *FT*, Mar. 10, 2008.

first Kyoto budget period of binding emission limits, competitiveness concerns are well-advanced, and the non-participating United States is an obvious target of resentment.³³

After the United States failed to ratify, European parliamentarians proposed a “Kyoto carbon tax” against imports from the United States.³⁴ The European Commission had to make a decision on the issue in January 2008, when the European Union determined its emission targets for the post-Kyoto period. In preparation for this decision, French President Sarkozy warned:

“...if large economies of the world do not engage in binding commitments to reduce emissions, European industry will have incentives to relocate to such countries...The introduction of a parallel mechanism for border compensation against imports from countries that refuse to commit to binding reductions therefore appears essential, whether in the form of a tax adjustment or an obligation to buy permits by importers. This mechanism is in any case necessary in order to induce those countries to agree on such a commitment.”³⁵

The envisioned mechanism sounds similar to that in the Bingaman-Specter and Lieberman-Warner bills, with the difference that it could go into effect soon, since Europe is already limiting emissions whereas the US is not.

In the event, the EU Commission included instead the following provision in its Directive:

“Energy-intensive industries which are determined to be exposed to significant risk of carbon leakage could receive a higher amount of free allocation or an effective carbon equalization system could be introduced with a view to putting EU and non-EU producers on a comparable footing. Such a system could apply to importers of goods requirements similar to those applicable to installations within the EU, by requiring the surrender of allowances.”³⁶

The second of the two options, “carbon equalization” sounds consistent with what is appropriate (and with the sort of measures suggested by Sarkozy, and spelled out in detail in the US bills). The first option, however, is badly designed. Yes, it would help European industries that are carbon-intensive and therefore vulnerable to competition from non-members by giving them a larger quantity of free emission permits. Given the market in trading permits that already exists in the EU, to give a firm permits is the same as to give them a cash subsidy. According to simple microeconomic theory, these subsidies would do nothing to address leakage. Because carbon-intensive production is cheaper in non-participating countries, the European firms in theory would simply sell the permits they receive and pocket the money, with the carbon-intensive production still moving from

³³ Bierman and Brohm (2005) and Government of Sweden (2004).

³⁴ *FT*, Jan 24, 2008.

³⁵ Letter to EU Commission President Jose Manuel Barroso, January 2008.

³⁶ Source: Paragraph 13, Directive of the European Parliament & of the Council amending Directive 2003/87/EC so as to improve and extend the EU greenhouse gas emissions allowance trading system; Brussels, Jan. 2008.

Europe to the non-participants. Perhaps these firms would use the money to buy or develop themselves subsidiaries in unregulated countries.³⁷

Admittedly in practice there might be some effects, for example, an infusion of liquidity might keep in operation a firm that otherwise would go bankrupt. But overall, there would probably be almost as much leakage as if there had been no policy response at all. Presumably the purpose behind this option is not to minimize leakage, for which it would be the wrong remedy, nor even to punish non-participating countries, but simply to buy off domestic interests so that they will not oppose action on climate change politically. But in this case it is important to make sure that the politician understand that this is what they are doing, because the rhetoric is different and the economic logic is not obvious to all.

Would trade controls or sanctions be compatible with the WTO?

Would measures that are directed against CO₂ emissions in other countries, as embodied in electricity or in goods produced with it, be acceptable under international law? Not many years ago, most international experts would have said that import barriers against carbon-intensive goods, whether tariffs or quantitative restrictions, would necessarily violate international agreements. Under the General Agreement on Tariffs and Trade (GATT), although countries could use import barriers to protect themselves against environmental damage that would otherwise occur within their own borders, they could not use import barriers in efforts to affect how goods are produced in foreign countries, so-called Processes and Production Methods (PPMs). A notorious example was the GATT ruling against US barriers to imports of tuna from dolphin-unfriendly Mexican fishermen. But things have changed.

The WTO (World Trade Organization) came into existence, succeeding the GATT, at roughly the same time as the Kyoto Protocol. The drafters of each treaty showed more consideration for the other than do the rank and file among environmentalists and free traders, respectively. The WTO regime is more respectful of the environment than was its predecessor. Article XX allows exceptions to Articles I and III for purposes of health and conservation. The Preamble to the 1995 Marrakech Agreement establishing the WTO seeks “to protect and preserve the environment;” and the 2001 Doha Communiqué that sought to start a new round of negotiations declares: “the aims of ... open and non-discriminatory trading system, and acting for the protection of the environment ... must be mutually supportive.” The Kyoto Protocol text is equally solicitous of the trade regime. It says that the Parties should “strive to implement policies and measures...to minimize adverse effects...on international trade...” The UNFCCC features similar language.

GHG emissions are PPMs. Is this an obstacle to the application measures against them at the border? I don't see why it has to be. Two precedents can be cited: sea turtles and stratospheric ozone.

³⁷ One important study, Hauser et al (2008) tends to favor such domestic subsidies, and opposes border measures, in part because the latter are judged to be more likely to run afoul of the WTO. I come to the opposite conclusion, for the reasons stated and because subsidies to sectors facing international competition run contrary to the WTO as much as import tariffs do.

The true import of the 1998 WTO panel decision on the shrimp-turtle case was missed by almost everyone. The big significance was a pathbreaking ruling that environmental measures can target, not only exported products (Article XX), but also partners' Processes & Production Methods (PPMs) -- subject, as always, to non-discrimination (Articles I & III). The United States was in the end able to seek to protect turtles in the Indian Ocean, provided it did so without discrimination against Asian fishermen. Environmentalists failed to notice or consolidate the PPM precedent, and to the contrary were misguidedly up in arms over this case.³⁸

Another important precedent was the Montreal Protocol on stratospheric ozone depletion, which contained trade controls. The controls had two motivations³⁹:

- (1) to encourage countries to join, and
- (2) if major countries had remained outside, the controls would have minimized leakage, the migration of production of banned substances to nonparticipating countries. In the event (1) worked, so (2) was not needed.

These two examples go a long way to establishing the legitimacy of trade measures against PPMs. Many trade experts, both economists and international lawyers, are not yet convinced⁴⁰, let alone representatives of India and other developing countries. I personally have come to believe that the Kyoto Protocol could have followed the Montreal Protocol by incorporating well-designed trade controls aimed at non-participants. One aspect that strengthens the applicability of the precedent is that we are not talking about targeting practices in other countries that harm solely the local environment, where the country can make the case that this is nobody else's business. Depletion of stratospheric ozone depletion and endangerment of sea turtles are global externalities. (It helped that these are turtles that migrate globally.) So is climate change from GHG emissions. A ton of carbon emitted into the atmosphere hurts all residents of the planet.

In case there is any doubt that Article XX, which uses the phrase "health and conservation," applies to environmental concerns such as climate change, a third precedent is relevant. In 2007, a new WTO Appellate Body decision regarding Brazilian restrictions on imports of retreaded tires confirmed the applicability of Article XX(b): Rulings "accord considerable flexibility to WTO Member governments when they take trade-restrictive measures to protect life or health... [and] apply equally to issues related to trade and environmental protection...including measures taken to combat global warming."⁴¹

³⁸ For a full explanation of the legal issues, see Charnovitz (2003a). Also Charnovitz and Weinstein (2001) and M. Weinstein, "Greens and Globalization: Declaring Defeat in the Face of Victory," *The New York Times*, 22 April, 2001.

³⁹ Brack (1996).

⁴⁰ Some experts believe that even multilateral trade penalties against non-members might not be permissible under the WTO. See Sampson (2000), p.87.

⁴¹ Source: Brendan McGivern, 12 Dec., 2007.

Some principles for design of legitimate penalties on carbon-intensive imports

While the shrimp-turtle case and the Montreal Protocol help establish the principle that well-designed trade measures can legitimately target PPMs, at the same time they suggest principles that should help guide drafters as to what is good design.

First, the existence of a multilaterally negotiated international treaty such as the Kyoto Protocol conditions the legitimacy of trade controls. On the one hand, that leakage to non-members could negate the goal of the Protocol strengthens the case for (the right sort of) trade controls. It is stronger, for example, than in the shrimp-turtle case, which was a unilateral US measure. On the other hand, the case is weaker than it was for the Montreal Protocol. (Multilateral initiatives like the latter are on firmer ground than unilateral initiatives.) The Kyoto Protocol could have made explicit allowance for multilateral trade controls, and chose not to. The case would be especially weak for American measures if the US has still not ratified the Kyoto Protocol or a successor agreement. The Europeans have a relatively good case against the United States, until such time as the US ratifies. But the case would be stronger still if a future multilateral agreement, for example under the Framework Convention on Climate Change (UNFCCC), agreed on the legitimacy of trade controls and on guidelines for their design.

Second, there is the question of the sorts of goods or services to be made subject to penalty. It would certainly be legitimate to apply tariffs against coal itself, assuming domestic taxation of coal or a domestic system of tradable permits were in place. It is probably also legitimate when applied to the carbon content of electricity, though this requires acceptance of the PPM principle. The big question is the carbon/energy content of manufactures. Trade sanctions would probably not be legitimate when applied solely as punishment for free riding, against unrelated products of a non-member or, in a more extreme case, on clean inputs, e.g., a ban on US turbines used for low-carbon projects (unless perhaps economy-wide sanctions were multilaterally agreed by UNFCCC members).

Paradoxically, the need to keep out coal-generated electricity or aluminum from non-members of the Kyoto Protocol is greater than the need to keep out coal itself. The reason is that the Protocol already puts limits on within-country emissions. If one assumes the limits are enforced, then the world community has no particular interest in how the country goes about cutting its emissions. But if the country imports coal-generated electricity or aluminum from non-members, the emissions occur outside its borders and the environmental objective is undermined.

But it is hard to determine carbon content of manufactures. The best would be to stay with the five biggest-scale, most energy-intensive industries – probably aluminum, cement, steel, paper, and glass. Even here there are difficult questions. What if the energy used to smelt aluminum in another country is cleaner than in the importing country (Iceland's energy comes from hydro and geothermal) or dirtier (much of China's energy comes from coal)? How can one distinguish the marginal carbon content of the energy used for a particular aluminum shipment from the average carbon content of energy in the country of origin? These are questions that will have to be answered. But as soon as one goes beyond four or five big industries, it becomes too difficult for even a good-faith investigator

to discern the effective carbon content, and it is also too liable to abuse. One would not want to levy tariffs against the car parts that are made with the metal that was produced in a carbon-intensive way, or against the automobiles that used those car parts (they could be low-mileage hybrids !) or against the products of the firms that bought the cars, etc.

The big danger

Just because a government measure is given an environmental label, does not necessarily mean that it is motivated primarily -- or even at all -- by bona fide environmental objectives. To see the point one has only to look at the massive mistake of American subsidies of bio-fuels (and protection against competing imports from Brazil). If each country on its own imposes border adjustments for imports in whatever way suits national politics, they will be poorly targeted, discriminatory, and often covertly protectionist. When reading the language in the US Congressional bills or the EU decision, it is not hard to imagine that special interests could take over for protectionist purposes the process whereby each government decides whether other countries are doing their share, and what foreign competitors merit penalties.⁴² Thus the competitiveness provisions will indeed run afoul of the WTO, and they will deserve to.

It is important who makes the determinations regarding what countries are abiding by carbon-reduction commitments, who can retaliate against the non-compliers, what sectors are fair game, and what sort of barriers are appropriate. One policy conclusion is that these decisions should be delegated to independent panels of experts, rather than made by politicians.

The most important policy conclusion is that we need a multilateral regime to guide such measures. Ideally the regime would be negotiated along with a successor to the Kyoto Protocol that set targets for future periods and brought the United States and developing countries inside. But if that process takes too long, it might be useful in the shorter run for the US to enter negotiations with the EU to harmonize guidelines for border penalties, ideally in informal association with the secretariats of the UNFCCC and the WTO.⁴³

Why approach the problem multilaterally?

Some say the most promising path for addressing the problem of climate change is for each country to take measures on its own. But GHG emissions are inherently a global externality. No single country can address the problem on its own, due to the free rider problem. While there is a role for unilateral actions on climate change, in the long term multilateral action offers the only hope of addressing the problem. The multilateral institutions are already in place -- specifically the UNFCCC, its child the Kyoto Protocol, and the WTO -- and they were predominantly created by US leadership.

⁴² The Congressional language imposing penalties on imports from countries that do not tax carbon was apparently influenced by the International Brotherhood of Electrical Workers, which regularly lobbies for protection of American workers from foreign competition. Alan Beattie, *FT*, Jan 24, 2008. Simultaneously, the European Trade Union Confederation urged the EU Commission to tax imports from countries refusing to reduce emissions. "Unions back carbon tax on big polluting nations," AP and *Wall Street Journal*, Jan. 16, 2008.

⁴³ Sampson (1999).

Moreover, the basic designs and operations of these institutions happen to be relatively sensible, taking political realities as given. They are more sensible than most critics of the international institutions and their alleged violations of national sovereignty believe. This applies whether the critics are on the left or right, and whether their main concern is the environment or the economy.⁴⁴ One can place very heavy weight on economic goals, and yet realize the desirability of addressing externalities, minimizing with leakage, dealing with competitiveness concerns, and so forth. One can place very heavy weight on environmental goals, and yet realize the virtues of market mechanisms, non-discrimination, reciprocity, addressing international externalities *cooperatively*, preventing special interests from hijacking environmental language for their own financial gain, and so forth.

Another reason why the US should be prepared to modify the sort of “international reserve allowances” language of the Lieberman-Warner bill, and moving in the direction of multilateral coordination of guidelines for such measures, comes from hard-headed self interest. Section 6006 of Lieberman-Warner originally envisioned these measures going into effect only in 2020. This was as it should be, since any such bill must give the United States time to start playing the game before it can presume to punish other players for infractions.⁴⁵ But the EU language could be translated into penalties against US products any day. It is in the American interest to have any border penalties governed by a sensible system of multilateral guidelines. The Europeans might welcome US participation in joint negotiations to agree on guidelines, as part of a process of negotiations over the Kyoto-successor regime. The argument is much stronger than the historical examples of US import barriers leading to subsequent emulation and retaliation that comes back to hit our exports (Smoot Hawley tariff in 1930, Anti-Dumping cases in the 1980s....) Here we have an opportunity to influence others’ barriers against our goods, probably more than ten years before we would be putting up barriers against theirs.

6. Concluding recommendations

Both the economics and the law are complicated. The issues need further study. Nevertheless, the central message of this paper is that border measures to address leakage need not necessarily violate the WTO or sensible trade principles, but that there is a very great danger in practice that the will.

I conclude with some subjective judgments as to principles that could guide a country’s border measures if its goal were indeed to reduce leakage and avoid artificially tilting the playing field toward carbon-intensive imports of non-participating countries. I classify characteristics of possible border measures into two categories, which I will name by color (for lack of better labels):

⁴⁴ I have addressed elsewhere *other* ways in which the climate regime (Kyoto) could come into conflict with the trade regime (WTO), and the more general questions of whether free trade and environmental protection need be in conflict. Frankel (2004, 2005a,b, 2008).

⁴⁵ The revised version of the bill, which the Senate voted on in the spring of 2008, would have moved the import measures much closer to the present. One hopes that any version of the bill that might pass in 2009 would recognize that the United States cannot very well set itself up in judgment of other countries before it has begun to take any steps of its own to fulfill the Kyoto agreement.

(1) the “Black” category: those that seem to me very dangerous, in that they are likely to become an excuse for protectionism; and (2) the “White” category: those that seem to me reasonable and appropriate.

The Black (inappropriate) border measures include:

- Unilateral measures applied by countries that are not participating in the Kyoto Protocol or its successors.
- Judgments as to findings of fact that are made by politicians, vulnerable to political pressure from interest groups for special protection.
- Unilateral measures that seek to sanction an entire country, rather than targeting narrowly defined energy-intensive sectors.
- Import barriers against products that are further removed from the carbon-intensive activity, such as firms that use inputs that are produced in an energy-intensive process.
- Subsidies – whether in the form of money or extra permit allocations -- to domestic sectors that are considered to have been put at a competitive disadvantage.

The White (appropriate) border measures could be either tariffs or (equivalently) a requirement for importers to surrender tradable permits. The principles include:

- Measures should follow some multilaterally-agreed set of guidelines among countries participating in the emission targets of the Kyoto Protocol and/or its successors.
- Judgments as to findings of fact -- what countries are complying or not, what industries are involved and what is their carbon content, what countries are entitled to respond with border measures, or the nature of the response – should be made by independent panels of experts.
- Measures should only applied by countries that are reducing their emissions in line with the Kyoto Protocol and/or its successors, against countries that are not, either due to refusal to join or to failure to comply.
- Import penalties should target fossil fuels, and five or six of the most energy-intensive major industries: aluminum, cement, steel, paper, glass, and perhaps iron and chemicals.

If countries follow these guidelines in enacting border penalties, they may be consistent with the avowed goals of preventing leakage and undue loss of competitiveness and are unlikely to fall afoul of the WTO. If they do not follow these guidelines – the more likely outcome – they can be consistent with these goals, and with the WTO as well.

References

Aldy, Joseph, and Jeffrey Frankel, 2004, "Designing a Regime of Emission Commitments for Developing Countries that is Cost-Effective and Equitable," *G20 Leaders and Climate Change*, Council on Foreign Relations.

Aldy, Joseph, Scott Barrett, and Robert Stavins (2003), "Thirteen Plus One: A Comparison of Global Climate Architectures," *Climate Policy*, 3, no. 4, 373-97.

Antweiler, Werner, Brian Copeland and Scott Taylor, 2001, "Is Free Trade Good for the Environment?" *American Economic Review*, 91, no. 4, September, 877-908.

Arrow, K., R. Bolin, P. Costanza, P. Dasgupta, C. Folke, C.S.Holling, B.O. Jansson, S.Levin, K.G. Maler, C.Perrings, and D.Pimentel, 1995, "Economic Growth, Carrying Capacity, and the Environment," *Science* 268, 520-521, April 28.

Barrett, Scott, and Kathryn Graddy, 2000, "Freedom, Growth, and the Environment," *Environment and Development Economics* 5, 433-456.

Bhagwati, Jagdish, 2000, "On Thinking Clearly About the Linkage Between Trade and the Environment," *The Wind of the Hundred Days: How Washington Mismanaged Globalization* (MIT Press: Cambridge).

Bimonte, Salvatore, 2001, "Model of Growth and Environmental Quality, A New Evidence of the Environmental Kuznets Curve," *Universita degli Studi di Siena, Quaderni*, no. 321, April.

Bordoff, Jason, 2008, "International Trade Law and the Economics of Climate Policy: Evaluating the Legality and Effectiveness of Proposals to Address Competitiveness and Leakage Concerns," *Climate Change, Trade and Investment Conference: Is a Collision Inevitable?*, Brookings Institution: Washington DC.

Brack, Duncan, 1996, *International Trade and the Montreal Protocol* (The Royal Institute of International Affairs and Earthscan Publications, Ltd.: London).

Bradford, David, Rebecca Fender, Stephen Shore and Martin Wagner, 2005. "The Environmental Kuznets Curve: Exploring a Fresh Specification," *Contributions to Economic Analysis & Policy*, Berkeley Electronic Press, 4 (1), 1073-1073. Revised version of David Bradford, Rebecca Schlieckert and Stephen Shore, 2000, "The Environmental Kuznets Curve: Exploring a Fresh Specification," *NBER Working Paper* no. 8001.

Braithwaite, John, and Peter Drahos, *Global Business Regulation*, Cambridge University Press, UK.

Brewer, T.L., 2003, "The Trade Regime and the Climate Regime: Institutional Evolution and Adaptation," *Climate Policy* 3, no. 4: 329-341.

Brewer, T.L., 2004, "Multinationals, the Environment and the WTO: Issues in the Environmental Goods and Services Industry and in Climate Change Mitigation," in S. Lundan, A. Rugman and A. Verbeke, eds., *Multinationals, the Environment and Global Competition* (Elsevier).

Brewer, T.L. "The WTO and the Kyoto Protocol: Interaction Issues," *Climate Policy* 4, no. 1 (Sept. 2004).

- Charnovitz, Stephen, 2003a, "The Law of Environmental 'PPMs' in the WTO: Debunking the Myth of Illegality," *The Yale Journal of International Law* 27, no. 1 (Winter): 59-110.
- Charnovitz, Stephen, 2003b, "Trade and Climate: Potential Conflicts and Synergies," in *Beyond Kyoto: Advancing the International Effort Against Climate Change* (Pew Center on Global Climate Change): 141-167.
- Charnovitz, Steve, and Michael Weinstein, 2001, "The Greening of the WTO," *Foreign Affairs* 80, no. 6, 147-156.
- Chaudhuri, Shubham, and Alexander Pfaff, 2002, "Economic Growth and the Environment: What Can We Learn from Household Data?" Columbia University, February.
- Copeland, Brian, and Scott Taylor, 2001, "International Trade and the Environment: A Framework for Analysis," *NBER Working Paper* No. 8540, Oct.
- Copeland, Brian, and Scott Taylor, 2003a, Trade and the Environment: Theory and Evidence (Princeton University Press: Princeton).
- Copeland, Brian, and Scott Taylor, 2003b, "Trade, Growth and the Environment," *NBER Working Paper* No. 9823, July.
- Cropper, Maureen, and Charles Griffiths, 1994, "The Interaction of Population Growth and Environmental Quality," *American Economic Review* 84, no. 2, May, 250-254.
- Bierman, F., and R. Brohm, 2005, "Implementing the Kyoto Protocol Without the United States: The Strategic Role of Energy Tax Adjustments at the Border," *Climate Policy* 4, no. 3.
- Brack, D., 1996, *International Trade and the Montreal Protocol* (London: The Royal Institute of International Affairs and Earthscan Publications, Ltd.).
- Brathen, Nils Axen, 2008, "Carbon-Related Border Tax Adjustments," Comments at conference *on Climate Change, Trade and Investment: Is a Collision Inevitable?*, June 9, 2008, Brookings Institution, Washington, DC, organized by Lael Brainard.
- Brewer, T.L. "The Trade Regime and the Climate Regime: Institutional Evolution and Adaptation," *Climate Policy* 3, no. 4 (2003): 329-341.
- Brewer, T.L. "Multinationals, the Environment and the WTO: Issues in the Environmental Goods and Services Industry and in Climate Change Mitigation," in S. Lundan, A. Rugman and A. Verbecke, eds., *Multinationals, the Environment and Global Competition* (Elsevier, 2004).
- Brewer, T.L. "The WTO and the Kyoto Protocol: Interaction Issues," *Climate Policy* vol. 4, no. 1 (Sept. 2004).
- Daly, Herman, 1993, "The Perils of Free Trade," Scientific American, Nov., 51-55.
- Dean, Judy, 1992, "Trade and the Environment: A Survey of the Literature," in Patrick Low, ed., *International Trade and the Environment*, World Bank Discussion Paper No. 159.
- Dean, Judy, 2001, "Overview," in International Trade and the Environment, J. Dean, ed., *International Library of Environmental Economics and Policy Series*, (Ashgate Publishing: UK).

Dean, Judy, 2002, "Does Trade Liberalization Harm the Environment? A New Test," Canadian Journal of Economics, November 35, no. 4, 819-842.

Dua, Andre, and Daniel Esty, 1997, *Sustaining the Asia Pacific Miracle: Environmental Protection and Economic Integration*, Institute for International Economics: Washington DC.

Ederington, Josh, Arik Levinson and Jenny Minier, 2003, "Footloose and Pollution-Free," NBER Working Paper No. 9718, May.

Eiras, Ana, and Brett Schaefer, 2001, "Trade: The Best Way to Protect the Environment," *Background*, The Heritage Foundation no. 1480, September 27.

Esty, Daniel, 1994, Greening the GATT: Trade, Environment, and the Future, Institute for International Economics, Washington DC.

Esty, Daniel, 2001, "Bridging the Trade-Environment Divide," Journal of Economic Perspectives, Summer 15, no. 3, 113-130.

Esty, Daniel, and Bradford Gentry, 1997, "Foreign Investment, Globalisation, and the Environment," Globalization and the Environment, edited by Tom Jones (Organization for Economic Cooperation and Development: Paris).

Esty, Daniel, and Michael Porter, 2001, "Measuring National Environmental Performance and Its Determinants," Yale Law School and Harvard Business School, April.

Foster, Andrew, and Mark Rosenzweig, 2003, "Economic Growth and the Rise of Forests," Quarterly Journal of Economics, 118, issue 2, May 601-638.

Frankel, Jeffrey, 2004, "Kyoto and Geneva: Linkage of the Climate Change Regime and the Trade Regime" for *Broadening Climate Discussion: The Linkage of Climate Change to Other Policy Areas*, FEEM/MIT conference, Venice.

Frankel, Jeffrey, 2005a, "Climate and Trade: Links Between the Kyoto Protocol and WTO," in *Environment*, vol. 47, no. 7, September 2005: 8-19.

Frankel, Jeffrey, 2005b, "The Environment and Globalization" in *Globalization: What's New* edited by Michael Weinstein (Columbia University Press: New York): 129-169. Reprinted in Economics of the Environment: Selected Readings, Fifth Edition, R.Stavins, editor (W.W.Norton: New York), 2005.

Frankel, Jeffrey, 2007, "Formulas for Quantitative Emission Targets," in *Architectures for Agreement: Addressing Global Climate Change in the Post Kyoto World*, Joe Aldy and Robert Stavins, editors, Cambridge University Press, p. 32-56.

Frankel, Jeffrey, 2008, "Addressing the Leakage/Competitiveness Issue In Climate Change Policy Proposals," *Climate Change, Trade and Investment: Is a Collision Inevitable?*, Brookings Institution, Washington, DC, organized by Lael Brainard.

Frankel, Jeffrey, and Andrew Rose, "Is Trade Good or Bad for the Environment? Sorting out the Causality" *Review of Economics and Statistics*, 87, no. 1, 2005.

Goulder, Lawrence, and Robert Stavins, 2002, "An Eye on the Future," *Nature*, 419, October 17, 673-74.

Government of Sweden, Kommerskollegium, 2004, *Climate and Trade Rules – Harmony or Conflict?*.

Grossman, Gene, and Alan Krueger, 1993, "Environmental Impacts of a North American Free Trade Agreement," in The U.S.-Mexico Free Trade Agreement, Peter Garber, editor, MIT Press.

Grossman, Gene, and Alan Krueger, 1995, "Economic Growth and the Environment," *Quarterly Journal of Economics*, 110, no. 2, May: 353-77.

Hanley, Nick, Jason Shogren, and Ben White, Environmental Economics in Theory and Practice, (Oxford: New York), 1997.

Hauser, Trevor; Rob Bradley; Britt Childs; Jacob Werksman; and Robert Heilmayr, 2008, Leveling the Carbon Playing Field: International Competition and US Climate Policy Design, (Peterson Institute for International Economics: Washington DC).

Hilton, F.G. Hank, and Arik Levinson, 1998, "Factoring the Environmental Kuznets Curve: Evidence from Automotive Lead Emissions," *Journal of Environmental Economics and Management* 35, 126-141.

Holtz-Eakin and T. Selden, 1995, "Stoking the Fires? CO2 Emissions and Economic Growth," *Journal of Public Economics*, vol. 57, May, 85-101.

Hufbauer, Gary, Daniel Esty, Diana Orejas, Luis Rubio, and Jeffrey Schott, 2000, NAFTA and the Environment: Seven Years Later, *Policy Analyses in International Economics* No. 61, Institute for International Economics: Washington DC.

International Panel on Climate Change (2001), *Third Assessment Report -- Climate Change 2001*, Working Group III.

Jaffe, Adam, S.R. Peterson, Paul Portney and Robert Stavins, 1995, "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?" *Journal of Economic Literature* 33, 132-63.

Levinson, Arik, and Scott Taylor, 2001, "Trade and the Environment: Unmasking the Pollution Haven Effect," Georgetown University and University of Wisconsin.

Low, P., and A. Yeats, 1992, "Do 'Dirty' Industries Migrate?" in P. Low, editor, International Trade and the Environment (The World Bank), 89-104.

Lucas, Robert E.B., David Wheeler, and Hememala Hettige, 1992, "Economic Development, Environmental Regulation and the International Migration of Toxic Industrial Pollution: 1960-1988," in Patrick Low, editor, International Trade and the Environment, World Bank Discussion Papers no. 159 (The World Bank: Washington DC).

McKibbin, Warwick, and Peter Wilcoxon, 2008, "The Economic and Environmental Effects of Border Adjustments for Climate Policy," Brookings Conference on *Climate Change, Trade and Competitiveness: Is a Collision Inevitable?*, Washington, DC.

Neumayer, Eric, 2002, "Does Trade Openness Promote Multilateral Environmental Cooperation?" *The World Economy* 25, no. 6, 812-832.

Panayotou, Theo, 1993, "Empirical Tests and Policy Analysis of Environmental Degradation at Different Stages of Development," Working Paper WP238, Technology and Employment Programme (International Labor Office: Geneva).

Ruggie, John, 2002, "Trade, Sustainability and Global Governance," *Columbia Journal of Environmental Law*, vol 27, 297-307.

Sampson, Gary, Trade, Environment, and the WTO: The Post-Seattle Agenda, Johns Hopkins University Press (Baltimore), 2000.

Sampson, Gary, 1999, "WTO Rules and Climate Change: The Need for Policy Coherence," in Bradnee Chambers, editor, Global Climate Governance: A Report on the Inter-Linkages Between the Kyoto Protocol and Other Multilateral Regimes (Tokyo: United Nations University).

Seidman, Laurence, and Kenneth Lewis, 2008, "Compensation and Contributions Under an International Carbon Treaty," University of Delaware, February.

Selden, Thomas, and Daqing Song, 1994, "Environmental Quality and Development: Is There a Kuznets Curve for Air Pollution Emissions," *Journal of Environmental Economics and Management* 27, 147-162.

Shafik, Nemat, 1994, "Economic Development and Environmental Quality: An Econometric Analysis," *Oxford Economic Papers* 46, 757-773.

Smarzynska, Beata, and Shang-Jin Wei, 2001, "Pollution Havens and Foreign Direct Investment: Dirty Secret or Popular Myth?" *NBER Working Paper* No. 8465, September.

Suri, Vivek, and Duane Chapman, 1998, "Economic Growth, Trade and Energy: Implications for the Environmental Kuznets Curve," *Ecological Economics* 25, 2, May, 147-160.

Tobey, James, 1990, "The Effects of Domestic Environmental Policies on Patterns of World Trade: An Empirical Test," *Kyklos* 43, 191-209.

Vogel, David, 1995, Trading Up: Consumer and Environmental Regulation in a Global Economy, Harvard University Press.

World Bank, 1992, Development and the Environment, World Development Report.