Climate Policy and Competition: U.S. Industry's Regulatory Dilemma

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The potential scale of impacts and the range of industries affected by domestic climate regulation are unprecedented in the history of U.S. environmental regulation. Pricing carbon emissions, via either a cap-and-trade system or an emissions tax, will affect electricity and primary energy producers, and it will hurt the competitive performance of certain downstream energy-intensive, import-sensitive users of fossil fuels, such as steel and chemical producers. This gives rise to two overarching concerns:

First, a small but prominent subset of domestic companies may be disproportionately harmed if domestic carbon policies affect their operations without corresponding controls on carbon from trading partners around the world.

Second, some environmental benefits will be eroded if increases in U.S. manufacturing costs cause production to shift to nations that have weaker greenhouse gas policies or none at all.

Addressing these issues is difficult, and policymakers are working with a paucity of data on specific industry-level impacts of carbon-mitigation policy choices. To help inform the ongoing discussion of competitiveness issues, RFF researchers Mun Ho, Richard Morgenstern, and Jhih-Shyang Shih recently completed a detailed analysis of the impacts of a $10-per-ton price on carbon dioxide emissions (CO_2) on domestic industries in more than 50 industrial categories (see the chart on page 6).

The most common approach to assessing the impact of carbon-control policies is to focus on the long-run impacts, after firms have adjusted by using new energy-efficient technologies and new import patterns have been established. Such analysis, however, fails to capture an important part of the story—the short-run costs that most firms will experience. A chemical or steel plant suddenly faced with higher energy costs cannot immediately or costlessly be retrofitted to rely on more energy-efficient methods. A policy that ignores the initial impacts will raise concerns about fairness and invite opposition, while plans suitable for the short term may not serve the economy well as time passes.

To paint a full picture, Ho, Morgenstern, and Shih employ four different modeling approaches in order to consider outcomes along four different time scales:

- The very short run, when firms cannot adjust prices and profits fall accordingly.
- The short run, when firms can raise prices to reflect the higher energy costs, with a corresponding decline in sales as a result of product or import substitution.
- The medium run, when in addition to the changes in output prices, the mix of inputs may also change, but capital remains in place, and economywide effects are considered.
- The long run, when capital may be reallocated and replaced with more energy-efficient technologies.

The Findings

In modeling various industrial sectors across different time horizons, the analysis yields a number of observations. They include:

Looking at the economy as a whole, the impacts are relatively modest from the type of carbon policies currently under discussion. At the same time, some industries are clearly affected more than others.

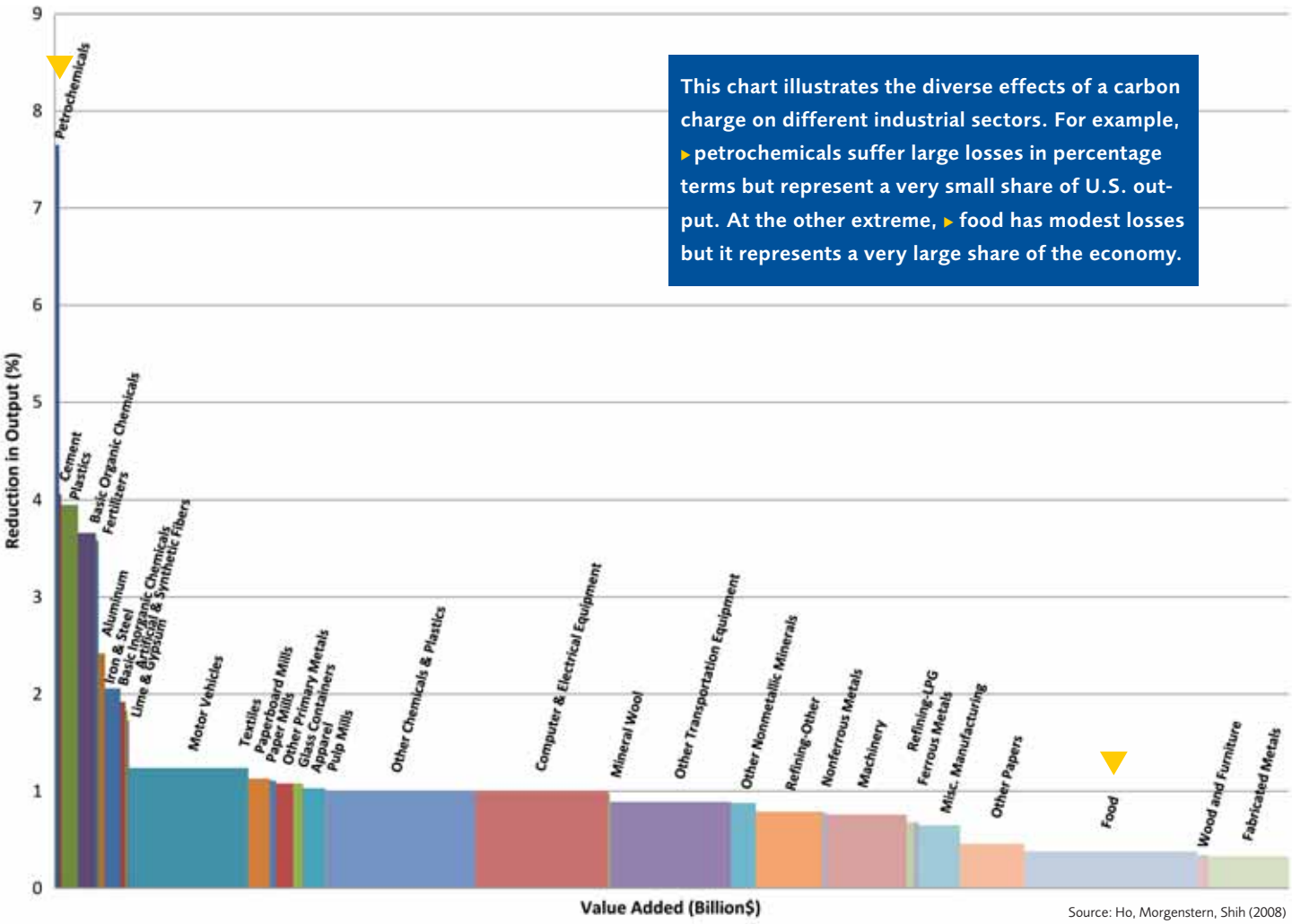
Measured by the reduction in domestic output, a readily identifiable set of industries is at greatest risk of contraction over both the short and long terms. Within the manufacturing sector, industries that will be hardest hit are petroleum refining, chemicals and plastics, primary metals, and nonmetallic minerals.

Although the short-run output reductions are relatively large in these industries, they tend to shrink over time as firms adjust inputs and adopt new technologies. The industries that continue to bear the impacts are generally the same ones affected initially, albeit at reduced levels. When measured in terms of reduced profits, the rebound is especially large and, for some industries, virtually complete.

Focusing on the nearer-term timeframes, the largest cost increases are concentrated in particular segments of affected industries. For example, petrochemical manufacturing and cement see very short-run cost increases of more than four percent from a modest charge of $10 per ton of carbon dioxide, while iron and steel mills, aluminum, and lime products see cost increases exceeding two percent.

In nonmanufacturing companies, the overall size of the production losses also declines over time, although a more diverse pattern applies. The impact on electric utilities, for example, does not

Effect of a $10 per ton CO_2 charge on industry
(percent change in output and employment)



Source: Ho, Morgenstern, Shih (2008)

substantially worsen over time compared to industries such as mining, which experiences a continuing erosion of sales as broader adjustments occur throughout the economy. Agriculture faces modest but persistent output declines over time, while the service sector is largely unscathed across all timeframes.

In terms of employment, short-term job losses are proportional to those of output. Over the longer term, however, when labor markets are able to adjust, the remaining, relatively small losses are fully offset by gains in other industries.

Leakage across Borders

A unilateral approach—in which the United States takes the first step by establishing a price for carbon—could lead to the problem of "leakage." If in response to the policy, production shifts overseas to nations that have weaker or non-existent policies, environmental gains in the United States will be offset by increased activity elsewhere.

The Ho, Morgenstern, Shih study shows that over the long term, the leakage rate for the most vulnerable industries can be as high as 40 percent or more. In many cases, much of the carbon reduction that regulators achieve domestically ends up reoccurring offshore. When a steel mill in the United States loses orders and cheaper mills in China—where standards are more lenient—take up the slack, we haven't done anything to cut the release of carbon into the Earth's atmosphere.

Importantly, the displacement of production is not the only source of carbon leakage from unilateral policies. A large-scale withdrawal of demand for carbon-intensive energy from the United States will drive down fossil fuel prices globally and expand consumption elsewhere. For example, coal will become cheaper, making electricity and steel in China less expensive and more carbon intensive. This driver of leakage can only be addressed by ensuring that all major international players take on comparable carbon policies and prices.

Still, while leakage related to production shifting may be only part of the problem, little can be gained by allowing domestic industries to contract if the accompanying emissions reductions are merely offset abroad.

Policy Tools

Efforts to ameliorate the leakage and competitiveness problems are being considered in Congress and by the Obama administration. In general, cost-effective policies that allow access to inexpensive mitigation opportunities throughout the United States and potentially around the world will minimize the economic costs of achieving any given emissions target and could be viewed as a first response to competitiveness concerns. Beyond that, policymakers have a number of options at their disposal to address these challenges, including:

- weaker overall program targets,
- partial or full exemptions from the carbon policy for some sectors,
- standards instead of market-based policies for some sectors,
- free allowance allocation under a cap-and-trade system, and
- trade-related policies, including some form of border adjustment for energy- or carbon-intensive goods.

A weaker overall policy—less-stringent emissions caps and lower emissions prices—represents the least focused approach available for addressing competitiveness impacts. It has an advantage that policymakers do not have to identify vulnerable sectors or firms, by avoiding a "gold rush" of industries seeking relief. The clear disadvantage is that less ambitious emissions-reduction targets will produce smaller environmental benefits and weaker incentives for technology innovation.

Simply exempting certain sectors or types of firms provides a direct response to competitiveness concerns and the most relief to potentially affected industries, but it is also the most costly option in terms of reducing the economic efficiency of the policy.

More traditional (non-market-based) forms of regulation, such as emissions standards or intensity-based regulations, can be used to avoid direct energy price increases and deliver some emissions reductions. Regulated industries will still face compliance costs, but not the added burden of allowance purchases for their remaining emissions. However, the overall cost to society of achieving a given environmental objective using these forms of regulation will tend to be higher than under an economywide pricing policy.

Pending legislation has focused mostly on the last two options: free allowance allocation and trade-related policies. In the case of free allocation, the emphasis is on updating allocations on the basis of current output. This is in contrast to a fixed allocation tied to historic emissions as was used in Title IV of the Clean Air Act. A recent paper by RFF researcher Carolyn Fischer and co-author Alan Fox examined several variations of these options, including a border adjustment for imports from countries without "sufficient" regulation; border relief for exports; a full border adjustment for both imports and exports; and domestic-production-based rebates in the form of an updating allowance allocation tied to current output.

However, they find that for most U.S. sectors, a full border adjustment (both imports and exports) is most effective at reducing global emissions. When border adjustments are limited (such as for reasons of WTO compatibility) to the domestic emissions rate or lower, a domestic rebate can be more effective at limiting emissions leakage and encouraging domestic production.

Two of the caveats that apply to these findings are as follows. First, although an emissions cap can be effective in limiting domestic emissions, awarding additional allowances to certain sectors to compensate for competitiveness concerns will tend to raise allowance prices overall and shift costs among sectors. In particular, it is not advised for energy-producing sectors like electricity or petroleum refining, where conservation should be encouraged as a cost-effective means of reducing emissions. Second, border adjustments or other trade-related policies risk providing political cover for unwarranted and costly protectionism and may provoke trade disputes with other nations.

In general, sector-specific policies are more difficult to implement and can require hard-to-obtain data. Further, they create incentives for individual industries to seek special protection even if they are not at significant competitive risk. Nonetheless, there is a real prospect that a unilateral domestic carbon mitigation policy will cause adverse impacts on energy-intensive, import-sensitive industries. Thus, some policy response seems warranted. ■

This article is based on two RFF discussion papers: "Comparing Policies to Combat Emissions Leakage: Border Tax Adjustments versus Rebates" by Carolyn Fischer and Alan K. Fox, RFF DP 09-02; and "The Impact of Carbon Price Policies on U.S. Industry" by Mun Ho, Richard D. Morgenstern, and Jhih-Shyang Shih, RFF DP 08-37. See also, "Addressing Competitiveness Concerns in the Context of a Mandatory Policy for Reducing U.S. Greenhouse Gas Emissions" by Richard D. Morgenstern in *Assessing U.S. Climate Policy Options* (Raymond Kopp and William A. Pizer, eds), RFF Report, November 2007.

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