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US INDUSTRY AND

CAP-AND-TRADE:

DESIGNING PROVISIONS TO MAINTAIN DOMESTIC COMPETITIVENESS AND MITIGATE EMISSIONS LEAKAGE

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This paper is the fifth in a five paper series on US cap-and-trade design

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Introduction

The potential range of affected sectors and the scale of impacts on domestic industries that would result from economy-wide climate legislation are unprecedented in the history of US environmental regulation. Even a cursory consideration of how the balance sheets of American companies would be impacted by a price on their greenhouse gas emissions reveals the complexity of designing evenhanded domestic climate policies.

Pricing carbon emissions, either through a cap-and-trade system or an emissions tax, will not only adversely affect electricity and primary energy producers, but it will also hurt the competitive performance of heavy fossil-fuel users in downstream industries, especially in trade-exposed sectors such as steel and chemicals.

This gives rise to two overarching concerns. First, a small but prominent subset of domestic companies may be disproportionately burdened if carbon mitigation policies affect their operations but not those of their international competitors. Second, some of the environmental benefits might be eroded if increases in US manufacturing costs from uneven international carbon pricing caused economic activity to shift to nations with weaker greenhouse gas mitigation policies or none at all.

This paper reviews the evidence on the competitiveness burdens imposed on domestic energy-consuming industries as a result of a unilateral or near-unilateral carbon pricing policy. We also examine the nature and magnitude of emissions leakage that could undermine the environmental effectiveness of such a policy. Subsequently, we analyze a range of options designed to address these concerns, with particular emphasis on the measures included in the American Clean Energy and Security Act of 2009 (ACESA). Overall, we find that this bill adopts a quite reasonable approach to the multiple challenges involved, although we do identify a number of possible refinements that might be considered as parallel legislation is discussed in the Senate.

Estimating Competitiveness Impacts

Competition from imports and consumers' ability to substitute other, less carbon-intensive alternatives for a given product will effectively determine the ultimate impacts of carbon pricing on domestic production and employment. However, policymakers are hampered in their ability to respond to these outcomes by the paucity of data on specific industry-level impacts of carbon mitigation policy choices.

Aldy and Pizer (2009) conduct one of the few empirical studies of energy-related competitiveness impacts. Since many energy price movements are global in nature, they examine the effects of changes in the price of electricity, which is an important input in many industries, but one that is more tightly tied to domestic factors and less likely to affect trade partners. Aldy and Pizer evaluate 400 different domestic industries to see how they respond to changes in their individual electricity prices, relative to average domestic trends. Based on these empirical results, they simulate the effects of a carbon price of $15 per ton of carbon dioxide (CO_2) and find that only a portion of lost production is due to changes in trade flows associated with international competitiveness. Among the energy-intensive manufacturing industries, roughly 30-50% of the production response to energy price increases results from changes in net exports, with the remainder reflecting reduced demand by final domestic consumers or by other domestic users of the products. Using different simulation models, Fischer and Fox (2009) and Ho et al. (2008) find similar results.

The distinction between changes in domestic demand and net exports is important when examining the effect of climate policy on industrial output. Reductions in output that derive from lower domestic consumption reflect conservation and shifting to less carbon-intensive substitutes, both cost-effective ways of meeting the carbon cap. However, output reductions resulting from changes in competitiveness reflect a shift to foreign production, which, in turn, contributes to increased carbon emissions abroad, or so-called emissions "leakage." While lost production and jobs are always a source of concern, policy prescriptions differ based on the driver: Output reductions associated with declines in domestic demand may require transitional assistance, while lost production made up by increased foreign output indicates a need for measures to address the structural cost disparities introduced by uneven international climate policy.

Distinguishing between the immediate and long-run impact of a carbon policy is also extremely important. A policy that ignores the initial impacts will raise concerns about fairness and invite opposition, whereas plans suitable for the short-run may not serve the economy well as time passes.

The most common approach to assessing the impact of carbon policies is to focus on the long-run impacts, once firms have adjusted by deploying new energy-efficient technologies and new import patterns have been established (e.g., Jorgenson et. al., 2007; Fischer and Fox, 2007, 2009). Such analyses, however, fail to capture an important part of the story, namely 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 use more energy-efficient methods.

To paint a more complete picture, Ho et al. (2008) provide a series of analyses, focusing on the impacts of a \$10 per ton CO_2 price on domestic industries in more than 50 industrial categories. They employ different modeling approaches in order to consider outcomes on four different timescales:

- The very short-run, when firms cannot adjust prices, and profits fall accordingly;
- The short-run, when firms can raise prices to reflect 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 economy-wide effects are considered; and
- The long-run, when capital may be reallocated and replaced with more energy-efficient technologies.

In modeling various industrial sectors across different time horizons, the analysis yields a number of observations. First, 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-run. Within the manufacturing sector, sectors such as chemicals and plastics, primary metals and nonmetallic minerals are hit the hardest.

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. That is, the same sectors continue to bear the impacts over time, but at reduced levels. In fact, when measured in terms of profits, the rebound is especially large and, for some industries, virtually complete. In addition, the largest cost increases in the short-run are concentrated in particular segments of affected industries. For example, petrochemical manufacturing and cement experience very short-run cost increases of more than 4% from a charge of \$10 per ton of CO_2, while iron and steel mills, aluminum and lime products experience cost increases exceeding 2%.

In the nonmanufacturing sector, the overall size of production losses also declines over time, but a more diverse pattern emerges. The impact on electric utilities, for example, does not 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 timescales.

In terms of employment, short-run job losses are proportional to those of output. Over longer periods, when labor markets are able to adjust, the models assume that the remaining, relatively small losses are fully offset by gains in other industries, although wage levels may shift as a result of new relative price levels.

Quantifying Emissions Leakage

Emissions "leakage" associated with domestic climate policy is conventionally defined as the increase in all foreign emissions from a given sector, divided by the reductions from that sector at home. It is a consequence of the current unilateral approaches in which countries like the United States and Europe take their own first steps by establishing a domestic price for carbon in the absence of a global agreement. In time, most experts agree that the best response to leakage would be a binding international agreement that would align carbon prices across different regions. Although the United States and Europe are two of the largest carbon emitters, they still represent only about 40% of global emissions. Eventually the rest of the planet must play the same game, or industries in the US and EU will face a significant competitive disadvantage.

Leakage estimates vary across models and sectors, but some models indicate considerable leakage rates for certain sectors. For example, in the cement industry, Ponssard and Walker (2008) find that the EU Emissions Trading System (ETS) is likely to induce significant emissions leakage through increased imports and production relocation. Gielen and Moriguchi (2002) simulate the effects of a carbon price on the Japanese iron and steel industry and find leakage rates of 70%. In general equilibrium studies of multiple sectors, Ho et al. (2008) and Fischer and Fox (2009), using similar GTAP-based trade models, find that, over the long-run, leakage rates for the most vulnerable industries can be as high as 40% or more.[1]

While it is difficult to project the magnitude of leakage, it is useful to understand how different drivers of leakage play different roles across sectors. In general, changes in emissions resulting from the imposition of a carbon price can be divided into two components: changes in emissions intensity and changes in production. This characterization applies equally to emissions leakage and to domestic emissions reductions.

Domestically, many reductions are achieved by changing fuels, improving energy efficiency, and deploying new technologies and techniques to reduce the emissions intensity of production. Other reductions are achieved by consuming less of the goods whose production leads to emissions. While some of this lost production may represent cost-effective conservation or substitution to less carbon-intensive goods, it may also reflect a shifting or displacement of consumption from goods manufactured in regulated regions to goods manufactured in unregulated regions.

[1] GTAP is the Global Trade Analysis Project. For more information, see <https://www.gtap.agecon.purdue.edu/>.

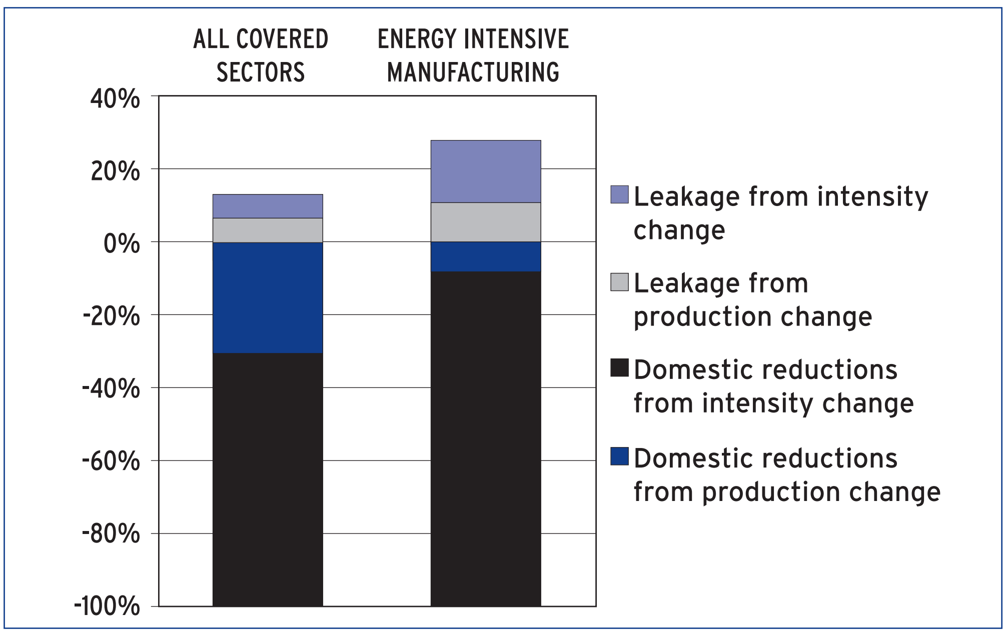
For leakage as well, changes in emissions intensity can be as or more important than the displacement of production. Large-scale withdrawal of demand for carbon-intensive energy from Europe or the United States will drive down fossil fuel prices globally and expand consumption elsewhere. For example, international coal prices will decline, making electricity and steel both less expensive and likely more carbon-intensive in China. As a result, foreign emissions attributed to these sectors will likely rise, even without any shifting in production.

Figure 1 from Fischer and Fox (2009) illustrates the relative importance of these sources of emissions changes by sector, using a scenario in which a $50 per ton C price is imposed on major covered sectors in the US.[2] For covered sectors generally, production changes represent an important source of domestic emissions reductions, one that is much larger than the leakage attributed to foreign production changes. However, for energy-intensive manufacturing specifically, not only is overall leakage higher, but the leakage due to changes in foreign production is actually larger than domestic reductions from production changes.

Leakage due to changes in foreign emissions intensity can only be addressed by ensuring that all major international players take on comparable carbon policies and prices. At the same time, while leakage related to production shifting may be smaller than that related to changes in emissions intensity, little can be gained by domestic emissions reductions via lower production if that production is merely offset abroad.

Figure 1

Changes in emissions from intensity or production changes, as a percentage of domestic sector reductions. These particular results represent the impacts of a $50 per ton C (~$14 per ton CO_2) price on major covered sectors in the US, as found by Fischer and Fox (2009)



[2] These sectors include electricity, refineries and energy-intensive manufacturing. Note that $50 per ton C is approximately equal to $14 per ton CO_2.

Policy Options

In general, use of an economic incentive-based policy with very broad coverage, such as the approach adopted in ACESA, can be viewed as a first response to competitiveness concerns. Taking advantage of inexpensive mitigation opportunities throughout the United States and potentially around the world will minimize the economic costs of achieving any given emissions target and keep carbon prices low. Beyond that, policymakers have a number of options at their disposal to address emissions leakage more directly—at least the portions associated with competitiveness.

One of the most prominent—and controversial—proposals is to employ trade-related measures to ensure that imports coming into a regulated country face comparable carbon prices on their associated emissions. Similarly, exports from a regulated country could have their emissions costs rebated. These border adjustments effectively ensure that domestic carbon is priced on a consumption, rather than production basis, putting imports and exports on an equal footing. However, many legal experts fear that border adjustments may not be compatible with World Trade Organization (WTO) obligations or may have to be weakened to be made so (see, e.g., Charnovitz et al., 2009; Pauwelyn, 2007). Others voice concern that unilateral trade measures could poison future climate negotiations (Houser et al., 2008) or trade relations (ICTSD 2008).

Another option for mitigating emissions leakage is to partially or fully exempt certain sectors or types of firms. Some theoretical justification exists for this when other options (like border adjustments) are not available (Hoel, 1996). Exemption provides a straightforward response to competitiveness concerns by relieving potentially affected industries of all direct burdens, but it is also economically inefficient. Many of the targeted industries have ample opportunities to reduce their emissions intensities, and exemption from the carbon price signal foregoes these cost-effective opportunities. As a result, exemptions require a higher carbon price to meet a given emissions reduction objective. While Babiker (2005) finds that exemptions can sometimes prevent more leakage than import adjustments, he also finds that most countries would be better off with tariffs due to the higher carbon prices required to meet equivalent reduction targets.

Instead of complete exemption, 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 would still be higher than under an economy-wide pricing policy.

Output-based rebating of emissions allowances offers an opportunity to keep vulnerable sectors under the cap while offsetting their production cost increases. This type of free allocation, with updating on the basis of recent output, stands in contrast to a fixed allocation tied to historical emissions, the mechanism that was employed in Title IV of the Clean Air Act and in the EU ETS.[3] With updating, firms that increase production also receive greater free allocation of allowances, which provides motivation to maintain production levels. Importantly, the per-unit allocation is not based on the firm's emissions, but on a sector-based intensity standard, such as average emissions or best practices, or something in between.

Under this type of policy, the ability to trade under the cap ensures greater cost-effectiveness. In essence, the carbon price remains in place to signal efficiency improvements, while the rebates prevent operating costs from rising too high, which keeps the playing field level both at home and abroad. However, the use of rebates to avoid competitiveness impacts does come at the expense of opportunities to reduce comsumption of emissions-intensive goods. In addition, the rebates themselves may raise WTO compliance issues under the Subsidies Code, which disciplines the use of subsidies and regulates the actions countries can take to counter the effects of subsidies.

A final option is to adopt a weaker overall policy—less stringent emissions caps and/or lower allowance prices—that would have smaller cost impacts. A variant of this approach would allow uncapped sources, either domestic or foreign, to sell offsets into the capped system. Both the weaker policy and the offsets options have the advantage that policymakers do not have to identify vulnerable sectors, thereby avoiding the potential for a "gold rush" of industries seeking relief. However, the environmental benefit of using offsets from uncapped domestic or international sources is difficult to determine.

The clear disadvantage of these policies is that less ambitious emissions reduction targets or lower domestic allowance prices will yield smaller environmental benefits and provide weaker incentives for technology innovation in the capped sectors. Interestingly, the EU has set (and Australia is proposing) two tiers of targets, with the more stringent target conditional on the ratification of a multilateral agreement. The offer to strengthen targets is intended to induce other countries to step up their efforts as well.[4]

In addition to allowing the use of domestic and international offsets, pending legislation has focused mostly on output-based rebating and trade-related, border adjustment policies. However, both of these have important legal, economic, and practical tradeoffs. Fischer and Fox (2009) find that while both promote domestic production to some extent, neither will *necessarily* reduce leakage effectively in a given sector, relative to evenly applied carbon pricing. While they both mitigate increases in foreign emissions, they also lessen the reductions in domestic emissions by preserving US production in those sectors. Output-based rebating does this directly by subsidizing all domestic production; export rebates subsidize production destined for foreign markets. Rigorous assessment of the alternatives is not possible without detailed information on the relative responses of domestic and foreign producers to carbon price changes and on the relative emissions intensity of production at home and abroad.

Using plausible values for these parameters, Fischer and Fox find that for most US sectors,

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[3] For a discussion of allowance allocation more generally, see Morris (2009).
[4] For a broader discussion of domestic emissions targets, see Mignone (2009).

a full border adjustment (for both imports and exports) is most effective at reducing global emissions. As one might expect, border adjustments preserve the domestic price signal for conservation, and also maintain competitiveness vis-à-vis foreign producers. But when border adjustments are limited (such as for reasons of WTO compatibility) to a weaker, uniform standard (e.g., the domestic emissions rate or a best practices standard), or applied to imports alone, Fischer and Fox find that the domestic rebate can be more effective at limiting emissions leakage, as well as encouraging domestic production.

Two caveats are especially notable. 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. This 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, under more targeted policies (that is, all options noted above except an overall weaker policy), individual industries will have incentives to seek special protection by taking advantage of the available mechanisms without necessarily being at significant competitive risk. Nonetheless, there is a real possibility that unilateral carbon policy will have undue impacts on domestic energy-intensive, import-sensitive industries. Thus, some policy response seems justified.

Current Proposals

In June 2009, the US House of Representatives passed H.R. 2454, the American Clean Energy and Security Act. Sweeping in scope, ACESA would establish a GHG emissions cap-and-trade system within the United States designed to reduce domestic emissions approximately 80% below 2005 levels by 2050. Along with the cap-and-trade system, the bill would also establish renewable energy standards, a major offset market for regulated entities, and programs for reducing deforestation in the developing world. While climate legislation is currently under discussion in the Senate, the Obama administration is pushing hard for passage of legislation prior to the Conference of the Parties (COP) negotiations in Copenhagen in December.

Several provisions in the bill have been designed specifically to address concerns over competitiveness and leakage, and other provisions are broadly relevant to these issues. These include:

- A system of rebates designed for eligible sectors deemed most vulnerable;
- Border adjustments in later years, which may be introduced for imports in eligible sectors from certain countries; and
- General cost containment measures, including offsets and a strategic reserve pool of allowances, as well as indirect allocation to the electricity sector to contain the magnitude of rate increases faced by consumers.

In the remainder of this section, we address each of these provisions in turn.

Output-based Rebates and Border Adjustments

ACESA directs the administration to identify specific subsectors that are most vulnerable to carbon leakage, that is, those that face stiff competition in global markets and risk incurring significant cost increases as a result of carbon pricing, if other policies are not adopted. Eligible energy-intensive, trade-exposed ("EITE") sectors are then given preferential treatment in the form of allowance allocations and ultimately import protection.

Specifically, the criteria for eligibility are sectors that are at least 5% energy or carbon intensive *and* 15% trade intensive. Additionally, sectors that are more than 20% energy (or carbon) intensive are also presumptively eligible. Energy (or carbon) intensity is measured by the value of energy costs (or carbon costs at a $20 per ton CO_2 price) as a share of the total value of shipments in that sector. Although the carbon intensity metric is likely to be a better indicator of cost increases, energy intensity is easier to calculate for some industries.

Energy intensity is likely to represent an easier basis on which industries can qualify for the program. Trade intensity is calculated as the value of imports and exports as a share of the value of total production plus imports. Ideally, one would want to measure trade sensitivity—how much imports and exports change due to a domestic price change—but those metrics are not readily available.

Eligible sectors are to be granted emissions allowances in the form of production rebates—essentially output-based allocation, as opposed to the grandfathering that was used in the US Acid Rain program and in the EU ETS. The legislation directs the Administrator of the US Environmental Protection Agency (EPA) to develop a benchmarking methodology to estimate average emissions, both direct and indirect, per unit of output for each eligible sector. For at least 10 years after the cap is fully implemented, these sectors receive 100% of this average for each unit of production. However, the total allocation is limited to 15% of the cap, so as the cap declines, the rebate allocations may be reduced. Refineries are not eligible for production rebates, although they are granted a significant number of free allowances without regard to current output levels (see below).

Meanwhile, if a multinational climate accord is not in force by 2018, the legislation directs the administration to notify trade partners that an International Reserve Allowance Program (IRAP) will be implemented, unless the President deems it unnecessary. Under the program, imported products from eligible sectors would have to purchase emissions allowances according to their carbon intensity (with that metric to be defined by the Administration). Eligible sectors are the same EITE manufacturing sectors as the rebate program, although certain trade-exposed manufacturers of products requiring many of those materials can also petition for protection.

Border adjustment for exports is not provided. Import protection continues as long as less than 85% of imports for that sector are produced in countries that meet at least one of the following criteria:

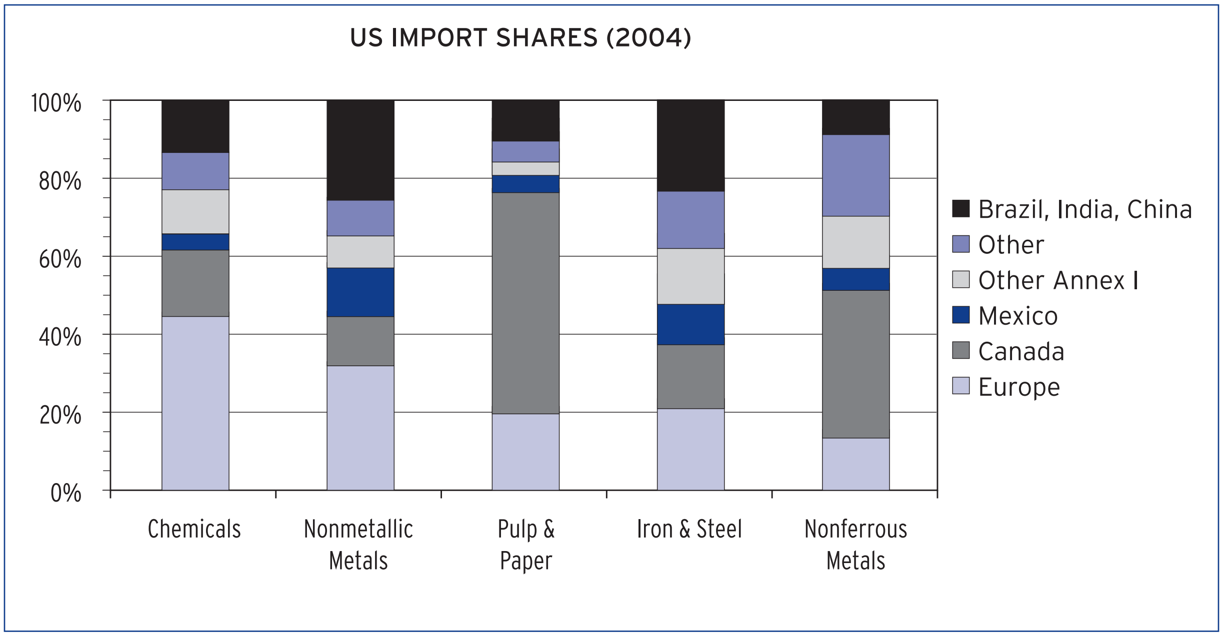
- The country is a party to an international treaty to which the US is a party and includes a nationally enforceable emissions reduction commitment that is at least as stringent as that found in the US;
- The country is a party to an international agreement for that sector to which the US is a party; or
- The country has an annual energy or GHG intensity for that sector that is equal to or less than that of the US.

Figure 2 presents recent import shares by major region or partner for the EITE sectors. However, imports from certain countries are exempt from the program, including least developed countries, small countries that represent less than 0.5% of global emissions and 5% of imports in that sector,[5] and countries with emissions regulation of comparable stringency. Thus, only a few recalcitrant and developing countries would likely be targets of the IRAP, should it be implemented. Furthermore, the border adjustment only occurs to the extent that the allowance requirement exceeds the rebate that is still afforded domestic industry.

[5] According to EIA's *International Energy Outlook 2006*, the countries currently responsible for more than 0.5% of global emissions include Mexico, Argentina, Brazil, Venezuela, South Africa, China, India, Indonesia, and Bangladesh, as well as many of the oil-producing countries and Ukraine.

Figure 2

US import shares by major region or partner for the EITE sectors



From 2026-2035, the rebates phase out by 10% each year, unless the President deems them to still be necessary. Thus, the intention of Congress is to phase from the rebate program to border adjustments to deal with leakage, although the administration has some discretion between them. The phaseout for rebates restarts if at any point more than 85% of imports for that sector come from compliant or less carbon-intensive countries.

Broader Cost Containment Measures

Competitiveness impacts are directly related to the magnitude of the cost increases associated with carbon policy. Thus, provisions to limit cost increases (or more specifically, allowance prices) complement specific border adjustment and rebate provisions. ACESA includes a number of specific cost containment measures, including:

- Allowance banking and borrowing to increase the temporal flexibility of the policy;
- A strategic allowance reserve to cushion against dramatic increases in allowance prices; and
- Domestic and international offsets programs to encourage low-cost project-based emissions reductions from uncapped sources.

The banking and borrowing provisions are intended to smooth allowance prices over time, by linking current prices to future opportunities. ACESA allows unlimited allowance banking and the ability for individual firms to borrow up to 15% of their annual emissions, subject to an 8% annual interest rate.

The strategic allowance reserve is designed to cushion against dramatic increases in allowance prices stemming from unanticipated changes in economic activity, weather, fuel prices, technology development or other factors. It would be "filled" by initially withholding 1% of the allowances allocated in years 2012-2019, 2% of the allowances from years 2020-2029, and 3% of the allowances from years 2030-2050.

In addition, reserve auction sales would be subject to a minimum (reserve) price, designed to make the allowances attractive only in the event of a significant escalation of prices. For the first year of the program the reserve price would be $28 per ton CO_2. The second-year price reserve would rise by 5% above the rate of inflation. Thereafter, allowances may be sold at a 60% premium above the rolling average three-year price. The maximum reserve sales in the first five years of the program are set at 5% of the national cap. Beginning in 2017, maximum sales rise to 10% of the total cap.

By contrast, the offsets provisions are designed to moderate allowance prices by expanding low-cost opportunities for reductions from uncapped sources. Under the domestic offsets provisions, uncapped domestic sources can sell offset credits on the basis of specific programs to be established by the EPA and the Department of Agriculture. These programs are to be based on emissions reduction or sequestration projects, with rules to be issued on additionality, baselines, monitoring and measurement protocols, enforcement and other issues. Domestic offsets are capped at one million tons per year.

International offsets based on emissions allowances from international programs designated as "qualifying" by the EPA represent both a cost containment mechanism for the US system and a mechanism to incentivize reductions abroad. An international program would qualify only if it imposed an absolute tonnage limit on one or more sectors and is at least as stringent as the US cap-and-trade program in terms of monitoring, enforcement and related factors. International emission reduction or sequestration credits would only be recognized if an appropriate bilateral or multilateral agreement with the host country exists.

Until 2018, international offsets are to be treated on an equal footing with domestic offsets. Beginning in 2018, international offsets are discounted by 25%. International offsets are capped at one million tons per year, although the President has the discretion to increase the limit to 1.5 million tons in the event that sufficient domestic allowances are unavailable.

Considering these cost containment provisions along with all the other elements of the bill, both the US EPA and the Energy Information Administration (EIA) have developed estimates of allowance prices under ACESA. The EPA estimates range from $13-24 in 2015 and $16-30 in 2020. EIA estimates range from $20-91 in 2020 and $40-186 in 2030 (EIA 2009; EPA 2009). A key question in both the EPA and the EIA analyses is the extent to which the strategic reserve and the domestic and international offsets provisions will be effective in holding down allowance prices.

Beyond the measures included in ACESA, several additional cost containment options have been proposed, including a "safety valve" (e.g., Kopp et al., 1997; Pizer, 2002) that would provide an upper bound on allowance prices or a "symmetric safety valve" (also known as a "price collar") that would limit allowance prices on both the upside and the downside. Recent analyses of this latter mechanism (e.g. Phillbert, 2008; Burtraw et. al., 2009; Fell and Morgenstern, 2009) find that the restrictions imposed on banking and borrowing of the type contained in ACESA can be costly. Adding a price collar to the reserve borrowing proposal can reduce costs and thereby reduce competitiveness impacts, while preserving the same expected emission reductions.[6]

6 For further discussion of cost containment options, see Mignone (2009b).

Remaining Controversies

Not surprisingly, many of the policies designed to address competitiveness introduce additional complexities. This section discusses some of the more controversial issues.

Over-allocation

Arguably, the EITE sector allocations may be too generous, at least in the early years. One concern relates to the criteria for eligibility. The 5% GHG intensity criterion essentially asks whether costs go up at least 5% for these sectors if CO_2 prices rise to $20 per ton. This is one reasonable measure of cost burden. However, in the likely event that many industries become eligible on the basis of the alternative (energy intensity) metric, under which expensive natural gas purchases are valued equally with cheap (but more carbon-intensive) coal, many of the presumptively eligible sectors would have GHG intensities considerably below 5%, perhaps as low as 2%.[7]

Second, allocating 100% of average sector emissions may raise concerns with our trade partners. Any firm in the sector with below-average emissions then receives a net subsidy from the climate policy. Indeed, recent EPA analysis has estimated that the output-based rebating will more than fully offset the production losses that would otherwise occur in the early years of the program (EPA 2009). This benchmarking contrasts with the EU plan, which looks at the top 10% of performers within a sector. Similarly, the Australian proposal offers rebates of 60-90% of emissions intensities. Arguably, the situation changes in later years, since the declining cap will likely drive average allocations below 100% anyway, due to the 15% constraint on EITE allocations. Thus, one reform option is a modest "haircut" in early years that would eliminate overcompensation and help avoid trade disputes, but not reduce allocations in later years when targets become more stringent.

A further concern is the phaseout schedule for the EITE rebates. It appears that the rebates may be designed to remain in place longer than necessary to compensate for competitiveness impacts. The phaseout starts in 2025, although the border adjustment provisions—which apply to the same sectors—take effect in 2020. The rebates can also be extended, in which case they begin to phase out once 85% of imports are from compliant or lower-emitting countries. It is legitimate to ask whether having only 15% of trading partners without comparable policies poses enough risk of leakage to justify sector-wide subsidies.

[7] Unpublished US EPA analysis.

It should also be recognized that managing the rebate system will be challenging. Even at the highly disaggregated level of 6-digit North American Industry Classification System (NAICS) code as a sector definition, the products are not all uniform within a sector. For example, one sector is "all other basic organic chemicals." The choice of units for defining the output upon which the rebates are based can be very important, and metrics like weight or value can have different implications across products. If rebates are based on the energy-using activities themselves, some of the environmental effectiveness of the carbon price signal will be muted.

Similar effects may occur in sectors that are highly concentrated, with just a few players; if the average emissions benchmarks are updated, these firms will recognize that reducing their own emissions lowers their allocation. Thus, the creation of distorting incentives and inappropriate subsidies is a real possibility. An alternative to updating the emissions benchmarks is simply to define an expected path of improvements from the baseline benchmark, which not only avoids the problems with concentrated industries but also helps address the problem of over-allocation. The legislation includes periodic reviews of sector eligibility, cost changes, and the program's effectiveness in reducing leakage; more explicit consideration of cost-effectiveness seems appropriate.

Allocation to Electricity and Refining Sectors

ACESA provides allocations to the electricity sector that function like the rebates in EITE sectors. Allowances are distributed to the load distribution companies (LDCs), which are regulated, with the stipulation that they be used to keep electricity rates low. For the EITE sectors, this system does little to improve competitiveness, since the measures of indirect emissions must account for these allocations. Meanwhile, keeping electricity rates low mutes the carbon price signal that conserving electricity is valuable, raising the overall cost of the program. The resulting upward pressure on carbon prices only serves to increase the cost burden on other sectors, including those for which competitiveness and leakage are real concerns (Burtraw et al., 2009b).

Another challenge is dealing with the refining sector. First of all, it is difficult to predict the likely impacts of carbon pricing on trade in refined products. Traditionally, local supplies have dominated, since transporting crude is cheaper than transporting refined products long distances, and since many mandates for gasoline formulations are region-specific. The existing trade in refined products has focused on the reallocation of excess supplies; oil is always refined into a variety of products, so the US sends its extra diesel to Europe, which sends back gasoline, keeping supplies better aligned with demand in both regions. Although trade in refined products, particularly gasoline, has historically been less sensitive to cost changes than EITE sectors, it is possible that the cost differential implied by significant carbon prices could be substantial enough to trigger stronger trade responses.

In the current legislation, refineries are given lump-sum allocations of 2.25% of the cap, a bit less than half their share of production-related emissions, which are roughly 5% of covered emissions.[8] The allocation is intended to compensate for lost competitiveness, and while it does benefit capital owners in that sector, it does not necessarily deal with emissions leakage. Thus, the allowances provided to refiners do not discourage sourcing offshore at the expense of US production (and jobs).

[8] Note that refineries are also a compliance point for the emissions associated with the consumption of transportation fuels, which are much larger. However, imported fuels are also under the cap, so these allowance liabilities do not represent a competitiveness issue. Furthermore, all of the consumption-related allowance costs can be expected to be passed along to consumers.

At the same time, one does not want to mute the price signal that encourages conservation in transportation fuels, which is the principal rationale for excluding this sector from the EITE rebates. For such products,[9] border adjustments in theory are much more effective than rebates for achieving real reductions, but in ACESA refined products are not eligible for border adjustments. The fact that refineries use the same energy to make multiple products (gasoline, diesel, fuel oil, jet fuel, etc.) also creates challenges for establishing appropriate metrics.

Border Adjustments

The border adjustment provisions in ACESA are already drawing objections from our trade partners and from some domestic businesses groups. One argument against the border adjustments is that they are made largely redundant by the rebates to EITE sectors. For another, there must be a Presidential finding that carbon leakage is still a problem at the time the border adjustments are implemented. And in any case, many countries are likely to be exempt. However, little clarity exists as to what metrics would be used to calculate foreign carbon intensities or what constitutes comparable policies. Although the President would have leeway to declare the IRAP unnecessary, sufficient flexibility exists to allow for application in a manner that could be deemed protectionist.

Furthermore, implementing the IRAP requires additional administrative complications well beyond those of the rebating program. Methodologies would need to be developed to assess the carbon intensity of imports, which is difficult to do on an individual basis and likely to trigger objections if done on any kind of average basis. For example, firms performing better than the standard would need to be able to appeal the assessments, or cry unjustified discrimination to the WTO.

Additional criteria would be needed to decide which countries have economy-wide GHG reduction commitments that are "at least as stringent" as those in the US. Does that mean comparable reduction targets, per-capita emissions targets, or comparable emissions prices? The latter is arguably the most meaningful when thinking about competitiveness and economic efficiency of the global reduction strategies (see Fischer and Morgenstern, 2008). Given the differential application across countries, rules of origin also become important. More pointedly, because of the differential application, retaliatory tariffs and trade disputes based on discrimination are likely, in which case the US would have to show that they are necessary (and among the least trade-distorting measures) to preserve the global environment.

Border adjustments are extremely popular among certain domestic political constituencies. Many argue that they will induce other countries to establish meaningful climate policies. However, other groups, such as the National Foreign Trade Council, argue that such provisions are equally likely to provoke a "green trade war".[10] In the meantime, the repercussions may spill over into other multilateral negotiations, including the already bogged-down Doha Development Round, which includes negotiations over the liberalization of trade in environmental goods and services, and the UNFCCC negotiations. A particular sticking point for border adjustments is the Bali principle of "common but differentiated responsibilities," in which developing countries should not be expected to undertake the same kinds of actions as developed countries. How will this be recognized in evaluating whether commitments are of comparable stringency?

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[9] Clinker, the most emissions intensive component of cement production, is another example.
[10] See letter from National Foreign Trade Council to Senators Reid and McConnell dated July 22, 2009.

The International Context

Importantly, one should not view the pending legislation from a strictly domestic lens: one must also consider how other countries will respond. The entire scheme, especially the EITE rebates, invites competitiveness policies by other nations. Thus, if a developing nation were to adopt a domestic carbon pricing scheme in its electricity or fuel sectors and become eligible to sell offsets into the US market, it would likely raise competitiveness issues for its own energy-intensive, trade sensitive sectors, especially in the presence of the US EITE rebates. Such a nation might be motivated to establish its own output-based rebate scheme which, in turn, could create new complexities and, possibly, undermine the effectiveness of the US EITE rebates.

Finally, although some of the specific competitiveness provisions phase out once most countries undertake their own climate policies, the legislation has left little room for the overall cap to respond to changing international policies. As noted, even though EU allowance prices are likely to be higher than those in the US, pending policy revisions in the EU stipulate that even more stringent actions would be adopted if other nations acted to tighten their policies. However, ACESA provides no authority for the US to strengthen its policies without new legislation in the event other nations adopt more stringent actions. Thus, a potential mechanism to encourage other nations to take further mitigation actions, which might also reduce US competitiveness impacts, is absent from US policy.

Conclusions

In a world of relatively free trade, the introduction of carbon pricing in one or a small group of nations can cause ripple effects around the globe and undermine the basic environmental objectives of policy. The development of efficient and fair policies, particularly in the case of energy-intensive domestic industries, poses many challenges. Not surprisingly, efforts to address even the most glaring problems can lead to unintended consequences.

On the whole, the competitiveness provisions contained in ACESA have been crafted with a solid recognition of the challenges. Despite the well-known limitations of such mechanisms, output-based rebates for energy-intensive, trade-sensitive industries can cushion the blow of higher production costs without muting the incentives for emission reduction and innovation—if crafted carefully. Ultimately, however, the success of ACESA in bringing about cost-effective domestic *and* global emission reductions hinges on the extent to which other nations adopt policies comparable to the United States in a timely manner. Using a mix of provisions, the bill provides breathing room for US producers to transition to the new carbon pricing regime, and it also creates incentives for other nations to join the regime.

Our review of the issues has identified a number of areas where refinements to ACESA might be warranted. Specifically, we note the importance of keeping allowance prices on a predictable and modest path; the need to watch out for allowance over-allocation to the EITE sectors, especially in the early years; the potential inefficiencies of the allocation mechanism to the electric sector and some of the special challenges in dealing with the refining sector.

Given the great focus on allocations, it bears emphasis that the value of the emissions cap represents an enormous public resource in a time of unprecedented public deficits. Allowance revenues can be well used to reduce the public debt and the tax rates needed to finance it, which can help make the entire economy more competitive. Diverting these revenues to narrow interests should only be done in a circumscribed way that ensures real market failures are being addressed.

Lastly we call attention to the administrative and political complexities of border adjustment provisions. The implementation of such mechanisms should carefully consider the possible responses by other nations and the broader international context in which these policies will apply. Ultimately, the nature and extent of international participation will determine the efficacy of the global climate mitigation effort, so one must keep in mind that a successful US policy is one that will quickly catalyze coordinated international action.

Portions of this paper are drawn from: Fischer, C. and R. D. Morgenstern, "Competitiveness, Emissions Leakage, and Climate Policy," Resources for the Future Weekly Policy Commentary, February 23, 2009.

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