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Climate Policy and Border Tax Adjustments: Some New Wine Mixed with Old Wine in New Green Bottles?

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Current policy discussions are making a very clear connection between domestic climate policies and international trade. In this article, the economic, legal and implementation issues relating to border tax adjustments for climate policies are discussed. The overall conclusion drawn is that the connection between trade and the environment is not new, having been discussed in considerable detail since the early 1990s, and reflected in an extensive economics literature. In addition, the legal aspects of border tax adjustments are not particularly new, although only a WTO ruling on their use in the presence of domestic climate policies will resolve any legal uncertainty about their use. However, there are some new issues concerning the determination and implementation of border tax adjustments for domestic climate policies that do present additional layers of complexity.

Keywords: climate policy, competitiveness, border tax adjustment

Introduction

In the past decade, it has become increasingly obvious to many observers that even though negotiation of the Kyoto Protocol on Global Climate Change in 1997 was a useful first step, further efforts to develop a comprehensive multilateral agreement for reducing greenhouse gas (GHG) emissions will be necessary if global climate change is to be properly addressed (Frankel, 2009). Public discussion of what might constitute key dimensions of such an agreement has focused on the need to include commitments by both developed and developing countries to reduce GHG emissions, as well as developed countries being willing to provide subsidies to developing countries such as China and India, in order that they are able to meet their emission caps without undermining their economic growth (*New York Times*, July 19, 2009).

Irrespective of the logic supporting a multilateral approach to dealing with a global public bad, many countries such as the United States and the European Union (EU) are actively pursuing national efforts to reduce GHGs. As Frankel (2009) notes, during the 110th U.S. Congress, at least half of the 12 climate change bills introduced by legislators called for some type of border measure to be targeted at energy-intensive imports, based upon the GHG emissions embodied in those imports. More specifically, at the beginning of 2008, separate bills sponsored by Senators Bingaman and Specter, and Senators Lieberman and Warner respectively, were being discussed in the U.S. Congress, both of which called for a domestic cap-and-trade system targeted at GHG emissions, along with a requirement that importers acquire emissions allowances based on the embedded carbon in their goods (Houser et al., 2008).¹

While neither of these latter bills became law, in the current session of Congress, a bill sponsored by Representatives Waxman and Markey was passed by the U.S. House of Representatives in June 2009, and currently a companion bill sponsored by Senators Kerry and Boxer is under consideration by the U.S. Senate as a whole.² Like the earlier Bingaman-Specter and Lieberman-Warner bills, the Waxman-Markey bill contains provisions relating to border adjustments for U.S. domestic climate policy. Under Title IX of the bill, “Promoting International Reductions in Industrial Emissions”, the following text appears with regard to the objectives of any multilateral environmental negotiations:

... [to] include in such international agreement provisions by which countries signatory to the agreement agree to apply, with respect to imports from countries not signatory to the agreement, border measures designed to minimize any carbon leakage from the signatory to the non-signatory countries, including border measures [H.R. 2454, Section 903, (a) (3)]

However, in the absence of any multilateral agreement on GHG emissions, the bill contains very clear language about unilateral implementation of border adjustments for U.S. domestic climate policy. Specifically, if no multilateral agreement exists by 2018 [H.R. 2454, Section 904, (b) (1)], the president is mandated to implement an international emissions allowance program, requirements being imposed on importers no earlier than January 2020 [H.R. 2454, Section 905, (c) (1)]. Importers in eligible industries will be exempt from having to purchase allowances if it is established that 85 percent or more of U.S. imports of covered goods are produced in countries that meet at least one of two criteria: (i) the country, along with the United States, is party to an international agreement to reduce GHG emissions, where the GHG reduction requirement is at least as stringent as that applied in the United States; (ii) the country has implemented domestic climate policies that increase production costs in the eligible industry by at least 80 percent of the cost of complying with U.S. legislation [H.R. 2454, Section 904, (c) (1) (2)]. Otherwise, importers in eligible industries will have to purchase an appropriate amount of emission allowances as a condition of entry into the United States, the border price of allowances being based on the mean of the daily U.S. market price for emission allowances [H.R. 2454, Section 903, (a) (1)].³ Additional exemptions from the purchase of emissions allowances are specified for imported products coming from (i) countries that are achieving reductions in GHGs equal to or better than U.S. reductions; (ii) countries that are identified as being the least developed; and (iii) countries deemed to be producing less than 0.5 percent of total global GHG emissions and accounting for less than 5 percent of U.S. imports of the eligible product [H.R. 2454, Section 905, (a) (1) (E(i))].

The key political reason for the inclusion of border adjustments in the Waxman-Markey bill was the need to “secure the votes of Rust Belt lawmakers who were wavering on the bill because of fears of job losses in heavy industry” (Broder, *New York Times*, June 29, 2009). Specifically, the provisions are designed to provide some protection to those parts of the U.S. manufacturing sector that would face competition from countries with less stringent GHG emissions regulation. In the words of Representative Sander Levin, “As we act, we can and must ensure that the U.S. energy-intensive industries are not placed at a competitive disadvantage by nations that have not made a similar commitment to reduce greenhouse gases” (Broder, *New York Times*, June 29, 2009); Representative Levin also argues that “this legislation ensures that the United States will avoid carbon leakage in its energy intensive and trade sensitive industries” (*International Centre for Trade and Sustainable Development*, July 1, 2009).

At the time of the bill's passage through the House of Representatives, President Obama, while recognizing that parts of the U.S. manufacturing sector have legitimate reasons to be concerned about competition from producers in developing countries, did express concern about the border adjustment provisions of the bill, noting that, "At a time when the economy worldwide is still deep in recession and we've seen a significant drop in global trade ... I think we have to be very careful about sending any protectionist signals out there" (Broder, *New York Times*, June 29, 2009). In addition, Senators Kerry and Boxer, sponsors of the Senate Bill on climate change, indicated that they had problems with the inclusion of border adjustments in the House bill (*ClimateIntel*, July 31, 2009), Senator Kerry expressing his concerns during hearings of the Senate Finance Committee (United States Senate Committee on Finance, July 8, 2009).

However, with pressure coming from several senators in states with manufacturing sectors likely to be negatively affected by a cap-and-trade system, a recent editorial by Senators Kerry and Graham suggests that bi-partisan agreement may eventually result in the inclusion of border provisions in the Senate bill: "... we cannot sacrifice another job to competitors overseas. ... For this reason, we should consider a border tax on items produced in countries that avoid these standards" (Kerry and Graham, *New York Times*, October 11, 2009). At present though, the language of the Senate bill simply states,

It is the sense of the Senate that this act will contain a trade title that will include a border measure that is consistent with our international obligations and designed to work in conjunction with provisions that allocate allowances to energy-intensive and trade-exposed industries. (S. 1733, Section 765)

While debate over the details of any climate change legislation that will eventually come out of the U.S. Congress is grabbing all of the headlines in the U.S. media, the United States itself could potentially be subject to border tax adjustments by the EU, especially if little comes out of the United Nations Climate Change Conference in Copenhagen. In determining its GHG emissions targets for the post-Kyoto period, the European Commission issued a directive in January 2008 which amended previous Directive 2003/87/EC and which contained the following language:⁴

Energy-intensive industries which are determined to be exposed to significant risk of carbon leakage could receive up to 100% of allowances free of charge or an effective carbon equalization system could be introduced with a view to putting installations from the Community which are at a significant risk of carbon leakage and those from third countries on a comparable footing. Such a system could apply requirements to importers that would be no less favorable than those applicable to

installations within the EU, for example by requiring the surrender of allowances. (2008/013 COD, 8)

Frankel (2009) notes that the term “carbon equalization” is consistent with the kind of language spelled out in the Bingaman-Specter and Lieberman-Warner bills, and matches the several calls made by French President Nicolas Sarkozy for a carbon tax on imports, his most recent public statement noting, “A carbon tax at the border is the natural complement to a domestic carbon tax. More importantly, a carbon tax at the borders is vital for our industries and our jobs. This has nothing to do with protectionism... . This is about fair play” (Hollinger, *Financial Times*, September 10, 2009).

As should be clear from the preceding discussion, a very clear connection is being made between domestic climate policy and trade policy. Policymakers in both the United States and elsewhere are arguing that policies designed to reduce GHG emissions, such as cap-and-trade, should be accompanied by appropriate border measures applied to carbon-intensive imports. The extent of the current interest from policymakers, the media and other observers might lead one to believe that border adjustments for domestic environmental policy represent a new regulatory issue, and one that creates serious and new challenges for both economic and legal analysis. The objective of this article is to examine whether this is the case, in light of both Paul Krugman’s claim in his blog that “the truth is that there’s perfectly sound economics behind border adjustments related to cap-and-trade” (Krugman, *New York Times*, June 29, 2009)⁵ and the earlier claim, by Lockwood and Whalley (2008) in an NBER working paper, that the debate about border tax adjustments for domestic carbon taxes is just “old wine in green bottles”.

To address this, the remainder of the article is broken down into four main sections: first, the two main concerns of competitiveness and carbon leakage are discussed in light of the existing economics literature on trade and the environment; second, the issue of World Trade Organization (WTO) rules and how they relate to the potential use of border adjustments is outlined; third, in light of the concerns about competitiveness and the WTO position on trade neutrality and border adjustments, some useful results from previous economic analysis are laid out; and fourth, some specific implementation issues relating to border adjustments for domestic climate policies are discussed, along with the potential they create for legal challenges through the WTO dispute settlement mechanism.

Trade and the Environment

In a recent joint report, the United Nations Environment Program (UNEP) and the WTO (2009) laid out the key economic connections between trade and climate change that underline the concerns expressed by U.S. and European policymakers about the potential impact of domestic climate policy. If the multilateral negotiations in Copenhagen fail to reach a global agreement on cutting GHG emissions, countries are likely to pursue different domestic climate policies, and as a consequence there will be no international price of carbon. From this, two interconnected issues arise: a reduction in the international competitiveness of firms in industries likely to be most affected by domestic climate policies, and the possibility of carbon leakage.

If a country such as the United States unilaterally implements a carbon tax or some type of emission trading scheme, this will impact negatively the relative costs of firms in, say the aluminum or paper industries, which in turn will constrain their ability to compete with imports from other countries with less stringent climate policies.⁶ While competitiveness of firms is a difficult concept to define, it would typically be thought of in terms of their ability to maintain either profits and/or market share. As the UNEP/WTO (2009) report notes, the competitiveness of industries subject to domestic climate policies will be a function of multiple factors, including (i) the specific characteristics of an industry, such as market structure, industry technology, the extent of import competition and the incidence of any explicit/implicit carbon price; (ii) the exact design of the domestic climate policy; and (iii) the design of other countries' climate policies.

Related to the expected impact of domestic climate policies on competitiveness is the issue of carbon leakage, which can be thought of as the possibility that energy-intensive industries such as aluminum or paper production will relocate to other countries that have less restrictive climate policies. Essentially, a wedge will exist between the price of carbon in countries that either do not implement domestic climate policy or impose lower caps on GHG emissions and countries that implement considerably tougher climate policies. This lack of an international carbon price is expected to have two effects: first, carbon havens may develop in those countries where less restrictive climate policies will attract carbon-intensive industries, resulting in globally inefficient production of a public bad; second, the possibility of capital flight through relocation of industries to countries with a lower carbon price will result in job losses in countries with a higher carbon price.

Despite these two issues coming to the forefront of the debate on implementation of domestic climate policy, they are not new, and both issues have been analyzed extensively in the economics literature on trade and the environment. Since the early

1990s, the connection between trade and environmental policy has been the subject of considerable debate between the trade policy community and environmentalists. This debate was given much prominence during negotiations over the North American Free Trade Agreement (NAFTA) (Esty, 1994) and became more intense with completion of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) and subsequent formation of the WTO (Copeland and Taylor, 2004).

A defining characteristic of this debate has been the oft-expressed concern of environmentalists that additional competitive pressures come with the process of international economic integration. These pressures will result in lobbying for less stringent environmental policies (Bagwell and Staiger, 2001a). This argument is typically applied to developed countries, where international competition may be expected to hurt domestic industries through either loss of market share or movement of those industries from developed countries with tough environmental standards to less developed countries with weaker environmental standards, i.e., a pollution haven effect (Copeland and Taylor, 2004). This issue received a good deal of public attention in the United States during the debate over NAFTA, including comments made by former presidential candidate Ross Perot (1993, 47): “Besides low wages, another attraction for companies to relocate to Mexico is the loose enforcement of its health, safety, and environmental standards. Mexico provides U.S. companies an escape hatch from increasingly expensive U.S. regulations.” In addition, failure by the Clinton administration to implement an energy tax in the early 1990s was largely due to the concerns of U.S. industry about lost competitiveness (Biermann and Brohm, 2005).

To understand how the current concern about carbon havens is no more than just a restatement of the pollution haven hypothesis, it is useful to adapt Copeland and Taylor’s (2004) analysis of the latter. Importantly, this analysis shows that the existence of a carbon haven depends on the stringency of domestic climate policies relative to traditional comparative advantage. Assume two countries in the world, the United States and China, the only difference between them being their factor endowments and/or their climate policies. In all other respects they are identical. Each region produces two goods, X and Y , under constant returns, using capital K and labour L . Good X is capital-intensive in production, while good Y is labour-intensive. In addition, production of good X generates GHG emissions G , production of good Y being non-carbon intensive in production. Each country has N identical consumers who maximize utility, treating carbon emissions as given. Preferences over X and Y are homothetic, and the utility function is separable with respect to goods and the impact of GHGs on climate, the latter being a pure global public bad. GHG emissions are regulated through either a carbon tax τ or through a system of tradable emissions

allowances, where government caps the total level of emissions G , and the price of permits τ is market determined.

Let the price of good X be p , and let good Y be the *numeraire*. Assuming perfect competition, and full employment of factors, the output of each good is given as follows:

$$X = x(p, \tau, K, L) \quad (1)$$

$$Y = y(p, \tau, K, L) \quad (2)$$

Relative supply and demand analysis can be used to illustrate two competing hypotheses for industry location and trade.⁷ Given the assumption about preferences, demand for X relative to Y , which is denoted as RD , is independent of income, such that $RD(p) = f_x(p) / f_y(p)$, where $f'_x(p) < 0$, $f'_y(p) > 0$ and $RD'(p) < 0$; i.e., an increase in p results in a decrease in the demand for X relative to Y . As North and South are identical, the relative demand curve is the same for each region. Given (1) and (2), and the assumption of constant returns, relative supply, which is denoted as RS , can be written as a function of K/L and prices:

$$RS(p, \tau, K / L) = \frac{x(p, \tau, K / L, 1)}{y(p, \tau, K / L, 1)} \quad (3)$$

where $RS'(p) > 0$; i.e., an increase in p results in an increase in the supply of X relative to Y . RS will differ across the two countries depending on the differences between their climate policies and factor endowments. In figure 1, if each region were initially identical, autarky prices would be the same, and there would be no reason to trade. Suppose climate policy is less stringent in the South, $\tau > \tau^*$; their relative supply shifts to RS^* , factors moving from industry Y to X (variables with a $*$ refer to China). Autarky prices now differ between the two regions, $p^A > p^{A*}$, reflecting comparative advantage. With free trade, the equilibrium world price is p^T , the United States imports the carbon-intensive good X from China, $X/Y < X^C/Y^C$, where C refers to consumption, and China imports the non-carbon intensive good Y from the United States, $X^*/Y^* > X^C/Y^C$. As a result, production of X contracts in the United States and expands in China, carbon emissions increasing in China and declining in the United States; i.e., there is a carbon haven in China.

What if the United States and China differ in both their climate policies and factor endowments? Assume that the United States is both capital abundant and has more stringent climate policies relative to China. As a result, its relative abundance in capital tends to make it an exporter of the carbon-intensive good X , while its tougher

climate policy tends to make it an importer of the carbon-intensive good. Consequently, the pattern of trade depends on which effect is stronger (Copeland and Taylor, 2003). Importantly, as shown in figure 2, if relative factor endowment differences dominate, the equilibrium world price is p^T , the United States exports the carbon-intensive good X , $X/Y > X^C/Y^C$, even though it has more stringent climate policy, and China exports the non-carbon intensive good Y to the United States, $X^*/Y^* < X^C/Y^C$, reversing the carbon haven hypothesis. In addition, global carbon emissions will be reduced as production of X shifts to the United States, where climate policy is more stringent compared to China's (Copeland and Taylor, 2003).

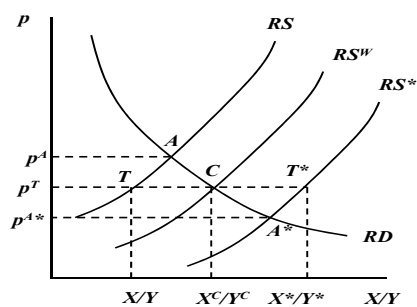


Figure 1: Carbon Haven

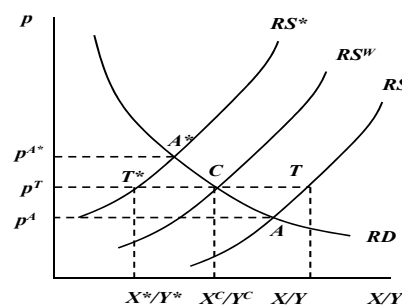


Figure 2: Factor Endowments

The implication of this analysis is that some care should be taken before simply accepting the argument that more stringent climate policy in one country will necessarily result in a carbon haven. This is supported by the overall conclusions that can be drawn from the empirical work on pollution havens – there is evidence for both trade and investment flows being affected by environmental policy. The evidence, though, is more in favour of an outcome whereby environmental policy affects the net exports of dirty goods as opposed to causing complete relocation of dirty goods' production; i.e., environmental policy is not the only factor affecting trade and investment patterns (Copeland and Taylor, 2004; Levinson and Taylor, 2004).

What are the implications of these findings for arguments about domestic climate policies and competitiveness? Essentially, if, carbon-intensive industries relocate to countries with less stringent climate policies, or if such countries increase their net exports of carbon-intensive goods, incentives for “regulatory chill” in climate policy may exist in those countries that would otherwise have had a preference for strict GHG emission standards. Does the existing economics literature offer any resolution to the problem of regulatory chill, and hence provide some support for the political

argument that border adjustments are necessary to account for the impact of domestic climate policy on competitiveness?

Bagwell and Staiger (2001b) offer an interesting solution drawing on their earlier modeling of the GATT (Bagwell and Staiger, 1999). Suppose the WTO consists of a two-stage tariff negotiation game between two countries such as the United States and China, where, before negotiations begin, the existing climate policies of each country are noted.⁸ At the first stage of the game, bound tariffs are negotiated, implying a set of market access commitments by the two countries. At the second stage of the game, the two countries are able to make unilateral changes to their mix of policies, providing that tariffs do not exceed their bound level and implied market access commitments are maintained.

What happens if the preferred choice of climate policy in the United States affects its competitiveness, resulting in an increase in China's market access? In order to maintain its market access commitment, it would also need to raise its tariff above the bound level, which it is unable to do under current WTO rules due to the threat of a violation complaint.⁹ This would appear to be a robust argument supporting the fears of environmentalists over trade liberalization. Bagwell and Staiger (2001b) argue that resolution of this problem lies in providing more flexibility to the current WTO rules by allowing countries to renegotiate their bound tariffs if unilateral changes in, say, their climate policies would increase access to their market.

This raises an interesting question as to whether the existing WTO rules allow for this flexibility, or whether they could be changed in this regard. Roessler (1996; 1998) argues that under GATT Article XXVIII, a unilateral increase in the bound tariff by one country can be met by the other country withdrawing an equivalent amount of market access. Such renegotiation would leave the terms of trade unchanged and would also satisfy the principle of reciprocity. Alternatively, Bagwell and Staiger (2001b) argue that the renegotiation provisions of Article XXVIII could be changed such that any change in, say, a country's domestic climate policies would be offered to the other country in compensation for raising the bound tariff. In other words, even though the terms of trade have changed, market access is maintained at the negotiated level due to the impact of the climate policies on domestic firms.

The preceding discussion indicates that the issue of stringent domestic climate policies having a negative effect on competitiveness, and thereby creating the risk of carbon leakage, is already well understood in the extant literature on trade and the environment. In addition, an argument has been put forward allowing adjustment of tariffs to account for domestic climate policies, based on an explicit model of the WTO. However, the principle of this argument is actually already applied in WTO

rules relating to border tax adjustments for domestic excise taxes (Enders, 1996), although there is an important technical difference between the theory and actual practice. According to WTO/UNEP (2009), a “border tax” (or tariff) is imposed on imported goods while a “border tax adjustment” is the imposition of a domestically imposed tax on “like” imported goods. Essentially, GATT Article II: 2(a) allows members of the WTO to place on the imports of any product a tax equivalent to an internal tax. This suggests the need for an assessment of current WTO rules as they relate to border tax adjustments.

WTO Rules and Border Tax Adjustments

The basic idea of adjusting taxes at the border in the presence of domestic taxes is not a new issue (Biermann and Brohm, 2005). Such taxes have been applied at borders since the late 18th century, and the underlying principle for such taxes has long been recognized, David Ricardo noting, “In the degree then in which [domestic] taxes raise the price of corn, a duty should be imposed on its importation. ... By means of this duty ... trade would be placed on the same footing as if it had never been taxed” (Sraffa, 1953). The key concept here is that any border tax adjustment should result in imports remaining at the same level as before implementation of the domestic tax.

Even though border tax adjustments have a long history, it was the formation of the European Economic Community (EEC) in the mid-1950s and its subsequent implementation of a harmonized system of value added tax (VAT) that resulted in economic and legal discussion of adjustment at the border for such an internal tax system (Biermann and Brohm, 2005; Lockwood and Whalley, 2008). The central issue that arose was whether VAT should be applied on an origin or a destination basis. If the EEC had adopted the former, VAT would have applied to production, the tax would also have applied to exports, with no tax rebate at the border, and imports entering the EEC would have done so tax free. The original members of the EEC did in fact adopt the latter principle for taxation, VAT being applied to both domestic consumption and imports as they entered the EEC, and with VAT rebates on exports. Subsequently, as new countries acceded to the EEC, and later the EU, they also began applying border tax adjustments for the internal application of VAT, and taxes on exports were rebated.

As a result of implementation of the harmonized VAT tax system, concerns arose in the United States that its exports to the EEC were being subject to a trade barrier when entering the EEC, while at the same time VAT-free exports from the EEC were essentially receiving an export subsidy. As a consequence, after completion of the

Kennedy Round of the GATT in 1967, and prior to the launch of the Tokyo Round in 1973, there was considerable discussion in the United States as to whether the destination basis of VAT as applied in the EEC was a violation of GATT Article III. In the event, no dispute settlement case was initiated through the GATT by the United States, and there was no negotiation over the issue in the Tokyo Round. This outcome was essentially due to analysis by economists of the impact of a uniformly applied destination-based tax, as well as establishment in 1968 of a GATT Working Party on Border Tax Adjustments.

Lockwood and Whalley (2008) note that there were contributions by economists at the time showing that movement between an origin and a destination base for VAT (or any other sales tax) would have no real effects on trade, production and consumption (Shibata, 1967). The basic argument was as follows: assuming application of VAT is broadly based with a single rate, it does not matter which way it is implemented, as there are no changes in the relative prices faced by consumers or firms. In other words, border tax adjustments for VAT would have no effects on trade, consumption and production, because their effects would be fully offset by adjustments in price levels, wages and/or exchange rates across countries.¹⁰ Subsequent work by Whalley (1979), Grossman (1980) and Lockwood, de Meza and Myles (1994) has extended this analysis to show formally that with either endogenous exchange rates, flexible prices across countries, or flexible wage rates within countries, changes in the tax basis would be offset by changes in real wages or changes in the price level. As a result of this previous literature, Lockwood and Whalley (2008) argue that if border tax adjustments for domestic climate policies are common across all products, there will be no effects on trade, and therefore no protection provided to domestic producers – hence their claim that the current debate is just an old one dressed up in new climate change “garb”.¹¹

Irrespective of the specific details of this analytical literature, the key point is the idea that a border tax adjustment may be neutral in its effects on trade, and this of course lies at the heart of the legal discussion of such taxes. In its 1970 report, the GATT working party defined border tax adjustments as

any fiscal measure which put into effect, in whole or part, the destination principle (i.e., which enable ... imported products sold to consumers to be charged with some or all of the tax charged in the importing country in respect of similar domestic products). (WTO, 1997, para. 28)

The objectives of such taxes are

to ensure trade neutrality of domestic taxation ... and thus to preserve the competitive equality between domestic and imported products. (WTO, 1997, para. 24)

The key questions raised by the language in these two paragraphs of course concern whether border tax adjustments are imposed on imported products that are similar to the domestic product and whether they are neutral in terms of their impact on trade and thereby maintain the competitiveness of domestic producers.

Goh (2004) and others note that border tax adjustments are normally implemented with respect to taxes on final goods, e.g., domestic excise taxes are levied on goods such as alcohol and cigarettes, and equivalent taxes are then levied at the border on imports of such goods. In principle, however, there is nothing to prevent a country from also applying a border tax adjustment for taxes on inputs such as energy used in production of a final good such as aluminum. The United States already has such a tax regime in place applied to ozone-depleting chemicals (Barthold, 1994; Davie, 1995; Pauwelyn, 2007). An environmental excise tax was imposed in 1989/90 on the domestic production of a range of chlorofluorocarbons (CFCs), and a border tax adjustment was also applied to the import of such chemicals, as well as to the import of manufactured products that either contain CFCs or use them in their production process.

The implementation of border tax adjustments for domestic climate policies raises the important distinction between their application to final goods versus their application to final goods produced using energy-intensive inputs. This distinction relates, of course, to the highly controversial issue of trade measures applied on the basis of process and production methods (PPMs). Importantly, while no WTO ruling has ever been rendered on the application by the United States of border tax adjustments to final goods containing CFCs, which is clearly process related, border tax adjustments on final goods that embody carbon emissions are likely to be highly contentious – notwithstanding the WTO Appellate Body’s findings in the Shrimp–Turtle case (WTO, 1998).¹²

Goh (2004) notes that potential challenges to countries seeking to implement border tax adjustments for their climate policies will come under GATT Article III and, if found inconsistent with WTO obligations, may be still justifiable under GATT Article XX. Nevertheless, he suggests that “the legal issues are, however, less than clear-cut, with longstanding divergence in views among WTO members” (Goh, 2004, 401).

As there are now several detailed legal commentaries in the literature on this issue, only a barebones outline is presented here, drawing on Goh’s (2004) discussion.

¹³ GATT Articles III: 1 and III: 2 (National Treatment) are the rules that oblige WTO members not to discriminate against imports from other members when applying

internal laws and regulations. The key language in Article III: 2 states that imported products

shall not be subject, directly or indirectly, to internal taxes or other internal charges of any kind in excess of those applied, directly or indirectly, to like domestic products. (GATT Article III: 2)

Consequently, a 20 percent border tax adjustment on imported diesel fuel to adjust for a 20 percent domestic excise tax on diesel fuel would clearly be consistent with Article III: 2. The 1970 GATT Working Party on Border Tax Adjustments also made it clear that indirect taxes levied on products such as diesel fuel were eligible for border tax adjustment, while direct taxes such as payroll taxes were not.

While the WTO position on border tax adjustments on final goods seems quite clear, it is much less clear that Article III: 2 will allow border tax adjustments on final goods that embody energy inputs, given imposition of domestic taxes on GHG emissions. The GATT working party was actually unable to agree on the legality of such measures, also noting a “scarcity of complaints” about such measures, and it was not until the 1987 Superfund case (GATT, 1987) that this issue was re-examined by the GATT. This case was a challenge by Canada, the EEC and Mexico against U.S. taxes being levied on certain imported chemicals as well as substances that were end-products of chemicals being taxed in the United States under the U.S. Superfund Act.¹⁴ Essentially, the GATT panel ruled that the rate of tax on the imported substances was equivalent to the tax borne by the like domestic substances, given the tax on chemicals, and therefore was consistent with Article III: 2. As Goh (2004) points out, the ruling focused on the notion that the U.S. Superfund Act imposed the same “fiscal burden” on imported and like domestic substances, and not on whether the substances subject to the border tax adjustment were similar to the chemicals subject to the domestic tax. Irrespective of the GATT ruling in the Superfund case, it is likely that the key issue still remains as to whether a border tax adjustment for domestic climate policy will fall under the aegis of Article III: 2, i.e., what goods are being compared for “likeness”, and can imported and domestic goods be compared given differences in the amount of energy embodied in the final product?

As noted earlier, even if a border tax adjustment for domestic climate policy is deemed inconsistent with GATT Article III: 2, it may still be possible to justify it under GATT Article XX (General Exceptions). Both GATT/WTO panels and the Appellate Body have adopted a two-tier test to determine whether any border measure is justified under Article XX: (i) the measure must fall within the scope of Article XX – specifically, such a measure is “necessary to protect human, animal or plant life or health” (Article XX (b)), or, “relating to the conservation of exhaustible natural

resources if such measures are made effective in conjunction with restrictions on domestic production or consumption” (Article XX (g)); and (ii) the measure must “not [be] applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade” (Article XX Chapeau).

Whether or not border tax adjustments for domestic climate policies are covered by Article XX (g) will depend on their being shown to be a reasonable means of achieving the ends, i.e., conservation of exhaustible natural resources. In addition, interpretation of how the chapeau of Article XX might be applied to such border adjustments will depend on (i) the requirement, as indicated by the Appellate Body in the *Shrimp–Turtle* case (WTO, 1998), that members of the WTO pursue multilateral agreements on environmental issues; (ii) whether special and differential treatment can be expected in the application of border adjustments, based on whether the imported good comes from a developed or developing country; and (iii) whether application of the border measure takes proper account of the comparative effectiveness of measures and policies applied in the exporting country.

The conclusion to be drawn from this discussion is that there continues to be significant debate about the outcome of any WTO dispute settlement panel on the issue of border tax adjustments for domestic climate policies, and this will only be settled via an actual ruling. However, based on Goh’s (2004) discussion, it seems reasonable to assume that any final legal interpretation could go one of two ways: on the one hand, border tax adjustments are found inconsistent with GATT Article III: 2, but the door is left open for a country to justify the measure under GATT Article XX; on the other hand, border tax adjustments are found to be consistent with GATT Article III: 2.¹⁵

Trade Neutrality and Border Adjustments

As suggested earlier, the use of policy instruments such as carbon taxes is likely to affect trade flows and the competitiveness of firms to which the climate policy applies. Clearly, firms in an importing country faced with imposition of a carbon tax may argue that the resulting cost will improve the market access of imported goods, and as a result there are likely to be demands for a corresponding border tax adjustment to offset the impact of the carbon tax. In addition, where the carbon tax is applied to an intermediate good such as energy, but it is a final good such as aluminum that is imported, the market access issue will arise because domestic producers of aluminum face an increase in the cost of energy inputs which places them at a disadvantage vis-à-vis final imports of aluminum from countries where the

cost of energy is lower in the absence of a carbon tax. In such a case, demands for any border tax adjustment relate to the imported final good, aluminum.

In light of the WTO rules concerning the need for border tax adjustments to ensure trade neutrality, it is critical in implementing such taxes that account be taken of the factors influencing the extent to which carbon tax on an intermediate good, energy, is passed through in the price of the final good, aluminum, i.e., the incidence of the carbon tax in a vertical production system. Incidence of the carbon tax will be a function of factors such as market structure, the shape of the demand curve for the final good, industry technology, and the nature of competition among producers of the final good. In addition, the appropriate border tax adjustment may be sensitive to whatever the definition of maintained market access relates to: the volume or market share of imports.¹⁶

If both the intermediate and final goods markets are perfectly competitive, the appropriate treatment of imports of the final good is relatively straightforward: an import tax on the final good, equal to the level of the carbon tax times the extent to which the intermediate good enters the cost function for the domestic final good, would raise marginal costs for the importer by the same amount and consequently will have a neutral effect on imports of the final good (Poterba and Rotemberg, 1995).¹⁷

More formally, suppose a final good is supplied by domestic and foreign firms under a constant returns to scale technology, where inputs are labour, L , and an intermediate good, energy, E . Domestic and foreign wages are w and w^* , but there is an integrated world market for the intermediate good, its unit price being e , and if both domestic and foreign firms supply the domestic market initially, then their prices are $p = p^*$. Given the technology, the cost function for the domestic producers is $c(e, w)X$, where X is output and $c(\cdot)$ is the unit cost function, and likewise for foreign producers, $c^*(e, w^*)X^*$, and under perfect competition, final goods prices are equal to unit marginal costs, $p = c$ and $p^* = c^*$. Given the price of energy E is fixed at e , a domestic carbon tax τ raises its price to $e + \tau$, so that the associated change in marginal cost is

$$c_e(e, w)\tau = \left(\frac{E}{X}\right)\tau \quad (4)$$

the derivative of total cost with respect to the energy input being equal to the demand for energy, implying $c_e(e, w)X = E$, so that rearranging gives $c_e(e, w) = E/X$. As a result, to raise the marginal costs of foreign producers by as much as that for domestic producers requires a border tax adjustment of $\tau^\beta = (E/X)\tau$; i.e., the border tax adjustment is equal to the amount of the carbon tax times the average energy requirement of producing the domestic good, this result holding for any constant returns to scale production function.¹⁸

In the case where the intermediate and final goods markets are oligopolistic, taxing the imported final good at the same level as the carbon tax imposed on the domestically produced intermediate good may have a non-neutral impact on imports of the final good (McCorriston and Sheldon, 2005a). Focusing on the final goods market, suppose a symmetric duopolistic market structure is assumed, where a domestic firm (foreign firm) chooses output $x(y)$ to maximize profits given the output choice of the other firm $y(x)$, the domestic firm purchasing energy inputs from a domestic, duopolistic market, which is subject to a carbon tax. Assuming a constant-returns downstream technology of one-to-one fixed proportions, and a move structure where the domestic government initially commits to tax policies, the key result is that the size of the border tax adjustment relative to the carbon tax is sensitive to the definition of maintained market access, which in turn generates quite different profit effects in the final goods market.

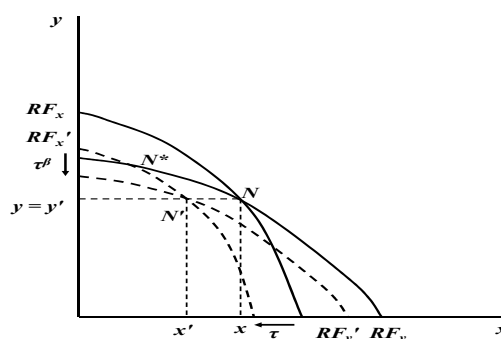


Figure 3: Import Volume Neutrality

In figure 3, if a carbon tax τ is imposed, the new Nash equilibrium at N^* results in the foreign producer of the final good increasing both its output and profits at the expense of the domestic firm; i.e., there is a loss of competitiveness. However, in the case of import-volume neutrality, the combination of the carbon tax τ and border tax adjustment τ^β shifts less output and profits away from the domestic to the foreign producer of the final good. The carbon tax shifts the domestic firm's reaction function from RF_x to RF'_x , output falling to x' , and the border tax adjustment shifts the foreign firm's reaction function from RF_y to RF'_y , the new Nash equilibrium being N' , such that the foreign firm's output remains at $y = y'$. As a result, the domestic firm's profits still fall while the foreign firm's profits increase. It is also important to note in this case that the appropriate border tax adjustment is less than the carbon tax. This is due to the carbon tax not being fully passed through by the domestic producer of the

intermediate good in terms of an increase in the energy costs of the domestic producer of the final good.

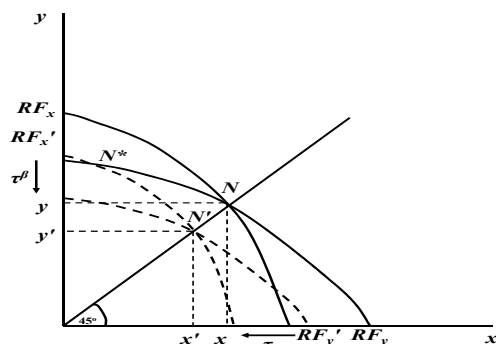


Figure 4: Import Share Neutrality

For import-share neutrality, the combination of the carbon tax τ and border tax adjustment τ^β increases the profits of both the domestic and foreign producers of the final good – figure 4. In order that domestic and foreign firm market shares, net of the carbon and border taxes, remain constant along the ray from the origin, the carbon and border taxes are now the same. Both the domestic and foreign firms' profits increase. In terms of political economy, the domestic producer of the final good will lobby for maintained market access to be defined in terms of market-share neutrality, while the foreign producer of the final good would prefer it to be defined in terms of market-volume neutrality.

In principle, border tax adjustments for carbon taxes should leave either the volume of imports or the market share of imports of the final good unchanged. This is consistent with Bagwell and Staiger's (2001b) analysis, as well as the current WTO rules on border tax adjustments. However, as just outlined, setting appropriate border tax adjustments may be more complex than what the simple competitive market rule implies and is dependent on how trade neutrality is defined. Even if set appropriately, they may result in the redistribution of profits between domestic and foreign firms. The overall conclusion is clear: market structure and other considerations in both final and intermediate goods sectors are important in setting the level of border tax adjustments for carbon taxes if the authorities are to avoid being unwittingly protectionist.

Some Implementation Issues

In the previous section, the analysis focused on how trade neutrality of border tax adjustments can be sensitive to various characteristics of vertical market structures. However, these characteristics are not peculiar to analyzing border adjustments for

climate policy. Consequently, it is important to consider whether there are any specific aspects relating to border adjustments in the context of domestic climate policies that create new implementation issues.

Possible new issues are illustrated in figure 5, along with suggestions as to where there is potential for challenge from the WTO. Going through these in sequence, the actual choice between a carbon tax and cap-and-trade is unlikely to attract the attention of the WTO, but there may be different implications of this choice for application of border adjustments. If a carbon tax is chosen, border tax adjustments for similar final goods will likely be admissible under GATT Article III, although it is less clear what will happen if the tax is applied on final goods that are energy-intensive. Also, while discussion in this article has mostly been limited to the application of border tax adjustments on imports, GATT/WTO rules also allow for remission of domestic excise taxes on exported goods (WTO, 1997). Specifically, as long as the border adjustment does not exceed the level of the domestic tax on either the final good or the intermediate input, it is not regarded as an export subsidy under the GATT Subsidies Code (McCorriston and Sheldon, 2005b).

In contrast, if the choice of domestic climate policy is cap-and-trade, the mechanism by which GHG emission allowances are initially distributed to firms in eligible industries has important implications for border adjustments. If emission allowances are auctioned competitively, the price of allowances at the margin will be similar to a carbon tax, and in principle, it should be possible to calculate the appropriate tax at the border on imports, although this will get complex when embodied energy inputs have to be calculated (WTO/UNEP, 2009). However, if there is free allocation of emission allowances, unless there is a secondary market where allowances are traded, there will be no carbon price on which to base a border tax adjustment. In addition, where emission allowances can be traded, while a domestic carbon price will be generated by any trading scheme, it is likely to fluctuate over time, thereby creating implementation problems for any border adjustment.

Even if a border price for carbon is generated from any domestic market for emission allowances, two important legal issues arise. First, if a domestic cap-and-trade scheme requires firms to hold allowances up to the amount of their GHG emissions, does it qualify as an internal tax or internal charge, which under GATT Article III: 2 can then be imposed as an equivalent border tax adjustment on imports of similar goods (Pauwelyn, 2007)? Alternatively, if importers are required to purchase emission allowances, would such a requirement be treated as a border adjustment equivalent to an internal charge (Pauwelyn, 2007)?

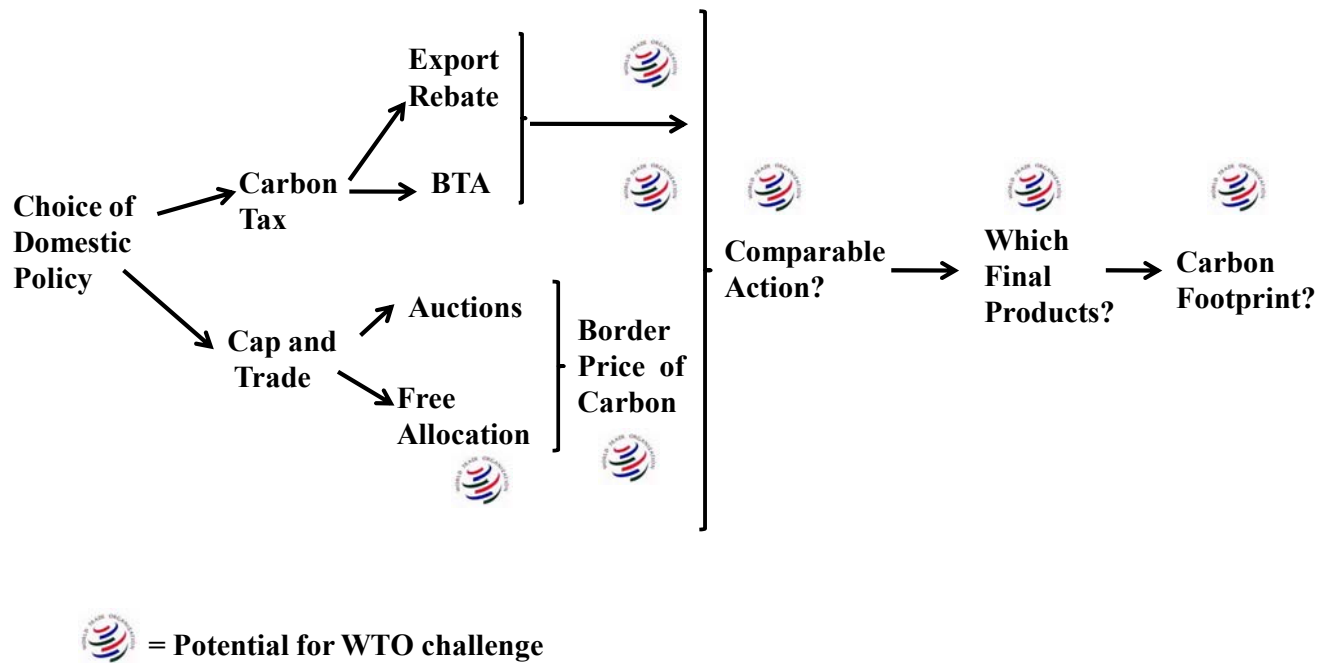


Figure 5: Some Implementation Issues

Finally, with regard to emission allowances, there has not been much discussion of whether free allocation might be non-compliant with the WTO Agreement on Subsidies and Countervailing Measures (Bordoff, 2009). Under this agreement, free allocation of allowances would be considered a subsidy if it (i) were a financial contribution by the government; (ii) were to confer an economic benefit; and (iii) were specific to certain industries. If these criteria were satisfied, free allowances would be WTO-inconsistent if other members of the WTO were adversely affected. However, this ignores the fact that while free allocation of emission allowances is a lump-sum transfer of income to domestic firms, the legal requirement of holding allowances for every ton of carbon emitted still imposes an opportunity cost on the firms that hold allowances which will be reflected in consumer prices, given the price of emission allowances in the secondary market (Pauwelyn, 2007; Bordoff, 2009).

As well as satisfying the principle of non-discrimination under GATT Article III, any border adjustment must also satisfy GATT Article I (Most Favoured Nation), which prohibits discrimination between WTO members. For example, if a border adjustment were applied to a similar good such as steel, based on a country such as China not having a “comparably effective” climate policy in place, the WTO might rule that this is discriminatory, and hence in violation of Article I. Even if differential treatment is permitted by the WTO, it will be hard to determine which countries actually have “comparably effective” policies in such a way that does not elicit claims of discrimination (Bordoff, 2009).

Finally, given the types of energy-intensive final goods that are likely to be eligible for border adjustments, there will also be an issue of how to measure the carbon footprint of final goods at the border. As noted by Houser et al. (2008), most border adjustment proposals are based on calculating the average carbon footprint for a specific final good in a specific country, based on available data. This would treat, for example, all Chinese steel mills as the same, no matter that some may be more efficient than others in their energy use. This may be challenged by exporting countries as being discriminatory, and hence inconsistent with WTO rules.

Summary and Conclusions

At present, discussions about implementation of climate policy are making a very clear connection between domestic climate policy and trade policy. Policymakers are arguing that domestic policies designed to reduce GHG emissions, such as cap-and-trade, should be accompanied by appropriate border measures applied to carbon-intensive imports. The objective of this article has been to consider whether this creates new challenges or not for economic and legal analysis, through examining

the existing literature on trade and the environment, outlining WTO rules as they relate to the potential use of border adjustments, analyzing the connection between trade neutrality and border adjustments, and detailing some specific implementation issues relating to border adjustments for domestic climate policies. The conclusions to be drawn are that the connection between trade and environmental policy is not a new issue, there having been a significant debate about it since the early 1990s. The basic economic and legal issues are also not new, although only a ruling on border tax adjustments in the presence of domestic climate policies will resolve any legal uncertainty. However, climate policies do present additional layer(s) of complexity for the problem of determining appropriate border adjustments. In other words, rephrasing Lockwood and Whalley's (2008) earlier conclusion, there is "*some new wine mixed* with old wine in new green bottles"!!

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Endnotes

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- * An earlier version of this paper was presented at the CAES-CATPRN Workshop, “Beyond the Three Pillars: The New Agenda in Agri-Food Trade”, held in Québec City, Canada, October 23, 2009.
 - 1. The Low Carbon Economy Act of 2007 [S. 1766] (<http://www.govtrack.us/congress/bill.xpd?bill=s110-1766>), and America’s Climate Security Act of 2007 [S. 2191] (<http://www.govtrack.us/congress/bill.xpd?bill=s110-2191>).
 - 2. The American Clean Energy and Security Act of 2009 [H.R. 2454] (<http://www.govtrack.us/congress/bill.xpd?bill=h111-2454>), and Clean Energy Jobs and American Power Act [S. 1733] (<http://www.govtrack.us/congress/bill.xpd?bill=s111-1733>).
 - 3. The bill is non-specific about the methodology for calculating the quantity of allowances that an importer of any eligible good will have to submit [H.R. 2454, Section 905, (a) (1)(C)].
 - 4. Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community. (http://ec.europa.eu/environment/climat/emission/pdf/com_2008_16_en.pdf)
 - 5. Interestingly, Krugman has been quite critical of President Obama’s position on border adjustments.
 - 6. Aluminum and paper are part of the sample of carbon-intensive goods analyzed by Houser et al. (2008), along with steel, chemicals and cement.
 - 7. For further discussion of relative supply and demand analysis in this context, see Copeland and Taylor (2003).
 - 8. See Bagwell and Staiger (2001b) for the technical details.
 - 9. Under Article XXIII of GATT, situations are described where actions taken by one member may be expected to “nullify or impair” the market access benefits expected by another member. As a result, a violation complaint can occur if a member country fails to meet its WTO obligations, e.g., it breaks a tariff binding.
 - 10. These models assume that there are no savings and no labour-leisure choice on the part of consumers.
 - 11. Lockwood and Whalley (2008) do recognize that border tax adjustments may be sector-specific, but they also argue that such taxes could still be neutral in their effects, although they do not provide any substantial analysis to support this claim.
 - 12. Based on the ruling in this case, Charnowitz (2002) argues that WTO rules do not forbid the use of environmental trade measures linked to PPMs in the exporting country. In May 1998, a WTO dispute settlement panel ruled that the United States wrongfully blocked imports of shrimp from countries catching them in a manner that endangered turtles. While the WTO’s Appellate Body upheld the original ruling in October 1998, they did recognize that the trade measure served a

-
- legitimate environmental objective but ruled that its implementation was arbitrary and discriminatory.
13. See, for example, Goh (2004), Biermann and Brohm (2005), Pauwelyn (2007), Bordoff (2009) and WTO/UNEP (2009).
 14. The purpose of the Superfund tax was to help underwrite the cost of cleaning up hazardous waste sites.
 15. Based on the WTO/UNEP report (2009), Krugman (2009) is of the opinion that the WTO will probably look favourably on border tax adjustments, but this author's reading of the same report suggests a much more nuanced position is being taken by the WTO at present, in keeping with other contributions to the legal debate.
 16. It should be noted that in the context of WTO rules, border adjustments are not motivated by environmental concerns but, as Demaret and Stewardson (1994, 14) note, "to preserve competitive equality in international trade".
 17. As noted earlier, this treatment of imported final goods broadly matches border tax adjustments as currently applied in the United States.
 18. It should be noted that it is impossible to implement the border tax rule once final goods are produced jointly, for example the set of goods produced through the refining of petroleum (Poterba and Rotemberg, 1995).

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