3

Trade Measures

The second class of measures to level the playing field for domestic carbon-intensive industries and guard against emissions leakage is based not on reducing the cost of compliance for participating companies but on applying a similar cost indirectly to international competitors. The idea of using trade measures to address competitiveness issues in climate policy was first floated in the European Union, with France and the European Parliament advocating a tax on imports from the United States as a response to American abstention from serious climate policy. Others, particularly the United Kingdom and the European Commission, have been considerably more cautious. The United States, for obvious reasons, has deeply opposed such measures. Interestingly, now that US climate policy is a serious prospect, US legislators have emerged as more enthusiastic advocates of such measures. But while the Europeans had the United States in mind when they were first contemplating such proposals, the focus in Washington is clearly on China.

Trade measures come in slightly different flavors, depending in part on whether domestic climate policy centers on a carbon tax or a cap-and-trade system (box 1.1 in chapter 1), but all seek to achieve the same result: to put domestic producers on a level international playing field and to encourage foreign countries to take steps to reduce emissions. In this chapter we evaluate the effectiveness of trade measures as a whole in achieving both outcomes. Our discussion is organized as follows:

- *designing a trade measure*: an overview of factors that shape the design of a trade measure, including the nature of domestic climate policy, considerations of World Trade Organization (WTO) legality, and the mechanics of enforcement;

- *scenarios for implementation*: under what circumstances might trade measures be imposed and what type of response such imposition (as well as mere enactment) is likely to elicit from major trading partners;
- *effect on US producers*: an assessment of what trade measures mean for the carbon-intensive industries included in this study, based on an analysis of trends in global supply and demand, international trade flows, and comparative carbon intensity across countries; and
- *implications for international engagement*: the ability of trade measures (whether threatened or imposed) to leverage other countries to reduce emissions and their potential impact on multilateral climate negotiations.

Designing a Trade Measure

The most important variable in the design of a trade measure is the nature of the domestic climate legislation of which it will be a part. Under a carbon tax system, trade measures most likely come in the form of a *border tax adjustment*—a levy on imported goods proportionate to their "embedded carbon" (the CO_2 emitted during the good's production). The equivalent under a cap-and-trade system is a requirement that importers *acquire emissions allowances* corresponding to the embedded carbon in their goods. Two other approaches are available under either a cap-and-trade or carbon tax system but have garnered less attention. The first is a requirement that all imports meet a *standard for carbon intensity* equivalent to that applied to domestic producers. The other is the application of *countervailing duties* based on "embedded carbon" and imposed at the border on products from energy-intensive industries originating in countries that have implicitly "subsidized" these industries by failing to regulate greenhouse gas emissions.

As of the start of 2008, the most prominent climate bills under debate in the US Congress call for creating a domestic cap-and-trade system and have thus adopted a variant of the second trade-related option mentioned above—i.e., emissions allowances. Legislation from Senators Joe Lieberman and John Warner, as well as Senators Jeff Bingaman and Arlen Specter, incorporate a proposal first introduced by American Electric Power (AEP) and the International Brotherhood of Electrical Workers (IBEW) in early 2007 that would require importers of carbon-intensive manufactured goods from nations without effective and comparable greenhouse gas reduction efforts to purchase emissions allowances equal to the allowances required from their US competitors.[1] And in Europe, early draft propos-

1. See America's Climate Security Act of 2007 (S 2191) and Low Carbon Economy Act of 2007 (S 1766), available at http://thomas.loc.gov.

als for the third phase of the EU Emissions Trading Scheme (which is a cap-and-trade system) also included some form of emissions allowance requirement for importers of carbon-intensive goods, though the most recent version omits such provisions, in part due to objections from the US administration.[2]

In this chapter our discussion of trade measures in general is often couched in terms of emissions allowance requirements. Where differences between this and other forms of trade measures arise, they are explored.

Making Trade Measures WTO Compliant

The international trade regime is not in its most robust state at present. The WTO's Doha Round of multilateral trade negotiations has stalled, and proponents are struggling to coax it back to life. While US policymakers are clearly concerned about the impact of climate legislation on global trade liberalization more broadly, they are navigating uncharted waters. There has been a great deal of discussion about whether trade measures being discussed would pass WTO muster. Joost Pauwelyn at Duke University has conducted a preliminary assessment of the WTO legality of climate-oriented trade measures in general (Pauwelyn 2007). An analysis of specific US legislative proposals is forthcoming from Gary Hufbauer and Jisun Kim of the Peterson Institute for International Economics. We defer to the WTO scholars to make such assessments. For the purpose of this book, we are primarily interested in how concern about WTO legality is shaping the trade measures under consideration and what this means for the competitiveness of US industry and the environmental integrity of the policy as a whole.

Generally, under WTO law a proponent of a challenged trade measure is required to demonstrate compliance with nondiscrimination standards, which limit the use of measures that discriminate in favor of domestic products or in favor of one country's imports over another's. They are also often required to show that the measure has been closely tailored to achieve a legitimate policy objective (such as protecting the environment) in a least trade restrictive manner. Protecting domestic producers from foreign competition is not recognized as a legitimate policy objective under WTO law, so US policymakers will need to credibly articulate how a trade measure has been designed to achieve greenhouse gas reductions.

2. European Parliament, Draft Proposal for a Directive of the European Parliament and of the Council Amending Directive 2003/87/Ec So as to Improve and Extend the EU Greenhouse Gas Emission Allowance Trading System, 2007; Gerard Wynn, "Carbon Revenues Can Aid Climate Fight—Barroso," Reuters News, January 21, 2008; Stokes (2008).

Defining Scope of Coverage

It is widely assumed that for any trade measure to survive a challenge at the WTO, foreign and domestic producers must be treated equivalently in imposing carbon costs. As such, only foreign products similar to those manufactured by covered entities under US legislation can have a price assigned to their "embedded" carbon emissions.

Imported goods covered by a trade measure would then, in theory, mirror those directly affected by domestic legislation. The Lieberman-Warner bill, the most developed piece of cap-and-trade legislation, specifically names iron, steel, aluminum, cement, glass, and paper as covered products. It also leaves open the option for the administration to include "any other manufactured product that is sold in bulk for purposes of further manufacture," the production of which results in a significant amount of direct or indirect greenhouse gas emissions.[3]

We would certainly expect the carbon-intensive chemicals included in our analysis to make the final list of covered products. But, as in the case of deciding who gets allowances, offsets, or carveouts when implementing domestic cost containment measures, we would also expect to see less carbon-intensive manufacturers seek similar protection from imports. The Lieberman-Warner bill defines covered industrial entities as "any facility within the industrial sector that emits more than 10,000 carbon dioxide equivalents of greenhouse gas in any year." There are plenty of manufacturers who would fall into this category but for whom carbon costs would not have a significant impact on product prices.

Determining Carbon Intensity

Once the set of products subject to trade measures is defined, the challenge becomes determining the amount of carbon used to produce them across both companies and countries. The final carbon footprint of a good depends on the production process employed, the energy efficiency of the capital stock, the fuel source, and the type of feedstock (box 3.1). How these differences are treated in comparing the "likeness" between and among domestic and foreign products is a key variable in whether a trade measure passes the WTO's nondiscrimination disciplines (Pauwelyn 2007).

Most domestic cap-and-trade, as well as carbon tax, proposals impose a price on carbon emissions upstream at the point of fuel combustion. These costs are then passed along the production chain to downstream consumers. Under such a system, manufacturers have an incentive to reduce exposure to carbon costs through changes in the technology and produc-

3. America's Climate Security Act of 2007, available at http://thomas.loc.gov.

Box 3.1 Measuring carbon at the border

Determining the "embedded carbon" in a specific good, or the amount of CO_2 emitted during its production, is complicated. Variations in the type of energy used and the efficiency with which it is consumed can create dramatically different carbon footprints for goods that appear identical at the border. The following are some key factors that determine the carbon intensity of the five categories of goods included in this study.

Process

The production process is the principal determinant of the carbon intensity of many products. In steel, for example, the two main production processes create similar products but with very different carbon footprints. Integrated mills use coal-fired blast furnaces to melt iron ore into pig iron, which is then turned into liquid steel in a coal-fired basic oxygen furnace. Mini mills melt recycled steel scrap, rather than melting virgin iron ore, into liquid steel in an electric arc furnace. By avoiding the use of blast and basic oxygen furnaces, mini mills emit less than one-third as much CO_2 in the production of a ton of steel, even if the electricity consumed in the process is generated from coal. In paper production, process choice also significantly affects the embedded carbon in the final product. Mechanical pulping requires large quantities of purchased electricity while chemical pulping relies on energy self-generated from biomass.

Feedstock

The selection of feedstock also affects embedded carbon in significant ways. Whether a chemical product is made from oil, natural gas, or coal is the largest determinant of its carbon intensity. Ethylene produced from natural gas emits less than half as much CO_2 as ethylene produced from naphtha (a petroleum product). Ammonia (used in fertilizer) produced from gasified coal is more than three times as carbon-intensive as that produced from natural gas. In cement production, the mix between clinker (the most energy-intensive component) and other feedstocks can change the carbon intensity of production by more that 20 percent, regardless of fuel source or technical efficiency. Similarly, in steel and aluminum, the quality of iron ore or bauxite used has a direct (though smaller) impact on the carbon footprint of the final product.

Energy source

The type of energy used to convert feedstock into final product, and thus its carbon intensity, varies considerably in some industries, given local energy resource

(box continues next page)

Box 3.1 Measuring carbon at the border *(continued)*

availability and type of production process employed. This is particularly true for industries using large quantities of electricity. In aluminum production, where nearly all energy is consumed in the form of electricity, the type of fuel used in power generation determines most of the carbon intensity of a ton of product. Electricity generated from coal emits two to three times more CO_2 than that generated from natural gas, let alone carbon-free options like nuclear power or renewables. Yet given the dynamic mix of generation sources included in an average power grid, it is difficult to pinpoint which power source was used to produce a given shipment of aluminum.

Technical efficiency

Even with identical production processes, feedstock, and energy sources, the carbon intensity of the final product still varies plant by plant due to differences in the energy efficiency of the capital stock. The difference in CO_2 emissions, for example, from an ethylene cracker built in the 1970s and from one built today can be greater than 30 percent based on variations in technical efficiency alone. Steel mills, paper mills, and cement kilns also vary considerably in efficiency depending on the type of technology used.

Given these differences, it is next to impossible to accurately assess the amount of carbon embedded in a product without specific plant-level information on production process, technical efficiency, feedstock, and energy source. The carbon footprint of identical shipments of steel, aluminum, chemicals, paper, or cement, even from the same country, will vary by producer.

tion processes they use and fuels they consume. Costs they are unable to mitigate are passed on to their customers, who may then seek out cheaper, lower-carbon substitutes. From an environmental standpoint, the policy is intended to have exactly this effect. By assigning a cost to carbon emissions at the top of the production chain, the policy relies on the market to find the lowest-cost abatement options. And if all primary emissions sources are included in the regime, the price of the final product accurately reflects the amount of embedded carbon.

Trade measures, on the other hand, take the opposite approach. Costs are applied directly to downstream products for carbon emissions from all upstream processes. But given the number of variables in terms of production methods, capital stock, and energy sources, it is nearly impossible to accurately assess embedded emissions of goods at the border on a case-by-case basis without the assistance of fairly rigorous emissions monitoring and reporting in the country of origin.

As a result, most proposals simply determine the average carbon footprint of a category of goods produced in an individual country, based on available data, and use that to determine the compliance obligation for all imports from that country. While more technically feasible, this approach is inequitable in its treatment and questionable in its environmental impact.

As stated earlier, there can be considerable difference in the amount of carbon emitted by different producers of the same product (box 3.1). While domestic producers with a smaller carbon footprint would face lower compliance costs under a cap-and-trade system, the courtesy would not be extended to foreign producers. For example, under proposed legislation, all Chinese steel mills, no matter how efficient, would face the same compliance cost at the border. Trading partners would likely challenge this approach on grounds that it fails the WTO's nondiscrimination tests.

If the trade measure fails to incentivize a change in climate policy abroad, this nationwide calculus could also undermine one of the stated goals of the trade measure: encouraging emissions reductions in other countries. Foreign companies would have no incentive to reduce the carbon footprint of their products because individual action would do nothing to change the way their goods were treated at the border. And in China, where exporters of carbon-intensive goods like steel and aluminum are among the most efficient in the country, nationwide industrial emissions could actually worsen as the best in class strive for average and the worst in class stay right where they are. If the trade measure affects trade but is not well tailored to achieve the intended policy objective of preventing emissions leakage and leveraging greenhouse gas reductions in the exporting country, the measure could fail to pass WTO muster.

A more equitable and environmentally productive approach would be to make assessments at a firm rather than national level. While doing this at the border would be nearly impossible, the United States could establish a two-track system where trusted importers were allowed to appeal a nationwide carbon-intensity determination through an individual company declaration. For example, Baosteel, the largest and most energy-efficient Chinese steel producer, could voluntarily enroll in a "green importer" program with US Customs. Customs officials would conduct an initial carbon audit of Baosteel's plants (at the Chinese company's expense) and then allow Baosteel to declare the carbon content of its exports to the United States, rather than be subject to China's nationwide carbon-intensity assessment. Periodic audits could be conducted to ensure accuracy in reporting as needed.

Assessing emissions allowance requirements or border taxes at the firm level is a more effective use of the leverage access to US markets provide. While Chinese steel sales to the United States are insignificant in terms of China's overall economic health (discussed later), they are very important for the financial health of the exporting firm. And though Baosteel has limited ability to influence nationwide climate policy, it has unlimited ability to improve its own carbon footprint, if given the economic incentive to do so. Focusing trade measures at the firm level uses market incentives rather than economic threats and thus stands a better chance of succeeding. Requiring foreign producers to track their own emissions has the added benefit of building the type of monitoring capacity required for more sophisticated climate policy. It also improves the measure's chances of surviving a WTO challenge by avoiding arbitrary distinctions based on the product's country of origin.

Two-track systems have a precedent in international trade, such as the Kimberley Process Certification Scheme in the diamond industry. It should be noted, however, that the scheme was negotiated multilaterally, is backed by both the UN General Assembly and the UN Security Council, and that, following additional multilateral negotiations, the WTO has waived the application of its rules to trade measures taken to implement the scheme. It is unclear whether inadequate climate regulation will generate the same level of international outrage and international consensus as has the use of diamonds to finance terrorism and guerilla war.

Assigning a Price

Once the carbon intensity of a product is established, the way compliance costs are assigned depends on the domestic regulatory framework in place. The Lieberman-Warner bill, a cap-and-trade approach, requires importers of covered goods to purchase emissions allowances from a special pool to cover the embedded carbon in the shipments entering the United States. These "international reserve allowances" are separate from the domestic allowance pool. A number of factors determine whether this system would impose the same costs on foreign producers as faced by those within the United States.

First, in order to pass the WTO's nondiscrimination test, the price of international reserve allowances cannot be allowed to exceed the price of domestic allowances. There is not, however, a corresponding limit on how expensive domestic allowances are relative to allowances for imported goods. Under the Lieberman-Warner bill, this is left to administration discretion.

Second, if free allowances are given to domestic producers, then it is assumed the same treatment would need to be extended to foreign producers. The Lieberman-Warner bill only requires importers to purchase allowances at the same percentage of emissions as the average for domestic producers. This disadvantages new domestic firms, who were not grandfathered into the allocation scheme.

Finally, in leading cap-and-trade proposals, there are conditions as to when, and to what degree, foreign companies are required to purchase allowances. The terms under which trade measures are enacted are discussed below.

As stated earlier, under a carbon tax system, the trade measure would likely take the form of a border tax adjustment (BTA). Assigning a BTA is, in principle, much simpler that creating an international allowance pool. The tax applied to imports mirrors the tax applied to domestic producers. While determining the carbon intensity of foreign production is just as difficult under a carbon tax regime, assigning a cost for those carbon emissions on a nondiscriminatory basis is far easier.

Carbon-intensity standards do not assign a price for the embedded emissions but rather establish a criterion for determining whether imports are allowed into the country. Carbon-intensity standards are generally discussed in the context of a domestic system where certain industries are exempt from the primary climate regime, whether cap and trade or carbon tax. Under such scenarios, exempt industries would be required to limit the amount of carbon emitted in the production of a particular good, based either on a domestic industry standard or an international sectoral agreement. Imports from countries or producers that did not meet the domestic, or international, carbon intensity standard could then be penalized or banned at the US border. In fact, the US steel industry has been a strong advocate of such an approach as an alternative to the AEP/IBEW proposal discussed at the start of this chapter (Obey 2007).

Proponents of applying a financial penalty at the border against energy-intensive products from uncapped countries could also seek to rationalize these measures as countervailing duties—charges levied to counteract the competitive advantage conferred on a product through government support. Nobel Prize–winning economist Joseph Stiglitz (2006) has proposed that "the countries of Europe and elsewhere could impose countervailing duties to make up for the subsidies that American producers, using energy intensive technologies, implicitly receive when they degrade the global environment without paying the costs."

While it may be conceptually sound to treat a government's failure to internalize the costs of a widely decried externality as a subsidy, the legal and political implications for international trade could be profound. If each country were able to unilaterally characterize the gaps in other countries' regulatory systems as actionable subsidies, the imposition of countervailing duties could snowball. Governments rarely fully implement even multilaterally recognized standards, such as labor and human rights standards. For these reasons, current WTO definitions of prohibited and actionable subsidies are quite narrow and would not likely be interpreted to include a government's failure to cap greenhouse gas emissions (Pauwelyn 2007, 16). The WTO is, however, negotiating specific rules on disciplining fisheries subsidies to reduce worldwide overfishing. This may provide some useful precedents for tying evolving climate change standards to emerging trade rules.

Scenarios for Implementation

In the leading legislative proposals under consideration, trade measures would not be an immediate feature of US policy. Rather, the law would provide for a review process, which could in time lead to the imposition of trade measures if the administration judges these necessary. This is, perhaps, out of recognition that the optimal outcome, both from climate and competitiveness standpoints, is to have major trading partners impose similar costs on their industry at home rather than the United States doing so at the border. It is also likely seen as a strategy for compelling similar action in other countries lest their exports be put at a disadvantage in the US market.

In both the Lieberman-Warner bill and its predecessor from Senators Bingaman and Specter, the administration is instructed to immediately engage in international negotiations to seek binding greenhouse gas reduction commitments from all major emitting nations. No later than the beginning of 2019, the administration shall evaluate whether major US trading partners have indeed taken "comparable action." If not, imports from those countries will be subject to compliance costs starting in 2020.

Under such a framework, the question of what constitutes "comparable action" will likely be the key to not only when trade measures are invoked but also how effective the system as a whole is in addressing the competitiveness concerns of domestic carbon-intensive industry.

Question of Comparability

International comparisons are fraught with challenges. For instance, it is not even obvious what it is that should be compared. The domestic mitigation efforts of a country, the results of those efforts, the efforts at helping other countries, and the results achieved overseas all seem to be relevant criteria when making cross-country comparisons (Philibert 2005) (box 3.2). Likewise, some policy actions (e.g., carbon tax) will result in immediate effects, whereas others (e.g., R&D) are expected to bear fruit over decades. Further complicating matters is that not all countries are expected to undertake the same level of efforts (or achieve the same results).

In particular, there is broad international consensus that poorer countries with less financial, technological, and administrative capacities are not expected to make the same amount of effort as countries that have contributed to the buildup of greenhouse gases in the atmosphere and have the financial and technological means to rein in emissions. The United States has long supported the view that national responses should be "differentiated" according to national circumstances faced by different countries and that some countries should be expected to contribute more than

Box 3.2 Defining "comparable"

Quantitative indicators do not clearly measure the level of effort on climate policy that a country actually undertakes. To gauge actual efforts, it is necessary to assess the actual policies and measures adopted. In making these assessments, the following factors, when taken together, provide a basis for comparison:

- **Form of action:** This may include the following:
  - fiscal measures: taxes (including exemptions and credits) and fees;
  - market and regulatory measures: cap and trade, mandates (products and processes), standards, sectoral regulatory reforms (e.g., electricity), and product labeling; and
  - industry agreements: corporate challenges and public-private partnerships.
- **Stringency/magnitude of action:** What level of effort is required under the particular measure? For example, level of emissions target, size of tax or subsidy, and stringency of technology or performance standard.
- **Legal character:** Are the policies and measures mandatory? If so, what are the accountability provisions with respect to reporting and review of compliance?
- **Scope of action:** What sectors, processes, or fuels are covered? For example, energy production, buildings, industry subsectors, transportation, waste, forestry, and agriculture. What share of a country's emissions do the policies and measures cover? Scope of action can also be international, in that they are aimed at assisting other countries, in particular developing countries (e.g., through aid and export credits).
- **Status:** Is the measure planned or already enacted?

The above classification provides a starting point for making meaningful comparisons. Once policies and measures are classified, additional considerations include:

- Given that countries are not all capable of performing, or expected to perform, equally, how much effort should a given country reasonably be expected to undertake?
- Across what time frames should efforts be evaluated? Should policies that result in certain and immediate emissions reductions be weighted more heavily than policies that may result in longer-term reductions?
- How should stringencies be compared across different forms of policy actions (e.g., technology standard versus an emissions cap)?

others. This principle is embodied in the 1992 Climate Convention,[4] which the United States has ratified. While the unanimous passage of the Byrd-Hagel resolution indicates that the US Senate is not inclined to give developing countries a free pass, both the Lieberman-Warner and Bingaman-Specter proposals take economic development status into consideration when evaluating the "comparability" of action by other countries.

In addition, many developing countries have already adopted a raft of policies and measures that can easily be compared with those in the United States. These include ambitious targets for renewable energy, reductions in energy intensity, efficiency standards for vehicles, and reforestation. Implementation of many of these policies and targets will be a challenge, and in many cases, it may not be possible to make a robust assessment of their success within the short time frames demanded by prospective US policy.

"Comparable" but Not Sufficient

Advocates of incorporating trade measures into climate policy hope providing a future US administration with the ability to threaten punitive tariffs at the border will both win industry support for overall legislation and provide incentives to other countries to take similar action. In the best case scenario, trade measures are a stick that stays firmly planted in the administration's back pocket, never actually needing to be invoked. Unfortunately, the history of US trade policy suggests that what is initially intended as a negotiating tool often becomes an embedded part of public policy (box 3.3).

In recent hearings on the Lieberman-Warner bill, both organized labor and the American Iron and Steel Industry expressed serious reservations with the 2020 start date for the trade measures included in the legislation.[5] Regardless of when the review is conducted, it is highly likely that carbon-intensive industries in the United States seeking protection from imports will take issue with the administration's determination of what constitutes "comparable action" by other countries on climate change. The European Union by any definition would pass a nationwide "comparable action" test, as it has a considerably more ambitious climate policy than the United States. However, aluminum producers in the European Union are not directly covered by climate targets (although they do face higher power prices from generators that are covered).

4. Article 3, United Nations Framework Convention on Climate Change (UNFCCC), 1992, available at http://unfccc.int.

5. Andrew G. Sharkey III, American Iron and Steel Institute, statement before the Environment and Public Works Committee, US Senate, November 13, 2007; Robert C. Baugh, executive director AFL-CIO Industrial Union Council and chair, AFL-CIO Energy Task Force, testimony before the Environment and Public Works Committee, US Senate, November 13, 2007.

Box 3.3 US antidumping law: A questionable precedent

Gary Clyde Hufbauer and Jisun Kim

The first US antidumping law, the Antidumping Act of 1916, drew its inspiration from the landmark Sherman Antitrust Act of 1890 and the Clayton Act of 1914. The 1916 Antidumping Act required "predatory intent" and invoked both criminal penalties and treble civil damages. However, the 1916 act was little used because of its high standards of proof and for practical purposes was superseded by the Antidumping Act of 1921, now regarded as the mother of antidumping legislation worldwide. The 1921 law is important for three reasons: (1) An administrative agency, the US Department of Treasury, replaced the US courts as the chief decision maker; (2) relief no longer required a demonstration of predatory intent; and (3) the remedy became antidumping duties rather than criminal liability or civil damages.

At the international level, the General Agreement on Tariffs and Trade (GATT) of 1947 established minimum standards for assessing antidumping duties on imported merchandise. Article VI of the GATT requires national authorities to make two separate determinations: (1) that subject imports are sold at "less than fair value" (LTFV); and (2) that the imports cause "material injury" to the competing domestic industry. Originally a finding of LTFV meant that export sales were priced below home market sales. However, the US Trade Act of 1974 expanded the LTFV definition to include sales below the average cost of production. Since then, so-called cost cases have become the main basis of antidumping determinations.

The US Trade Agreements Act of 1979, which implemented the Tokyo Round Agreement in 1979, shifted administrative responsibility for LTFV determinations from a "less friendly" Treasury Department to a "more friendly" Commerce Department. Much earlier, in 1954, the authority for making injury determinations was shifted from Treasury to the US Tariff Commission (now the US International Trade Commission).

Importantly, following the 1979 Trade Agreements Act, antidumping cases were no longer a matter of administrative determination; instead, they became private rights of action. Subsequent legislative and regulatory changes have made antidumping procedures ever more friendly to private petitioners. For example, highly artificial accounting procedures influence "cost" calculations.

As a consequence of all these changes, international economic policy considerations now play almost no role in deciding the outcome of antidumping cases. Antidumping actions have become the most widely used trade remedy tool for industry-specific grievances. This development raises serious concerns about the abusive use of antidumping petitions and their negative impact on global commerce. Many economists, including Michael Finger (1998) and Bruce Blonigen and Thomas Prusa (2001), point out that, under current US antidumping laws, imports are often deemed "unfair" and subject to antidumping duties even when foreign companies are behaving no differently than domestic firms.

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Going forward, China could choose to implement policies that reduce greenhouse gas emissions while imposing *no* additional costs on carbon-intensive manufacturing whatsoever. Under such a scenario, it is quite plausible that industry and labor groups would seek additional legislation from Congress, making the review process a "private right of action," as happened with the antidumping regime.

Be Careful What You Wish For . . .

Including the threat of trade measures in US climate legislation would open the door for other countries to do the same. And their timing and criteria for "comparable action" would be entirely out of Washington's hands. For all the talk of leadership on climate change, the truth is that at the moment, the United States is playing catch up. Some major trading partners, in particular the European Union, have imposed carbon emissions costs on their industry, which will likely remain higher than those in the United States for some time. The European Parliament and the French government have been among the most prominent European voices calling for trade measures against US producers on these grounds. Others have argued that the actual competitiveness impacts at stake are not worth a trade battle with the United States, and to date this argument has carried the debate. However, trade measures are getting a fresh hearing as Europe plans for phase III of the EU Emissions Trading Scheme. While the current draft of phase III stops short of including such measures, European Commission President Jose Manuel Barroso has warned that they might be in store if the United States and large developing countries do not accept commitments under the next round.[6]

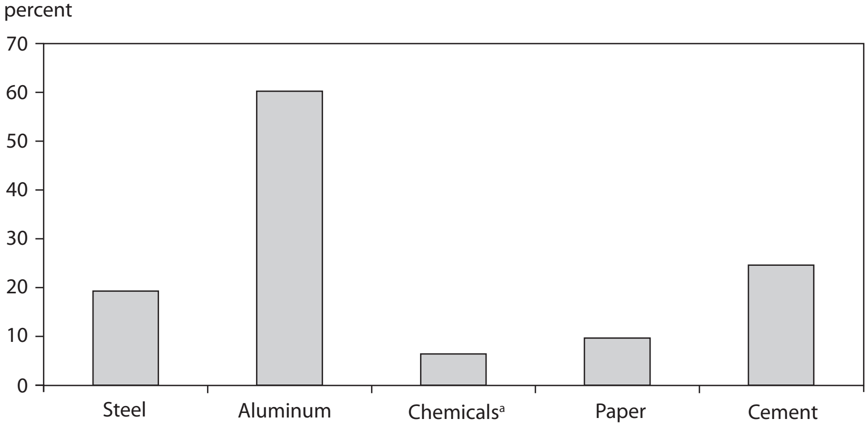
Ironically, Europe may ultimately balk at targeting these trade measures at the United States, anxious as they are to help encourage US climate action. However, this is not true of all countries. Middle Eastern producers of some energy-intensive goods are both highly skeptical of climate policy and less emissions-intensive than their US competitors. While US trade measures are intended to impose a penalty on more carbon-intensive producers, some would also give countries with lighter carbon footprints a competitive advantage over US producers. In the following section, we look at what trade measures, imposed either by the United States or other countries, would mean for individual US industries.

Effects on US Producers

The imposition of the type of trade measures outlined above would impact different carbon-intensive industries in different ways, depending on

6. Roger Harrabin, "Barroso Trade Threat on Climate," BBC News, January 22, 2008.

Figure 3.1 Net imports as share of US demand, 2005



a. Refers to the 11 basic chemical categories included in the study.

Sources: United Nations Comtrade database, 2007; International Iron and Steel Institute, *Steel Statistical Yearbook*, 2006; US Department of the Interior/US Geological Survey, *2005 Minerals Yearbook;* UN Food and Agriculture Organization, FAOSTAT database, 2007; Nakamura (2006); authors' estimates based on industry reports.

the degree to which they compete with imports, the origin of those imports, and the comparative carbon intensity of foreign producers.[7]

Prevalence and Origin of Imports

The United States runs a trade deficit in all five carbon-intensive industries included in this study, despite running a trade surplus in certain product lines. Aluminum is, by far, the most exposed to trade, with net imports accounting for 60 percent of US consumption (figure 3.1). But even in cement, long considered the classic "nontradable," foreign producers meet nearly 25 percent of domestic demand. Domestic producers have the largest market share in paper and energy-intensive chemicals, with net imports accounting for 10 and 6 percent, respectively.

The origin of imports also differs greatly between industries. Table 3.1 lists the top ten sources of imports for each product category. The majority of US imports of steel, aluminum, and paper come from other

7. A note on the data used in this chapter: Because 2005 was the most recent year for which comprehensive global trade data were available at the time this book was written, data from 2005 was also used for supply, demand, and carbon intensity in the interest of consistency. It is important to note that in fast-growing economies like China, the average carbon intensity of production has likely improved considerably since 2005, thanks to large additions of capital stock.

Table 3.1 US imports by origin, 2005

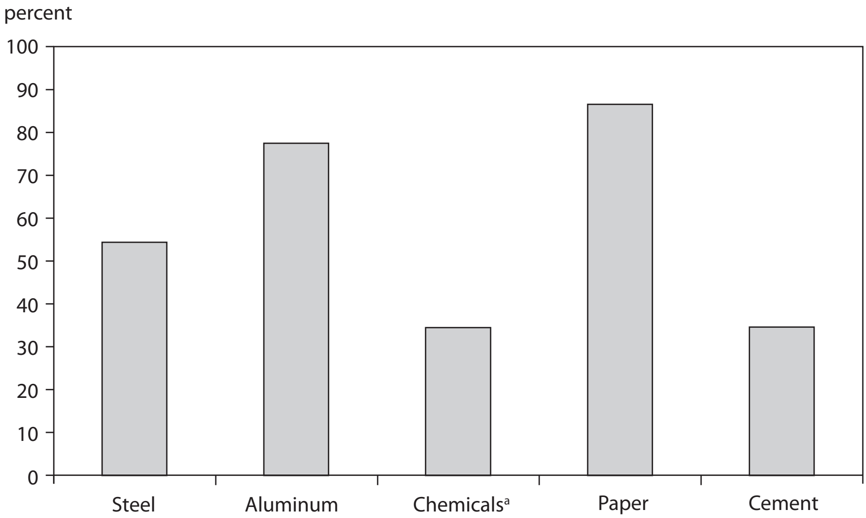
	Steel		Aluminum		Chemicals		Paper		Cement	
Rank	**Source**	**Share** (percent)	**Source**	**Share** (percent)	**Source**	**Share** (percent)	**Source**	**Share** (percent)	**Source**	**Share** (percent)
1	Canada	18.56	Canada	51.02	Trinidad and Tobago	41.58	Canada	66.89	Canada	16.06
2	European Union	17.25	Russia	17.08	Canada	19.30	European Union	16.82	China	14.04
3	Mexico	13.08	European Union	6.24	Ukraine	7.34	China	3.53	European Union	13.87
4	Brazil	8.24	OPEC	5.10	OPEC	6.60	South Korea	2.24	OPEC	9.97
5	China	7.11	Brazil	3.79	European Union	4.49	Mexico	2.20	Thailand	8.60
6	South Korea	5.67	China	3.07	South Korea	4.36	Brazil	1.84	Greece	8.28
7	Russia	5.12	South Africa	2.50	Brazil	3.79	Chile	1.50	South Korea	7.94
8	Turkey	4.16	Tajikistan	2.43	Russia	3.19	Japan	0.96	Mexico	6.49
9	Japan	4.12	Argentina	1.54	Equatorial Guinea	2.76	Norway	0.85	Colombia	5.49
10	India	2.70	Australia	1.27	Chile	1.52	OPEC	0.71	Peru	3.11
From UNFCCC Annex I industrialized countries		54.42		77.57		34.46		86.66		34.61

OPEC = Organization of Petroleum Exporting Countries
UNFCCC = UN Framework Convention on Climate Change

Note: Standard International Trade Classification Codes of included products (version 2): Steel (672, 673, 674, 675, 676, 677, 678, 679), Chemicals (51111, 51112, 51113, 51122, 51123, 51124, 51211, 52218, 52323, 52213, 52251), Cement (6612), Aluminum (6841, 6842), and Paper (641, 642).

Source: United Nations Comtrade database, 2007.

Figure 3.2 Share of US imports from Annex I countries, 2005



a. Refers to the 11 basic chemical categories included in the study.

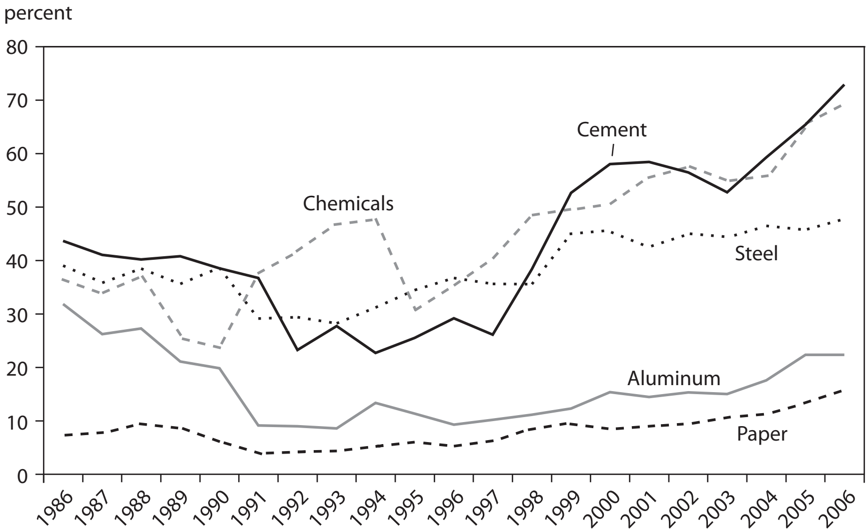
Note: Annex I countries are the industrialized countries listed in Annex I of the UN Framework Convention on Climate Change.

Sources: United Nations Comtrade database, 2007; International Iron and Steel Institute, *Steel Statistical Yearbook*, 2006; US Department of the Interior/US Geological Survey, *2005 Minerals Yearbook;* UN Food and Agriculture Organization, FAOSTAT database, 2007; Nakamura (2006); authors' estimates based on industry reports.

industrialized countries, those listed in Annex I of the UN Framework Convention on Climate Change (figure 3.2). With the exception of the United States, all Annex I countries have accepted mandatory emissions reduction targets as part of the Kyoto Protocol. As such, these countries would likely pass a "comparability test" exempting them from allowance requirements under US cap-and-trade legislation. Under a carbon tax regime with a border tax adjustment, some Annex I countries may seek a tax credit arguing their products are less carbon-intensive than those manufactured in the United States.

Despite the concern about carbon-intensive imports from China, they account for less than 10 percent of all but cement imports. Canada is the largest foreign source of all carbon-intensive imports except chemicals, where it ranks second only to Trinidad and Tobago. Canada accounts for more than half of US paper and aluminum imports, compared with China at 3 percent. That said, it is important to note that over the past 15 years, more US carbon-intensive imports have come from developing countries (figure 3.3). How this trend translates into competitiveness of US industry under trade measures that attach a price to embedded carbon in imports

Figure 3.3 Share of US imports from non-Annex I countries, 1986–2006



Note: Non-Annex I countries are mostly developing countries and are not listed in Annex I of the UN Framework Convention on Climate Change.

Source: United Nations Comtrade database, 2007.

depends on the carbon intensity of foreign production. As discussed later, the developing countries from which these goods are imported are, in many industries, less carbon-intensive on average than the United States.

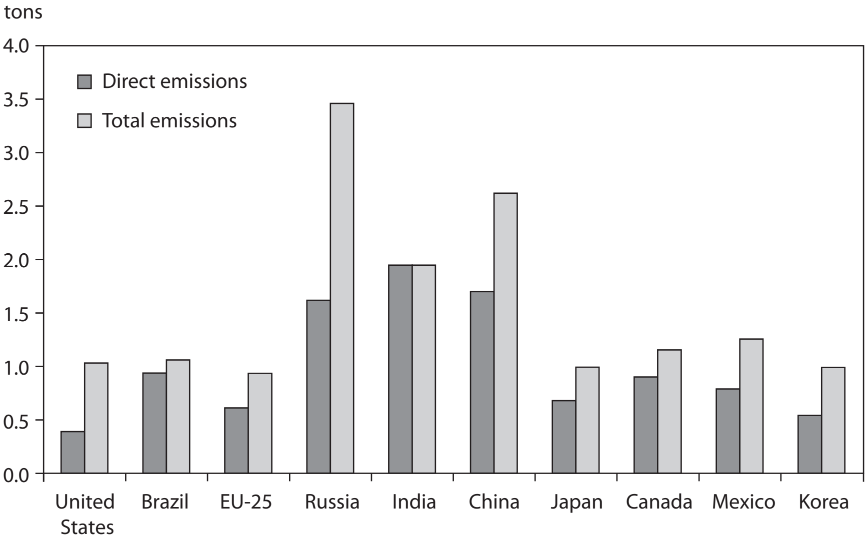
Comparative Carbon Intensity

As discussed earlier, two factors determine the carbon intensity of industrial production: the source of energy used to manufacture the good and the efficiency with which it is produced (box 3.1). These two factors can differ greatly between firms and between countries. Yet under the trade measures included in current US legislative proposals, carbon intensity would be assessed at the nationwide level. In response, this study takes the same approach. Below we provide an overview of how the United States stacks up against its international competition in each of the five industries.

Steel

On average, US steel production is among the least carbon-intensive in the world (figure 3.4). This is primarily the result of the type of production process the industry employs. Nearly half of all steel in the United

Figure 3.4 Carbon intensity of steel, 2005
(tons of CO_2 emissions per ton of steel)



Sources: International Iron and Steel Institute, *Steel Statistical Yearbook,* 2006; IEA (2007c); authors' estimates.

States is made in "mini mills," which use electricity to recycle scrap steel rather than starting from scratch by burning coal and coke to melt iron ore into iron. The electric arc furnaces employed by the mini mills emit one-fourth the amount of CO_2 per ton of steel as the blast furnaces and basic oxygen furnaces used in integrated mills if only direct emissions from the factory are counted. If one includes the CO_2 emitted to produce the electricity an electric arc furnace consumes, the embedded carbon increases (though still less than that from an integrated mill, especially if that electricity is generated from low-carbon fuel sources).

Countries like China and India, which have yet to build up their own supplies of scrap steel, rely much more on integrated mills. While US mini mills would likely see an increase in competitiveness resulting from the implementation of a trade measure in the short term, this benefit would dissipate over time as other countries installed electric arc furnaces and the price of US scrap rose in response to demand from foreign producers. Also, if the carbon content of imports is assessed nationwide rather than at the firm or process level, US integrated mills would see a decline in competitiveness vis-à-vis Canadian, Japanese, European, Mexican, and Brazilian imports, which account for over 60 percent of the current US steel imports.

Aluminum

The majority of the energy consumed in manufacturing primary aluminum is in the form of electricity. Thus, the carbon intensity of a ton of aluminum is largely determined by the source of electricity used to produce it. In the United States, roughly half of the electricity used in primarily aluminum production comes from hydropower, with the remainder coming from coal. That makes US smelters less carbon intensive than the average Asian or African smelter, despite being less energy efficient, but more carbon intensive than Canadian, European, Russian, or Middle Eastern smelters, which account for nearly 80 percent of US aluminum imports. In addition, most new aluminum smelters slated for construction in the years ahead will be sited next to cheap yet low-carbon electricity sources such as hydro and geothermal power in Iceland or stranded natural gas in Russia and the Middle East. China, with rising coal-fired electricity prices, is struggling to remain competitive with these low-cost producers, even in the absence of a regime that prices carbon.

Chemicals

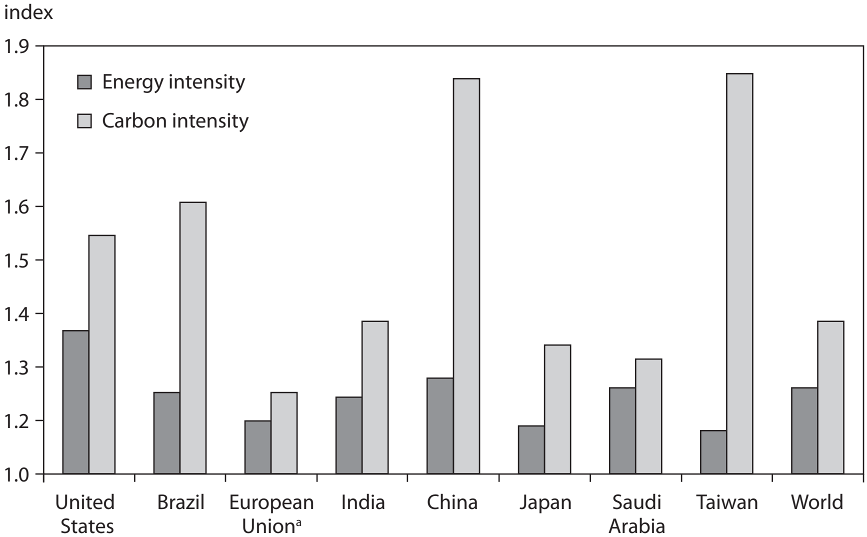
The US chemical industry, with some of the oldest capital stock in the world, is fairly energy inefficient in the production of commodity chemicals. New ethylene crackers[8] in China and the Middle East are all more energy efficient than the average facility in the United States, and older crackers in Japan and Europe have been upgraded and are now some of the most energy efficient in the world (figure 3.5).

At the same time, the US chemical industry is more dependent on natural gas for feedstock than its competitors in Asia, which rely primarily on an oil-derived feedstock called naphtha, and as a result it is less carbon intensive than China and Taiwan. For some chemical products, like ammonia (used for fertilizer) and methanol, China also uses considerable amounts of coal as a feedstock, further increasing the average carbon intensity of its chemical industry. Japan and Europe are more reliant on naphtha than the United States, but highly efficient capital stock there makes their industries less carbon intensive overall.

Yet in commodity chemicals for which energy costs matter, the United States does not compete so much with Europe and Asia as with producers in the Western Hemisphere like Canada and Trinidad and Tobago, which are even more dependent on natural gas. And as is the case with alu-

8. Cracking is the process of breaking down complex chemical compounds into simpler ones of lower boiling points by means of excess heat and distillation under pressure in order to give a greater yield of low-boiling products than could be obtained by simple distillation.

Figure 3.5 Energy and carbon intensity index for chemicals, 2005



a. Germany, Italy, the United Kingdom, France, and the Netherlands.

Note: An energy and carbon intensity index value of 1.00 equals best available technology and feedstock.

Sources: IEA (2007a); authors' estimates.

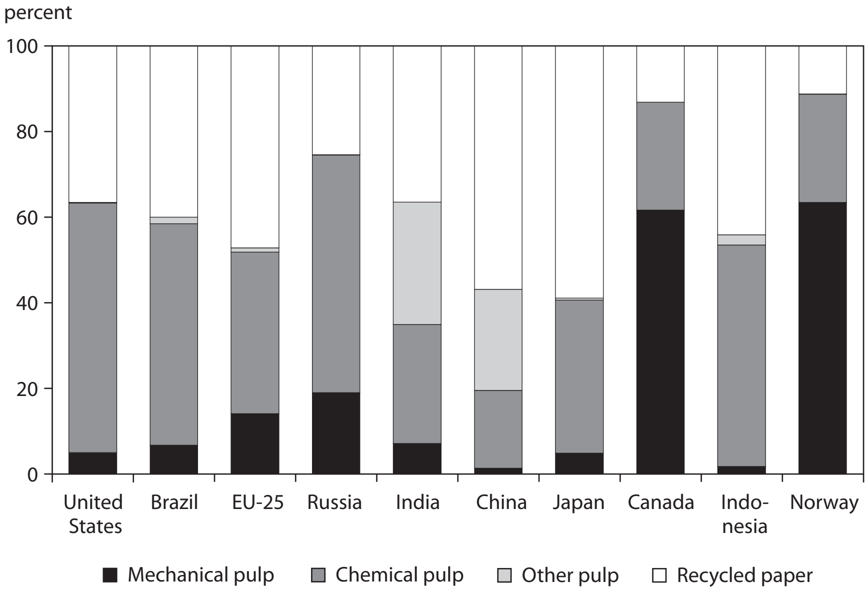
minum, much of the new capacity in commodity chemicals is being built in the Middle East to take advantage of relatively abundant natural gas.[9]

Paper

The US paper industry would perhaps stand to gain the most from a trade regime that imposed costs on the carbon content of imports. There are two basic processes for making the pulp used in paper manufacturing. Mechanical pulping uses electric-powered machines to grind wood into pulp. Chemical pulping breaks the wood down through a chemical process. Waste paper can also be turned into pulp suitable for some types of paper manufacturing. Chemical pulping is dominant in the US and Brazilian paper industries while mechanical pulping is more prevalent in

9. While historically most aluminum smelters and ethylene crackers in the Middle East have been built to utilize stranded natural gas, slow gas development has prompted some countries to look to oil as a substitute energy source and feedstock. See Neil King Jr., "Saudi Industrial Drive Strains Oil-Export Role—Kingdom's Use Jumps as Cities, Smelters Bloom in the Desert," *Wall Street Journal*, December 12, 2007.

Figure 3.6 Pulp used in paper production, 2005



Sources: UN Food and Agriculture Organization, FAOSTAT Forestry (ForesSTAT) database (accessed August 18, 2007); authors' estimates.

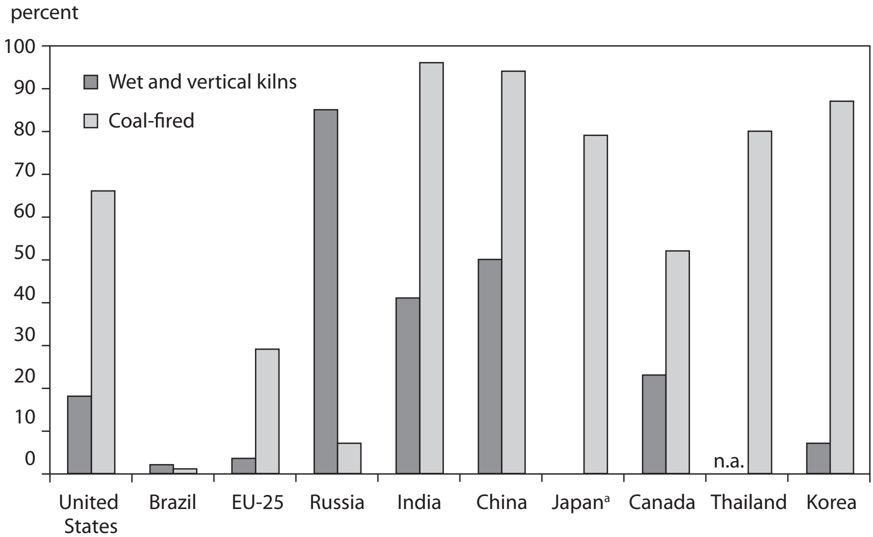
Canada and Norway. Japan and China, with thinner forestry resources, rely on recycled paper (much of it is imported from the West) for their paper production (figure 3.6).

From an energy standpoint, recycling is the most efficient way to produce paper. But from a CO_2 standpoint, chemical pulping can produce paper with a smaller carbon footprint, if one includes the CO_2 removed from the atmosphere during the life span of the trees (the kind of calculus used for biofuels). In fact, an integrated chemical pulping plant and paper mill can be configured to have zero emissions itself while also selling surplus low-carbon energy to other users (IEA 2007a). If US climate policy credited paper producers with the CO_2 absorbed when they replant trees, trade measures would likely give US mills a leg up on Asian and Canadian producers, though not those from Indonesia or Brazil.

Cement

For cement production, the most important variable in determining carbon intensity is the type of kiln used. Wet kilns are used when the feedstock has a high moisture content and are between 25 and 125 percent more energy intensive than dry kilns (IEA 2007a). In the United States, 18 percent of production is from wet kilns, more than Europe or Brazil but

Figure 3.7 Cement kiln type and fuel source, 2005



n.a. = not available

a. Dry kilns account for 100 percent of kiln type in Japan.

Source: IEA (2007a).

less than Canada and Russia (figure 3.7). In China, and to a lesser extent India, vertical kilns are still widely used, which can be slightly more efficient than wet kilns but much less efficient than dry kilns.

Coal accounts for two-thirds of the fuel used in US kilns, less than the shares in China and India but more than Canada and far more than Brazil and Europe, which use large amounts of biomass (figure 3.7). Many Latin American and European producers also reduce the carbon footprint of their cement through the use of additives. As a result the US cement industry is, on average, less carbon intensive than most Asian producers (about one-third of US cement imports), more carbon intensive than European and Latin American producers (another one-third of imports), and about the same as Canadian producers (16 percent of imports).

Impact on Downstream Industries

By necessity, a trade provision would have to draw a boundary around a set group of products for which a BTA or allowance requirement is applied. The law may, for example, regulate imports of steel sheet, but not the steel in an automobile or toaster oven, as the origin and carbon content of that steel would be extremely difficult to assess. Yet the American Iron and Steel Institute (AISI 2006) estimates that in 2005, the United States imported 36.9 million tons of steel in the form of final goods like automobiles and toaster ovens, more than the 30 million tons in actual steel products imported that year. A trade measure that imposed carbon costs on steel products but not the steel contained in other products would raise material costs for US auto and appliance industries without applying similar treatment to their foreign competitors. In addition, such measures create an incentive for foreign producers to move downstream and export finished goods to the United States rather than carbon-intensive intermediates. Steel-consuming industries have argued that tariffs and restraints on steel imports (for noncarbon reasons) cost the United States more in the way of economic output and employment in downstream industries than is saved in steel production (Barringer, Pierce, and McCullough 2007).

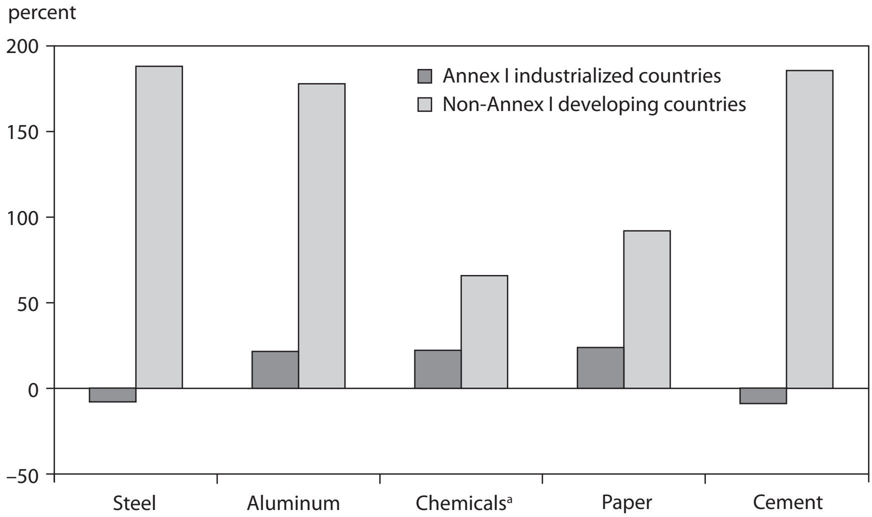
For aluminum, in which the United States runs a larger trade deficit than in steel, tariffs on imports would also impose a cost on downstream consuming industries, often the same firms that buy large quantities of steel. But downstream impacts may be most significant in the chemicals sector. Of the $209 billion in US economic output from the chemicals sector in 2005, only a fraction came from the production of carbon-intensive commodity chemicals like ethylene, chlorine, and ammonia. The bulk of the value added and the employment is in the production of downstream specialty chemicals that use basic chemicals as feedstock. Of the $1 trillion in global chemicals trade in 2005, only $38 billion could be considered carbon intensive (United Nations Comtrade database, 2007). And while the United States runs a trade deficit in carbon-intensive chemicals, it is fairly competitive in the much larger specialty chemicals market. As in steel, applying a carbon tariff on commodity chemicals but not downstream products could be both trade distorting and detrimental to the competitiveness of the sector as a whole.

The potential impact on downstream industries is least relevant in the case of cement and paper. The majority of cement is consumed by the construction industry, which is not globally traded. And as US paper production is among the least carbon-intensive in the world, paper-consuming industries likely would not see a significant increase in their paper costs vis-à-vis their overseas competitors.

Competing in Export Markets

The final consideration in quantifying the impact of a trade measure on carbon-intensive industry in the United States is whether the relevant market is at home or abroad. While the trade-related provisions included in both the Lieberman-Warner and Bingaman-Specter bills try to level the playing field for domestic producers and importers, they do nothing to address the competitiveness of US production in foreign markets. As most

Figure 3.8 Demand growth by country grouping, 1991–2005



a. Refers to the 11 basic chemical categories included in the study.

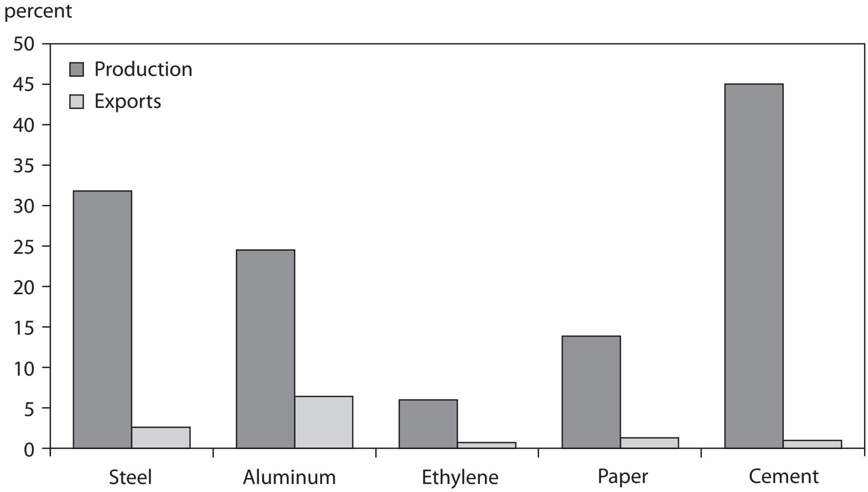
Sources: United Nations Comtrade database, 2007; International Iron and Steel Institute, *Steel Statistical Yearbook*, 2006; US Department of the Interior/US Geological Survey, *2005 Minerals Yearbook;* UN Food and Agriculture Organization, FAOSTAT database, 2007; Nakamura (2006); Rhodes (1996); authors' estimates based on industry reports.

carbon-intensive industries in the United States run a substantial trade deficit, defending the home market has been the primary consideration of policymakers to date.

Yet the developing world, not the United States, will account for most of the growth in demand for these goods in the years ahead. Demand for steel in industrialized countries has, in fact, declined over the past 15 years, while demand from the developing world has tripled (figure 3.8). Demand for aluminum, paper, and chemicals has grown in industrialized countries but has still been far outpaced by demand from emerging economies. China, which alone has accounted for three-quarters of the growth in global steel, cement, and aluminum production over the past decade, has built out capacity primarily to supply its fast-growing domestic market.

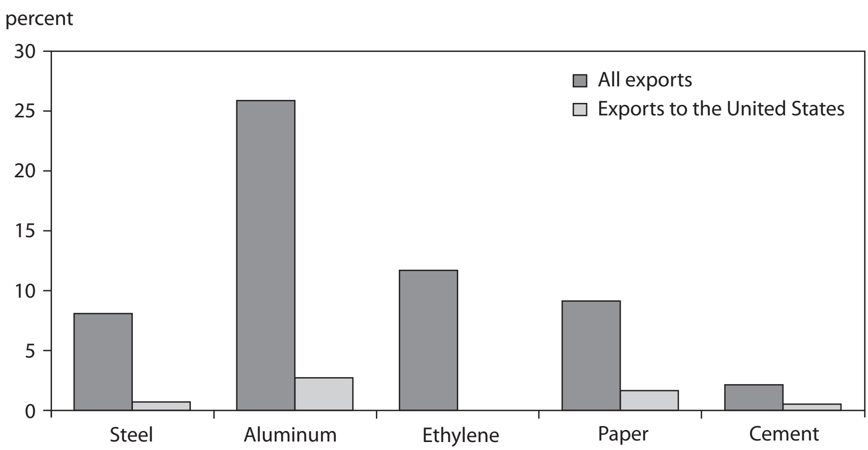
While this capacity has recently gone into surplus and is spilling into international markets, there is little doubt that China is, and will continue to be, the primary driver of global demand for these goods. For example, while overcapacity has made China the world's largest steel exporter, only 8 percent of total production was sold abroad in 2005 and less than 1 percent showed up in the United States (figures 3.9 and 3.10). Exports to the United States account for an even smaller share of Chinese cement

Figure 3.9 Chinese production and exports as shares of global supply, 2005



Sources: United Nations Comtrade database, 2007; International Iron and Steel Institute, *Steel Statistical Yearbook,* 2006; US Department of the Interior/US Geological Survey, *2005 Minerals Yearbook;* UN Food and Agriculture Organization, FAOSTAT database, 2007; Nakamura (2006); authors' estimates based on industry reports.

Figure 3.10 Chinese exports as share of domestic production, 2005



Note: Chinese ethylene exports to the United States are negligible.

Sources: United Nations Comtrade database, 2007; International Iron and Steel Institute, *Steel Statistical Yearbook,* 2006; US Department of the Interior/US Geological Survey, *2005 Minerals Yearbook;* UN Food and Agriculture Organization, FAOSTAT database, 2007; Nakamura (2006); authors' estimates based on industry reports.

and ethylene production. In addition, there is good reason to think that China may again become a net importer of energy-intensive goods in the years ahead. This raises the question of just how much leverage US trade measures, if taken unilaterally, would have on the industrial behavior of China and other developing countries.

A BTA under a carbon tax regulatory regime provides more flexibility in leveling the playing field for US exports. A carbon tax rebate for products sold to countries without "comparable" climate policy could be issued at the border, in the same way as value-added tax (VAT) rebates are given to exporters in some countries.

Implications for International Engagement

An important assumption of proponents of trade measures is that they will help drive other countries to the negotiating table and thus strengthen global climate action. Current legislative proposals would only impose penalties on carbon-intensive imports from countries that had not implemented climate policy "comparable" with that taken in the United States. The rationale is that giving countries an economic incentive to participate in international climate change mitigation efforts will make them more inclined to submit to greenhouse gas reduction targets. After all, access to international markets is likely to be a higher priority for many governments than international climate negotiations. Perhaps trade measures could raise the political focus on mitigation options for America's major trading partners. And as mentioned earlier, the United States is not alone in considering the use of trade measures for such ends. On a recent trip to Beijing, French President Nicolas Sarkozy warned that if the Chinese government did not take action on climate change, Chinese goods could face restrictions in entering the European market.[10]

Multilateral action would not only expand the coverage in terms of industrial emissions (the United States accounts for 14 percent of the global total) but also expand the degree of protection for US industry and increase the leverage on the behavior of nonparticipating countries (see box 3.4 on the disadvantages of unilateral action). Yet there is reason to be skeptical of the likelihood that the threats of trade measures alone, whether unilaterally by the United States or in concert with Europe and Japan, will force developing countries to take a different position in international negotiations.

Developing-country leaders, like politicians in many other countries, need to act tough for the domestic audience. This is particularly true in the case of China, which is also the primary focus of most trade measures

10. Tony Barber and Mure Dickie, "Sarkozy Warns China of Carbon Tariffs," *Financial Times*, November 27, 2007.

Box 3.4 Porous borders

The fungible nature of international markets for basic materials like steel, aluminum, and chemicals must be considered when contemplating unilateral use of trade measures. For example, a border tariff or emissions allowance requirement for Chinese but not Japanese steel could create incentives for producers simply to redirect trade flows rather than reduce emissions. In 2006 the United States imported 5 million and 2 million tons of steel from China and Japan, respectively. If a US trade measure made Japanese steel more competitive in the US market than Chinese steel, Japanese firms could redirect steel produced for the domestic market to the United States to take advantage of the price gap, leaving Japanese steel consumers to import more from China.

Likewise, US trade measures could encourage import substitution in countries like China, by reducing the profitability of exports vis-à-vis domestic sales. Accounting for over 30 percent of global steel demand, China is not only the world's largest steel consumer but also its second largest importer, buying 19 million tons from foreign producers in 2006. Growing at over 14 percent per year, domestic Chinese steel demand during one month will soon be greater than total steel exports to the United States during the course of a year. While trade measures enacted by the United States would likely reduce Chinese steel exports to the American market, they would not address the competitiveness of Chinese producers relative to Japanese, US, European, or Korean producers in supplying the far larger and faster-growing domestic Chinese market.

currently proposed. In judging extraterritorial "conditions" in other countries, it is helpful to consider a "reciprocity test": What would be the US reaction, for instance, to a provision adopted by the Indian Parliament or the Chinese Communist Party that conditioned Indian or Chinese actions on those of the United States? Threats of punitive trade sanctions against Beijing have failed to make headway on issues far less contentious then climate change and in which the United States had considerably more leverage (box 3.5). And as climate change is an issue that can be solved only with the involvement of the developing world, China in particular, there is considerable risk in a brinksmanship approach on the part of the United States.

That said, Beijing has demonstrated the willingness and ability to make painful adjustments to the structure of the Chinese economy in order to be part of a multilateral framework, when it perceives such membership to be in its national interest. With China surpassing the United States as the world's largest CO_2 emitter (on an annual basis), the country's leadership is under growing domestic and international pressure to take ac-

Box 3.5 The sanctions track record

The use of economic sanctions to coerce foreign countries to change policy has a mixed track record. In an assessment of 174 instances of economic sanctions worldwide, the Peterson Institute's Gary Clyde Hufbauer, Jeffrey J. Schott, Kimberly Ann Elliott, and Barbara Oegg (2007) find some degree of success in only 34 percent of the cases. Among those where trade was the only form of leverage applied, the success rate dropped to 25 percent. The success rate was higher among cases where the intended effect of the sanctions was a modest policy change and where the economic cost of the sanctions was high.

Trade measures in US legislation intended to coerce large developing countries like China into adopting "comparable" climate policy would seek to bring about a substantial change in government behavior with extremely limited economic leverage. Chinese exports to the United States of the five carbon-intensive goods included in this study amounted to only $3.5 billion in 2005, less than 0.2 percent of the country's economic output. Even exports of these goods to all countries accounts for only 1 percent of China's GDP. Given that the cost of climate policy "comparable" to that under consideration in the United States would almost certainly exceed this amount, it is unlikely that the threat of losing market access for these goods would be enough to jawbone Beijing into taking steps it otherwise would not.

Moreover, the threat of sanctions in the past on an even wider array of Chinese goods than the carbon-intensive products discussed here made little headway in changing Beijing's behavior. A number of legislative proposals and trade petitions aimed at coercing China into appreciating its currency, the renminbi, against the US dollar have thus far failed to achieve the desired result. One bill, sponsored by Senators Charles Schumer and Lindsey Graham, would have imposed a 27.5 percent tariff on all imports from China. Beijing correctly predicted that, given its economic consequences for US business and consumers, such legislation was unlikely to pass. If it did, Beijing was confident that an administration that relies on Chinese help in foreign policy issues like international terrorism, North Korea, and Iran would veto the bill. If US climate policy included the possibility of imposing trade measures on Chinese goods, Chinese leaders would likely be similarly confident that the administration would ultimately stop short of using them.

tion. But to translate that political momentum into a meaningful policy commitment, the industrialized world will be more successful engaging China and other large developing counties through inducement rather than threat. The next chapter addresses scenarios for coordinated international action, both in terms of curbing greenhouse gas emissions and addressing industrial competitiveness concerns.