16 *Global environment and trade policy*

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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 efforts to reduce greenhouse gas (GHG) emissions as carbon-intensive production migrates to non-participating countries—a phenomenon known as leakage. Meanwhile businesspeople fear the adverse effects of disparate climate policies on their own competitiveness. These fears have now become prominent in the policy-making process. In early 2008, legislation to enact long-term targets for reduced GHG emissions included provisions for possible barriers against imports from countries perceived as non-participating—both in Washington, DC (where climate legislation has not yet passed) and in Brussels (where the EU Commission Directive has gone into effect). Such provisions could be interpreted as violating 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 collision would unleash, it would be a disaster for supporters of the WTO and free trade as much as for supporters of the Kyoto Protocol and environmental protection.

The clash of trade and climate policy 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 its critics, the WTO is a symbol of globalization, and their concerns attach also to that larger phenomenon.

Fears of a collision need not be realized. Global environmental goals and trade goals can be reconciled. Globalization and multilateral

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institutions can facilitate environmental protection rather than obstruct it, if they are harnessed in the right way. Perhaps most urgent is that negotiators working on a sequel to the Kyoto Protocol agree on guidelines to govern precisely how individual countries can and cannot use trade measures in pursuit of carbon mitigation

The first part of this chapter 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 how nations' efforts to implement climate change policy will affect trade and whether they are likely to come into conflict with the WTO.

The environmental kuznets curve

Conceptually, we must begin with the effect of economic growth on the environment, before we can address the independent effect of open trade *per se*.

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 measures of environmental quality, an inverted U-shaped relationship appears: At relatively low levels of income per capita, economic 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) first published this statistical finding for a cross section of countries.[2] Grossman and

[2] Grossman and Krueger (1993, 1995) found the inverted U-shaped pattern for urban air pollution (SO_2 and smoke) and several measures of water pollution; Selden and Song (1994) found it for SO_2, suspended particulate matter (PM), oxides of nitrogen (NOx), and carbon monoxide; Shafik (1994) for deforestation, suspended PM, and SO_2; Hilton and Levinson (1998) for automotive lead emissions; Bimonte (2001) for land; and Bradford, Fender, Shore and Wagner (2005) for arsenic, chemical oxygen demand (COD), dissolved oxygen, lead, and SO_2 (but not for PM and some other measures of pollution).

Krueger (1995) estimated that sulfur dioxide (SO_2) 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 sufficiently long time series of data is available, there is also some evidence that the same inverted 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 has typically held with respect to water pollution and deforestation in rich countries.

The idea behind the environmental Kuznets curve is that, although growth is bad for air and water pollution during the initial stages of industrialization, prosperity later leads to reduced 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 conventional types of air pollution—such as SO_2, oxides of nitrogen (NOx), and so forth—are 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 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. These requirements apply to environmental regulation at the national level. The requirements for dealing with cross-border externalities are greater still.

Another possible explanation for the Kuznets curve pattern is that it works naturally via the composition of output. In theory, the usual stages of economic development could produce the same pattern as

[3] Chaudhuri and Pfaff (2002) find an inverted 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.

societies transition from an agrarian economy to manufacturing, and then from manufacturing to services (Arrow 1995; Panayotou 1993). In contrast to the conventional view, this explanation suggests that environmental improvement is less likely 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, such as emissions of GHGs. Importantly, no Kuznets curve has yet appeared for carbon dioxide (CO_2), as we will see below (see, e.g., Holtz-Eakin and Selden 1995). Even though carbon emissions *per unit of gross domestic product (GDP)* do tend to fall as countries become more prosperous, this is not enough to reduce overall carbon emissions.

A third possibility is that rich countries reduce their pollution only by importing manufactured goods from lower-income countries, which become pollution havens. In this case the environmental Kuznets curve would apply only to individual countries, not to the world in the aggregate. Furthermore the pollution haven effect, to the extent it operates, is explicitly enabled by trade, the subject to which we now turn directly.

Effects of openness to trade

This chapter focuses on the implications of international trade for the global environment. Some effects come via economic growth, and some are independent of a country's level of income. In both cases, the effects can be either beneficial or detrimental. Probably the strongest effects of trade are in the first category—that is, they are directly related to growth. 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 measures of environmental quality, such as SO_2 emissions.

What about effects of trade that do not operate via economic growth? They can be classified in three categories: average global effects that are adverse (the "race to the bottom" hypothesis), average global effects that are beneficial (the "gains from trade" hypothesis), and effects that vary across countries depending on local "comparative advantage" (the "pollution haven" hypothesis).

Race to the bottom

The *"race to the bottom"* hypothesis provides perhaps the strongest basis for concerns that international trade and investment specifically (rather than industrialization generally) will put downward pressure on countries' environmental standards and thus damage the global environment. Leaders of industry, and leaders of labor 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 become less competitive with respect to firms in other countries. They warn of a loss of sales, employment, and investment to foreign competitors.[4] 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 countries are open to international trade and investment, environmental standards will be lower than they would otherwise be. But how important is this dynamic in practice? Some economic 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 more attention to such issues as labor costs and market access than to the stringency of local environmental regulation.[5]

Once again, it is important to distinguish, first, the fear that globalization will lead to a race to the bottom in regulatory standards from, second, fears that the environment will be damaged by the very process of industrialization and economic growth itself. Opening national economies to international trade and investment could play a role in both cases, but the two possible channels for adverse environmental impacts are very different. In 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

[4] Levinson and Taylor (2001) find that those US industries that have experienced the largest increase in environmental control costs have indeed also experienced the largest increases in net imports.

[5] See Jaffe, Peterson, Portney, and Stavins (1995); Grossman and Krueger (1993); Low and Yeats (1992); and Tobey (1990). Other researchers, however, have found that environmental regulation has more of an effect on direct investment decisions; see, for example, Lee and Roland-Holst (1997) and Smarzynska and Wei (2001).

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 same 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-impoverishment.

Gains from trade

While the hypothesis that exposure to international competition might have an adverse effect on environmental regulation is familiar, less widely recognized and more surprising is the possibility that trade might have beneficial effects, 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 outputs.

How could openness to trade 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.[6] This suggests 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.[7] The largest political jurisdiction can set the pace for others. Within the United States, this is called the "California effect"—when the largest state sets high standards for auto pollution control equipment, the end result may be similar standards in other states as well. The United States can play the same role globally.

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

[7] See, for example, 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 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 these techniques 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 their standards tend on average to be higher than if the host country were undertaking the same activity on its own (Esty and Gentry 1997, pp. 157, 161, 163; and Schmidheiny 1992).

Corporate codes of conduct offer a new way that residents of some countries can pursue environmental goals in other countries (Ruggie 2002). Formal international cooperation among governments is another way that globalization/interdependence can lead to higher environmental standards rather than lower ones (Neumayer 2002).

Evaluating the overall effects of trade on the environment

If a set of countries opens up to trade, is this development on average likely to have a positive or negative effect on the environment (for a given level of income)? In other words, which kinds of effects 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 SO_2 pollution. 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, trade and environmental quality were both responding to some other, third factor, such as economic growth or democracy.

A number of studies have sought to isolate the independent effect of openness.[8] None of these studies makes allowances for the possibility

[8] 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 SO_2 concentrations is beneficial.

that trade may be the *result* of other factors rather than the cause. Antweiler *et al.* (2001) point out this potential weakness. Frankel and Rose (2003) attempt to disentangle the various causal relationships by focusing on exogenous variation in trade across countries where this variation is attributable to factors such as geographical location. They find trade effects on several measures of air pollution (particularly SO_2 and NOx concentrations), for a given level of income, that are more good than bad. This suggests that the "gains from trade" effect may be at least as powerful as the "race to the bottom" effect.[9] The findings are different for emissions of CO_2, however, which appear, if anything, to be exacerbated by trade.

It is not hard to explain why carbon emissions might rise continuously with trade and growth, even while local measures of pollution improve. National governments, given the will and the money, can address local pollution because even though it is external to the household or firm, it is internal to the country. A cross-border environmental problem like global climate change, however, cannot be addressed by individual countries acting on their own, due to the free rider problem. Multilateral cooperation is required.

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 given the increasing importance of major sources of environmental damage that cross national borders, and given the fact that these cross-border impacts would exist even if there were no such thing as international trade. Some externalities have long spilled over from individual countries to their neighbors; examples include SO_2 pollution, which is responsible for acid rain, or water pollution, which flows downriver. Many cross-border environmental problems can be addressed by negotiations between the two countries involved (e.g., the United States and Canada). An increasing number of environmental externalities are truly global, however. The best examples are GHGs. A ton of CO_2

[9] The question of whether openness has a negative effect on countries' regulatory standards overall (the race to the bottom) is distinct from the question of whether openness results in some countries becoming cleaner and others dirtier (the pollution haven hypothesis). For a review of evidence on the latter, see the pollution havens section of Frankel (2009).

creates the same global warming potential in the atmosphere regardless of 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.

Processes and production methods

Even localized environmental damage, such as deforestation, is increasingly seen as a valid object of international concern. In a trade context, a distinction is traditionally made between trade measures that target specific undesirable products, such as tobacco, 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, such as asbestos, so long as it does not discriminate against foreign producers. 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?[10]

Often an international externality can be easily identified. Forests act as carbon sinks because they absorb CO_2 (through a process called sequestration)—as a result, 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.

[10] 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 world of environmental advocacy that their concerns may be valid, but that they should address them outside the WTO, in their own, separate negotiations, and under the auspices of their own multilateral agencies.[11]

In the post-war period, the vehicle for multilateral negotiations that succeeded in bringing down trade barriers in many countries was the General Agreement on Tariffs and Trade (GATT). The GATT organization in 1995 was replaced with a real agency, the World Trade Organization (WTO). 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 country 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 do not represent "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 that established the WTO, language was added to specify that the new organization's objectives were not limited to promoting trade but included also optimal use of the world's resources, sustainable development, and environmental protection. Environmental objec-

[11] The most prominent and articulate spokesperson for the view that trade should *not* be linked to unrelated issues is Jagdish Bhagwati (2000).

tives are also specifically recognized in WTO agreements that deal with product standards, food safety, intellectual property protection, and so on.

Given these provisions, how does one explain the common view in the anti-globalization movement that the WTO is actively harmful to the environment? When members of the protest movement identify specifics, they usually mention past rulings of WTO panels under the dispute settlement mechanism. The panels are quasi-judicial tribunals, whose job is to rule in disputes about 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 WTO 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 non-governmental organization (NGO) community have at some point become convinced that these rulings told the United States, or another 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 involve Canadian asbestos, Venezuelan reformulated gasoline, US 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-country plaintiff alleged to have trade-distorting effects. None of these complaints, however, was based on the allegation that the goal of the measure was not valid, or that protectionism was the original motivation. In most of the cases, the allegation was that discrimination against foreign products was an incidental, and unnecessary, feature of the environmental measure.

Canadian asbestos

The case of Canadian asbestos was a clear win for environmental advocates. The WTO Appellate Body in 2001 upheld a French ban on asbestos products against a challenge by Canada, which had been exporting to France. This ruling made real the WTO claim that its charter gives priority to health, safety, and environmental requirements insofar as GATT Article XX explicitly allows exceptions

to the Most Favored Nation and national treatment rules for these purposes.[12]

Venezuelan reformulated gasoline

In this case, Venezuela successfully claimed that US law violated the national treatment rule—that is, it discriminated in favor of domestic producers. The case was unusual in that the intent to discriminate had, at the time the law was passed, been made explicit by US administration officials seeking to please a domestic interest group. If the WTO had ruled in favor of the United States, 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.

The United States was not blocked by this ruling from 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: namely, 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 US law to protect sea turtles that are caught in the nets of shrimp fishermen in the Indian Ocean. (The provision was pursuant to the US Endangered Species Act.) In reality, the dispute resembled the gasoline case in the sense that the American 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 United States had unilaterally and inflexibly banned shrimp imports from countries that did not have in place, for all shrimp production, a specific turtle-protection regime to the United States' own liking.

[12] *New York Times*, July 25, 2000.

The case could in fact be considered a victory for environmentalists, in that the WTO panel and appeals body in 1998 explicitly stated that the United States 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 (Charnovitz 2003a). 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.[13]

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 fishermen to use nets that also caught dolphins. Mexico brought a case before the GATT, as this dispute pre-dated the WTO. The GATT panel ruled against the US law, in part due to features that discriminated unnecessarily against Mexican fishermen in favor of US fisherman. The GATT report was never adopted. Instead, the parties 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.[14] That the GATT ruling in the tuna case did not affirm the right of the United States to use trade bans to protect dolphins shows how much the environmentalist cause has progressed under the WTO, as was borne out in the subsequent gasoline, shrimp–turtle, and asbestos cases.

[13] 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 PPM measures.

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

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 United States, European Union, and developing countries) was an inherently near-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, when European and other countries went ahead without the United States, they found that they could not manage without such trading mechanisms.)

Even those who, for one reason or another, do not believe that Kyoto was a useful step, should acknowledge that multilateral agreements will be necessary to tackle effectively the problem of global climate change. 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 climate change would not be effectively addressed.

The issues of leakage and competitiveness

Among countries making legislative attempts to limit GHG emissions, many are increasingly obsessed with twin problems related to international trade: the problems of leakage and competitiveness (Frankel 2005a, 2005b). Assume that a core of rich countries is able to agree on a target GHG emissions pathway for the remainder of the century, following the lead of Kyoto, or alternatively, is able to agree on other measures to cut back on emissions, and assume further that

the path is aggressive enough at face value to go some way to achieving the atmospheric GHG concentration goals that the environmental scientists say are necessary. Even under a business–as-usual (BAU) 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 these countries are not included in a system of binding commitments, overall global emissions will continue to grow rapidly. 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 abatement measures adopted by rich countries. Furthermore, not wanting to become less "competitive" and pay economic costs for minor environmental benefits, the rich countries would probably lose heart and the entire effort would unravel. Thus it is essential to find ways to address concerns about competitiveness and leakage.

Developing countries

Developing countries need to be inside whatever international climate policy regime is the successor to Kyoto, for several reasons.[15]

First, as already noted, the developing countries will account for the largest share of emissions growth in coming years according to BAU projections. China, India, and other developing countries will account for as much as two-thirds of global CO_2 emissions over the course of this century, vastly exceeding the expected contribution from member countries of the Organisation for Economic Co-operation and Development (OECD), which are projected to account for 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.

[15] An additional reason that developing countries need to be included is to give the United States and other industrialized countries the opportunity to buy relatively low-cost emissions permits, which is crucial to managing the economic cost of achieving any given stabilization goal. Elaboration of this point is available from Aldy and Frankel (2004), Frankel (2007), Seidman and Lewis (2008), and many other sources.

If a quantitative international regime is implemented without the developing countries, their emissions are likely to rise even faster than current BAU projections, due to the problem of leakage. This phenomenon could come about through several (interrelated) channels. First, energy-intensive industries could relocate production from countries with emissions commitments to countries without such commitments. 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 possibility is that a plant in a poor unregulated country might use dirty technologies and so emit more than a plant producing the same output in a rich country with stricter environmental standards—in that case, aggregate world emissions could actually go up rather than down.

Another channel for leakage involves world energy prices. If participating countries succeed in cutting back their consumption of high-carbon fossil fuels such as coal and oil, demand will fall and prices for these fuels on world markets will decline (other things equal). This is equally true whether the initial policy is a carbon tax that raises the price of fossil fuels to rich-country consumers or if other measures are used to reduce demand. Non-participating countries would naturally respond to declining world oil and coal prices by increasing consumption.

Estimates of the likely extent of leakage (in terms of how many tons of increased emissions from developing countries would be expected for every ton abated in an industrialized country) vary. 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, conclude that these impacts would be small on most traded goods.[16] But one authoritative survey reaches a less sanguine conclusion: "Leakage rates in the range 5 to 20 per cent

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

are common" (International Panel on Climate Change, 2001, Chapter 8.3.2.3, pp. 536–54). Another study reports estimates of leakage ranging from 8 to 11 percent.[17]

Even more salient politically than concern about leakage is the related issue of competitiveness: specifically, the concern that domestic industries that are particularly intensive in energy or in other GHG-generating activities will be at a competitive disadvantage to firms in the same industries operating in non-regulated countries.[18] Firms in such sectors as aluminum, cement, glass, paper, steel, and iron will point to real costs in terms of lost output, profits, and employment if they are subject to a GHG regulatory regime and their competitors are not (Hauser *et al.* 2008). They understandably will seek protection and are likely to get it.

Measures in climate change legislation to address competitiveness and leakage

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

[17] Bordoff (2008, fn. 4). One of the estimates cited by Bordoff is from McKibben *et al.* (1999), who find that if the United States had adopted its Kyoto target unilaterally, leakage would have been 10 percent. Ho, Morgenstern, and Shih (2008) also find that the imposition of a price on carbon in the United States would produce substantial leakage for some industries, especially in the short run; they conclude that petrochemicals and cement are the most adversely impacted, followed by iron and steel, aluminum, and lime products. Demailly and Quirion (2008a) and Reinaud (2008) do not find large leakage effects from the first stage of the EU Emissions Trading System; but this tells us little about the next, much more serious, stage.

[18] 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 taxes on 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 used to tap renewable energy, would benefit.

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. A bit, but not all, of the variation is semantic.

- *Border adjustment taxes*. Technically, this phrase applies not just to import tariffs alone but to a combination of import tariffs and export subsidies. Export subsidies do not, however, seem to be under active contemplation.
- *Green tariffs*. "Import tariffs" are the most accurate description of what we are talking about; the adjective "green" converts a negative-sounding term into a positive one.
- *Import barriers*. The phrase "import barriers" also has the pejorative flavor of protectionism. It clearly includes the option—likely to be adopted in practice —of requiring importers to buy emission permits, or "international reserve allowances" in the language of the Lieberman-Warner bill introduced in the US Congress. For economists such requirements are precisely equivalent to import tariffs—the cost of the permit is the same as the tariff rate. Others would not so readily make this connection, however. International law may well defy economic logic by treating import tariffs as impermissible but permit requirements for imports as acceptable (Pauwelyn 2007; Brewer 2008; and Fischer and Fox 2009).
- *Import penalties*. The term "penalties" is a bit like the term "barriers" in its generality. Both terms have the added advantage of connoting a tie to behavior in the exporting country—in this case, insufficient action on climate change—while yet sounding less extreme than "sanctions."
- *Import measures*. "Measures" is the term that maximizes generality and neutrality.
- *Carbon-equalization taxes*. A well-designed policy to target leakage and competitiveness concerns could be described as equalizing the effective tax on the carbon content of goods produced domestically versus goods imported from abroad. One hopes that "carbon equalization" is not used as a euphemism for domestic subsidies or rebates.

- *Trade sanctions*. An alternative function of import measures is to encourage those countries not participating in a post-Kyoto multilateral climate policy 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 United Nations Security Council, and are not currently under consideration as a mechanism for addressing climate change (Charnovitz 2003b, page 156).

Pauwelyn (2007) compares some of these options more carefully, from a legal standpoint. Fischer and Fox (2009) compare four of them from an economic standpoint: import tax alone, export rebate alone, full border adjustment, and domestic production rebate. Hufbauer, Charnovitz, and Kim (2009, Chapter 3) are more exhaustive still. Recent papers that compare the options in a European context include Demailly and Quiron (2008b), Reinaud (2008), and Alexeeva-Talebi, Loschel and Mennel (2008).

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: typically a requirement that importers of energy-intensive goods surrender permits corresponding to the carbon emissions embodied in those goods (which is equivalent to a tariff on these imports).[19] The Bingaman-Specter "Low Carbon Economy Act of 2007" would have provided that "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 would have required 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, it would have required the importer to buy international reserve allowances

[19] Source: Resources for the Future. Or Hufbauer, Charnovitz and Kim (2009, Table 1.A.2).

(S. 2191: "America's Climate Security Act of 2007," Sections 6005–6006). These requirements would be equivalent to a tax on covered imports. The major candidates in the US presidential election campaign of 2008 supported 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 passed and gone into effect poses similar issues: "The Energy Independence & Security Act of 2007" explicitly "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."[20] Canada's oil sands are vulnerable. Since Canada has ratified the Kyoto Protocol and the United States has not, the legality of this measure strikes this author as questionable.

Possible application of trade barriers by the European Union

It is possible that many in Washington don't realize that the United States is likely to be the victim of legal sanctions before it is the wielder of them. In Europe, where firms have already entered the 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 (Bhagwati and Mavroidis 2007; Bierman and Brohm 2005; and Government of Sweden 2004).

After the United States failed to ratify the Protocol, European parliamentarians proposed a "Kyoto carbon tax" against imports from the United States.[21] 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 Nicolas 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

[20] Section 526. Source: *FT*, Mar. 10, 2008.
[21] *FT*, Jan 24, 2008.

is in any case necessary in order to induce those countries to agree on such a commitment." [22]

The envisioned mechanism sounds similar to that in the Bingaman-Specter and Lieberman-Warner bills in the United States, with the difference that it could go into effect soon, since Europe is already limiting emissions whereas the United States 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." [23]

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 tradable permits that already exists in the European Union, giving a firm free permits is the same as giving them a cash subsidy. According to simple microeconomic theory, however, these subsidies would do nothing to address leakage. Because carbon-intensive production is cheaper in non-participating countries, the European firms would simply sell the permits they receive and pocket the money, while carbon-intensive production would still move from Europe to non-participants.[24] Recipient firms might even use the money to buy or develop their own subsidiaries in unregulated countries.[25]

[22] Letter to EU Commission President Jose Manuel Barroso, January 2008.

[23] 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.

[24] This logic presumes that the subsidies are tied to past production, rather than ongoing production. But this is the idea of course: A system of granting permits based on future production would encourage emissions rather than the reverse.

[25] 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

Admittedly there might in practice be some effects from granting free allowances to affected industries: For example, an infusion of liquidity might keep a firm operating 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. Perhaps the purpose behind this subsidy option is not to minimize leakage, for which free allowances are 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 politicians understand that this is what they are doing, because the rhetoric is different and the economic logic is subtle.

Would trade controls or sanctions be compatible with the WTO?

Would measures that are directed against CO_2 emissions in other countries, as embodied in electricity or in goods produced using electricity or other carbon-emitting forms of energy, be acceptable under international law? Not many years ago, most international experts would have said that import barriers against carbon-intensive goods, whether in the form of tariffs or quantitative restrictions, would necessarily violate international agreements. Under 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 to affect how goods are produced in foreign countries—that is, they could not impose barriers on the basis of processes and production methods (PPMs). A notorious example was the GATT ruling against US barriers to imports of tuna from Mexico on the basis of dolphin-unfriendly fishing practices. But things have changed, as explained in the previous section summarizing WTO panel cases.

The WTO 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 envi-

Footnote 25 (*cont.*)
more likely to run afoul of the WTO. I come to the opposite conclusion, for the reasons stated and also because subsidies to sectors facing international competition run contrary to the WTO as much as import tariffs do.

ronmental and free-trade advocates, 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 that established the WTO seeks "to protect and preserve the environment;" while the 2001 Doha Communiqué that sought to start a new round of free trade negotiations declared: "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 Parties to the Protocol should "strive to implement policies and measures…to minimize adverse effects…on international trade…" The United Nations Framework Convention on Climate Change (UNFCCC) features similar language.

GHG emissions are the result of processes and production methods. Is this an obstacle to the application of trade measures to address these emissions at the border? I don't see why it has to be. Three precedents can be cited: sea turtles, stratospheric ozone, and Brazilian tires.

The true import of the 1998 WTO panel decision on the shrimp–turtle case was missed by almost everyone. The major significance of this decision was its pathbreaking ruling that environmental measures can target not only exported products (under Article XX), but also the processes and production methods (PPMs) used by trading partners in supplying these products—subject, as always, to the non-discrimination provisions of Articles I and III. The United States was, in the end, able to seek to protect turtles in the Indian Ocean, provided it did so without discriminating against Asian fishermen. Environmentalists failed to notice or consolidate the PPM precedent, and (to the contrary) were misguidedly up in arms over this case.[26]

Another important precedent for harmonizing trade and environmental goals was established by the Montreal Protocol on stratospheric ozone depletion, which contained controls on trade in ozone depleting substances (ODSs) and products that contain ODSs. These controls had two motivations:[27]

[26] For a full explanation of the legal issues, see the references cited in footnote 12.
[27] Brack (1996). Barrett (1997) shows theoretically how multilateral trade sanctions can enforce a multilateral environmental treaty.

1. to encourage countries to join, and
2. to minimize leakage (if major countries had remained outside the Montreal Protocol, the controls would have minimized the migration of production of banned substances to nonparticipating countries).

In the event, (1) worked, so (2) was not needed.

These two examples—the shrimp–turtle decision and the Montreal Protocol precedent—go a long way towards establishing the legitimacy of trade measures against PPMs. Many trade experts, including economists and international lawyers, let alone representatives of India and other developing countries, are not yet convinced[28] of the legitimacy of such measures. 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 of climate change 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 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), which accords "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."[29]

[28] Some experts believe that even multilateral trade penalties against non-members might not be permissible under the WTO. See Sampson (2000), p.87. Of course, countries wishing to participate in such a system could always withdraw from the WTO.

[29] Source: Brendan McGivern, Dec. 12, 2007.

Some principles for designing 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, they also 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 unilateral 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. Trade controls imposed in this context are stronger, for example, than in the shrimp–turtle case, which was primarily a unilateral US measure.[30] On the other hand, the case for unilateral controls on the basis of climate concerns is weaker than it was for the Montreal Protocol, where the Protocol itself defined multilaterally-agreed trade controls. (Multilateral initiatives like the latter are on firmer ground than unilateral initiatives.) The Kyoto Protocol could have made explicit allowance for multilateral trade controls, but its negotiators chose not to. The case would be especially weak for American measures if the United States 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 United States ratifies. But the case would be stronger still if a future multilateral agreement, for example under the 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 that would be 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 to apply tariffs to the carbon content of electricity, though this requires acceptance of the PPM principle. The big question is whether it is legitimate to impose trade measures on the basis of the

[30] Webster (2008) explains that unilateral measures more likely acceptable if in pursuit of an existing multilateral agreement such as the Kyoto Protocol. Even sea turtles are, however, given some protective status by their inclusion in Appendix 1 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

carbon or energy content of manufactured goods. Trade sanctions would probably not be legitimate when applied solely as punishment for free riding against unrelated products of a non-member country or, in a more extreme case, on clean inputs—e.g., a ban on US turbines used for low-carbon projects (unless perhaps there was multilateral agreement among UNFCCC members on economy-wide sanctions—an unlikely prospect).[31]

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 a 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.

Unfortunately, it is difficult to determine the carbon content of manufactured goods. The best option would be to focus on the half-dozen largest-scale, most energy-intensive industries—a category that probably includes aluminum, cement, steel, paper, and glass. Even here there are difficult questions, however. 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 power) or dirtier (much of Australia'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. Pauwelyn (2007) proposes that the US Customs Bureau assign imports an implicit carbon content based on the production techniques that are dominant in the United States, as a back-up when the foreign producer does not voluntarily provide the information needed to calculate carbon content; apparently there is precedent for this approach.

As soon as one goes beyond a half-dozen industries, however, it becomes too difficult for even a good-faith investigator to discern the

[31] Charnovitz (2003, 156) emphasizes the distinction between trade controls, which fall on environmentally relevant sectors, versus trade sanctions, where the targeted products are arbitrary and unrelated to the noncompliant act (and are used multilaterally only by the WTO and UN Security Council).

effective carbon content. This approach is also too liable to abuse. One would not want to attempt to levy tariffs against car parts that are made with metal produced in a carbon-intensive way, or against the automobiles that use those car parts (which could include efficient, high-mileage hybrids) or against the products of firms that bought the cars, and so on.

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 to ethanol (and concurrent protection against competing imports of biofuels from Brazil). If each country on its own imposes border adjustments for imports in whatever way suits its national politics, those adjustments 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 manipulate, for protectionist purposes, the process whereby each government decides whether other countries are doing their share, and what foreign competitors merit penalties.[32] If so, the competitiveness provisions may indeed run afoul of the WTO, and would in that case deserve to be struck down.

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 sorts of barriers are appropriate. One policy conclusion is that these decisions should be delegated to independent panels of experts, rather than be left to politicians.

The most important policy conclusion is that we need a multilateral regime to guide climate-related trade measures. Ideally the regime

[32] 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 that refuse to reduce GHG emissions. "Unions back carbon tax on big polluting nations," AP and *Wall Street Journal*, Jan. 16, 2008.

would be negotiated along with a successor to the Kyoto Protocol that sets emissions targets for future periods and brings the United States and developing countries inside. But if that process takes too long, it might be useful in the shorter run for the United States to enter negotiations with the European Union to harmonize guidelines for border penalties, perhaps in consultation with the secretariats of the UNFCCC and the WTO (Sampson 1999).

Why take multilateralism seriously?

"Why should WTO obligations be taken seriously?" some may ask. Three possible answers may be ventured, based on considerations of international citizenship, good policy, and realpolitik.

Regarding international citizenship, the broader question is whether the United States wants to return to the highly successful post-war strategy of adherence to international law and full membership in—indeed leadership of—multilateral institutions. This course does not mean routinely subordinating American law, let alone American interests, to international law. There will be cases where the United States wants to go its own way. But efforts to address climate change surely do not (or should not) represent one of those cases. Among other reasons is the fact that GHG emissions are inherently a global externality. No single country can address climate change on its own, due to the free rider problem. While there is a role for unilateral action on climate change—for example, by the United States as part of a short-term effort to demonstrate seriousness of purpose and begin to catch up with the record of the Europeans—in the long term, multilateral action offers the only hope of addressing the problem. The multilateral institutions to do so are already in place—specifically the UNFCCC, the Kyoto Protocol, and the WTO—and all of them were created with strong US leadership.

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 international institutions and of their alleged violations of national sovereignty typically believe. This applies whether the critics are on the left or the right of the political spectrum, and whether their main concern is the environment or the economy. One can place very heavy weight on economic goals, and yet realize the desirability of addressing externalities, minimizing leakage,

dealing with competitiveness concerns, and so forth. Likewise, 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.

The third reason why the United States should be prepared to modify the sort of "international reserve allowances" language of the Lieberman-Warner bill and move in the direction of multilateral coordination of guidelines for climate-related trade measures is grounded in 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.[33] 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 a Kyoto-successor regime. The argument is stronger than an argument based on historical examples of US import barriers that led to subsequent emulation and retaliation, which eventually came back to hit US exports (e.g., the Smoot Hawley tariff in 1930, anti-dumping cases in the 1980s, etc.). Here the United States has an opportunity to influence other countries' barriers against its goods, probably more than ten years before the United States would be erecting barriers against others' goods.

Concluding recommendations

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

[33] 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.

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. Based on their characteristics, I classify possible border measures into two categories, which I will name by color (for lack of better labels):

1. The "Black" category—measures that seem to me very dangerous, in that they are likely to become an excuse for protectionism; and
2. The "White" category—measures that seem to me reasonable and appropriate.[34]

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 seeking special protection.
- Unilateral measures that seek to restrict trade with particular partners more broadly, 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. (One must note that the aversion to subsidies is based on economists' logic. International lawyers may have the opposite ranking.)

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

[34] Hufbauer, Charnovitz and Kim (2009, Chapter 5) call this category "the green space" and present a list of desirable attributes which is more authoritative than the one I had drawn up, at least from a legal standpoint. Green is the more familiar color, but I had thought to avoid it because of possible confusion with the "green box" of the WTO's Agreement on Agriculture.

- Measures should follow some multilaterally-agreed set of guidelines among countries participating in the Kyoto Protocol and/or its successors.
- Judgments as to findings of fact—for example, 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 what is the nature of allowable responses—should be made by independent panels of experts.
- Measures should only be applied by countries that are reducing their emissions in line with the Kyoto Protocol and/or its successors, against countries that are not participating, either due to their refusal to join or to their failure to comply.
- Import penalties should target fossil fuels, electricity, and a half-dozen of the most energy-intensive major industries (e.g., aluminum, cement, steel, paper, glass, iron and chemicals).

If countries follow these guidelines, the border penalties they enact are more likely to be consistent with the avowed goals of preventing leakage and undue loss of competitiveness and less likely to fall afoul of the WTO. If countries do not follow these guidelines—which may be the more likely outcome—the trade measures they devise will more probably be inconsistent with environmental and competitiveness goals, and with the WTO as well.

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