

Border Carbon Adjustments and the WTO¹

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Abstract

In this paper we discuss how a WTO adjudicating body would likely adjudicate a dispute concerning the legality of a Border Carbon Adjustment/Border Tax Adjustment scheme under the GATT, and we juxtapose it to our own preferred approach. There are some noticeable differences in the two approaches, the main one being the manner in which the two approaches control for the *default rules* allocating jurisdiction across states under public international law. In our view, relying on the *default rules* is a matter of legal compulsion anyway. But explicit reliance on the *default rules* would lead adjudicating bodies to an examination of the reasonableness in the exercise of jurisdiction, a review which is alien to the requirements of the GATT substantive obligations. Our proposed approach allows WTO panels to thwart unwarranted exercises of jurisdiction (that is, cases where no interest to regulate exists other than maybe protectionism). It also opens up the door to the legal relevance of multilateral environmental treaties (MEAs) that have been and are being concluded to address global environmental concerns.

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1 Introduction

One of many contentious issues in the policy debate over how to deal with green-house gas (GHG) emissions is the appropriate role of Border Carbon Adjustments (BCAs)/Border Tax Adjustments (BTAs).¹ The role of BCAs has been analyzed in a very large policy discussion literature, as well as in a significant number of academic writings in both law and economics. One can safely summarize the state of each of these literatures as bewildering: in the legal literature there is still no consensus as to whether such measures are legal under the WTO Agreement, and while the economic literature often show that such schemes in theory at least could have a role to play, there is doubt whether the literature addresses the concerns of critics of BCA schemes. The views concerning BCAs also differ widely in the policy areas. For instance, in November 2006 French Prime Minister de Villepin voiced his concerns with countries that will not take part in a successor to the Kyoto Protocol, expressing fear that this will lead to both competitiveness problems for European industry, and to carbon leakage. Some form of BCA was suggested to cope with these problems. However, the European Trade Commissioner Peter Mandelson discouraged effectively shelved this proposal arguing that such policies would ultimately prove counter-productive, since international cooperation was claimed to be necessary to combat climate change. In 2009 German officials even called a French proposal to target countries that would not participate in reductions of GHG a form of "eco-imperialism."²

At the same time, international cooperation is far from being guaranteed: the Copenhagen conference that took place in December 2009 delivered a modest outcome in the format of a short political declaration called the *Copenhagen Accord*.³ Throughout the negotiations two diametrically opposed points of view were expressed on the role of *trade measures*: a broad group of developing countries favoured the negotiation and inclusion of provisions that would restrict the use of unilateral trade measures as part of climate

¹The term BTA specifically refers to tax measure, but the taxes could be imposed for any reason (including e.g. revenue collection). The term BCA instead applies to measures with a specific purpose – to reduce carbon emissions – but includes any measure imposed at the border aiming at an equalization policy treatment of the embedded carbon content of like foreign and domestic products, regardless of whether the measure takes the form of a tax or a regulation. Since we are here concerned with adjustment schemes in the context of climate policy, we will use the term BCA unless we specifically refer to tax measures.

²Recently, similar concerns have been voiced by US policy makers. The Obama Administration has expressed willingness to join a successor to the *Kyoto Protocol* but has also argued that non-signatories should be punished for not joining in. As in the case of Europe though, no concrete measure has been adopted as yet (the *Waxman – Markey Act* was before the Senate at the moment of writing). Moreover, this is hardly an exclusively international issue: North Dakota recently voiced its concern with Minnesota's willingness to enact and apply a carbon tax, stating that it was prepared to sue, see http://digg.com/environment/N_D_likely_to_sue_Minnesota_over_carbon_tax.

³United Nations Climate Change Convention (UNFCCC), 15th Conference of the Parties (COP 15).

change policies; conversely, the European Union (EU), together with other developed countries, firmly opposed any provisions that would question the parties' right to apply trade measures in the climate change context. The end result was that no references to trade are made at all in the *Copenhagen Accord*, but trade-related proposals were included in the Chairs' draft texts.

The purpose of this paper is to discuss the legal possibility for WTO Members to use trade remedies in the form of BTAs/BCAs against other WTO Member. We will discuss the possibility of imposing trade remedies unilaterally and also as means to comply with a multilateral environmental agreement (MEA), such as but not limited to, the *Kyoto Protocol*.

In Section 2, we reflect on the economic literature on BCAs/BTAs. There is a wealth of analysis of their direct effects on the environment, which are typically found to be positive. The latter is hardly surprising given the presence of externalities in these analyses. But unfortunately this literature seems to largely disregard the critique of these schemes from the trade policy community, in particular, which fears that these schemes will become vehicles for disguised protectionism. In Section 3, we take this discussion within the legal multilateral trade context: we explore the question under what conditions recourse to BTAs/BCAs is consonant with WTO law. The Section provides the relevant regulatory framework that a WTO adjudicating body must have recourse to in order to adjudicate a dispute like the one presented here. Section 4 then seeks to determine how a WTO adjudicating body would likely view BTAs/BCAs. Section 5 changes the perspective, and discusses the question of how BTAs/BCAs should be viewed. We here first briefly highlight the view of the legal doctrine, and then turn to our own proposed approach. To ease the exposition we consider a series of scenarios in which an importing country levies carbon tariffs on the exports of a country with less ambitious EPs. Section 6 concludes.

2 Reflections on the Economic Literature on Border Carbon Taxes

The main purpose of this paper is to examine how, in light of the case law, an environmental border taxation adjustment scheme is likely to be treated in a GATT dispute, and secondly how such a dispute should be adjudicated under the GATT. In order to adequately address the latter normative question, it would be necessary to understand the effects of BCAs/BTAs. As we have also argued elsewhere (see e.g. Grossman et al (2010)), the objectives of the GATT, as expressed in its Preamble, are clearly of an

economic nature (which is not to deny that there may also be other objectives), and it operates by restricting governments’ interventions in markets. Economic analysis is required in order adequately interpret the GATT, and the role of BCAs/BTAs in the GATT. There is indeed a rapidly increasing, and by now very large, literature on the impact of these schemes. But this literature is too large and too unwieldy to be readily summarized and drawn upon here. We will therefore confine ourselves to point to some aspects of BCAs that we believe are central to the skepticism toward BCAs from the point of view of the trade policy community, but that do not seem to have been adequately addressed in the economic theory literature.

To avoid misunderstanding, we presume throughout that countries do not face the true cost of their emissions of GHGs and for this reason tend to emit more than is optimal. The question concerns the role of BTAs as a corrective mechanism to this problem.

2.1 “Allocational” Effects of BTAs

It is probably fair to say that most of the economic theory literature on BCAs/BTAs studies the impact of unilaterally imposed taxes in situations where an exporting country pursues no environmental policy (EP), or an EP that is deemed inadequate by the importer. It is for the most part not clear whether this is due to non-compliance with an existing MEA, or whether this is the outcome of unilaterally chosen weak EPs. The question addressed is thus whether the unilateral imposition of a tax on imports is desirable from a national and/or international perspective, assuming that all other policies are unaffected by the tax decision.

The situation hence typically seems to have the stylized feature illustrated in Figure 1:

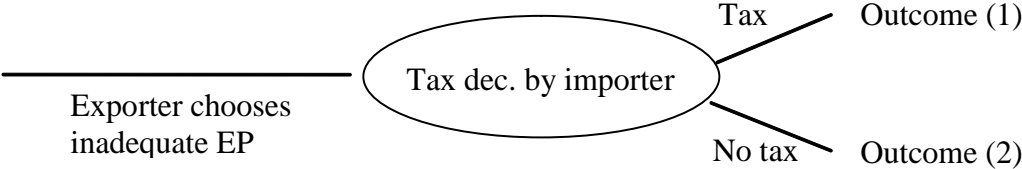


Figure 1

We will refer to this literature as studying “allocational” effects of BCAs/BTAs. These studies differ in the description of the economy, and in the more precise nature of the environmental problem they study.

This literature can be systematized in various ways. One distinction that can be drawn is between partial and general equilibrium analyses. Partial equilibrium analyses consider an isolated industry, without taking into consideration its interaction with other sectors. Hence, such analyses typically presume that the prices at which the industry at study purchases inputs, and the prices of all other products, are unaffected by what happens in the industry. General equilibrium studies instead highlight the interaction between different industries. The advantage of partial equilibrium analysis is that it allows for more detailed descriptions of the sector of primary interest, but this hence comes at the cost of disregarding important interactions with the rest of the economy. There is hence no presumption that either method is generally superior to the other.

Another distinction can be drawn between purely analytical analyses, and analyses employing some form of computations. Both methods are used both in the context of partial and equilibrium analyses, but it is more common for general equilibrium analyses to rely on computation, employing so called Computable General Equilibrium (CGE) models. These are typically large, computerized models, which use real-world data on trade flows, etc., to try to mimic the functioning of the world economy. The economic profession is divided as to the extent to which such models have any real predictive power, but they have become very popular in the study of environmental problems. Two factors seem to contribute to this popularity. First, the issue at stake is often too complex to allow analytical solutions, making it necessary to use numerical methods to shed light on properties of the economies under study. Second, the real question at stake is often not qualitative; for instance, it is quite obvious that an import tax discourages imports. The real issue is instead often quantitative, such as how large will border taxes have to be to tackle a certain problem? To answer such questions requires use of computations.

The economic literature on BCAs/BTAs contains a very large number of both partial and general equilibrium studies of the allocational effects of BTAs. Recent examples of partial equilibrium studies are Fischer and Fox (2009), Gros (2009), Ismer and Neuhoff (2007), and Veenedaal and Manders (2008). Examples of recent general equilibrium studies in this category are Mattoo et al (2009), McKibben and Wilcoxon (2008). It is almost impossible to generalize the findings in this large literature. But perhaps it can be said to show that border taxes may reduce global environmental problems, and may be beneficial from a welfare point of view for at least the importing country. But some studies also suggest that the gains are quantitatively small except for in a few energy intensive sectors.

The interest in the role of BTAs in the GATT is not new, of course. The 1960s and 1970s witnessed a lively discussion concerning the legality of such schemes. The BTAs of interest were then not motivated by environmental concerns, but as means of correcting for different forms of indirect taxation. This interest in turn went back to the debate concerning the process of European integration in the 1950s and 1960s. The EC adopted in the 1960s a destination-based VAT scheme as a means of harmonizing taxation within the Common Market. It was subsequently argued by the US that this arrangement created a competitive disadvantage for US firms relative to EC firms, since EC firms would be exempted from the high EC value added tax (VAT) when exporting and would pay only the low US VAT; conversely, US firms would face the higher European VAT when exporting.

An economic academic literature emerged in response to these policy discussions, building on insights dating back to the *Tinbergen Report* (1953).⁴ The essential point made in this literature, which addressed general equilibrium aspects of BTAs, was that it is under certain conditions immaterial from a trade point of view whether a tax system is origin-based, or destination-based. The implication would thus be that the implementation of a BTA scheme, which effectively transforms an origin-based system to a destination-based system, actually has no effect on trade.

To get some intuition for the mechanism behind this result, note first that an origin-based indirect tax is effectively equivalent to a producer tax, since only goods produced in the taxing country will bear the tax, and will do so regardless of whether production is for consumption domestically or abroad. A destination-based tax instead corresponds to a consumption tax since domestic production for exports are compensated for the tax through the BTA, and exports to the market have to pay the tax also through the BTA. Second, note also that the tax schemes under consideration (sales and value added taxes) treat all products uniformly, whether they are destined for local consumption or exports. Third, the proposition assumes (among other things) that prices respond flexibly to clear markets, and the perspective is sufficiently long run that full employment of all resources is ensured.

Consider first an origin-based tax system, in which a country imposes uniform taxes on all domestic production. In such a case, consumers can continue to purchase both imports and export products at international prices. The relative price facing consumers will therefore remain unchanged (for the sake of the argument we assume that international

⁴According to Johnson *et al* (1968), the insight should be largely attributed to the Tinbergen Committee member W.B. Reddaway (1958). Later contributions include Dosser (1967), Shibata (1967), Johnson and Krauss (1970), Meade (1974), Grossman (1980), Berglas (1981), and Georgakopoulos and Hitiris (1992), to mention just a few papers in a very large literature.

prices are unaffected), and they so no reason to reallocate production between imports and exports. The international prices of the imported product will serve as ceilings on what domestic producers can sell their products for domestically and abroad. Hence, the production taxes will reduce the net prices received by producers, whether selling domestically or abroad, but will do so in the same proportion for all products. So these producers see no reason to reallocate production. And with full employment of all resources, they will have to continue employing the same amount of resources, and thus produce the same volume. The effect of the imposition of the tax will thus be to affect the level of producer prices, and indirectly also factor rewards, but not production or trade.

In a similar way, if a destination based tax system is introduced, home country consumers will not see any relative price changes, since all consumption will be taxed in the same fashion, regardless of origin. Domestic producers maintain the possibility of selling both the importable and the exportable at the respective international prices, so domestic relative prices facing producers will have to remain unchanged. They will neither see any reason to reallocate production. Consequently, the imposition of the BTA, which converts the tax system from being origin-based to being based on destination, will not have any impact on trade.

Lockwood and Whalley (2008), and Whalley (2009), emphasize the relevance of this earlier literature for the current debate concerning the virtues and vices of BCA schemes. If applicable to the current discussion, this literature would suggest that BCAs in the form of BTAs will have no trade impact, in which case they should not be a source of concern from a trade perspective (at least not as it concerns their allocational effects), but also would not address the competitiveness and carbon leakage problems that they are meant to ease.

This raises the question of whether the assumptions underlying this earlier literature are appropriate for the current discussion. As briefly explained above, central to the non-equivalence result was the fact that uniform taxes were being considered. Lockwood and Whalley (2008), and Whalley (2009), argue however that similar features would arise also with sector-specific BTAs, provided that certain factors of production, such as labour, are sector-specific (so that the sector-specific returns to these factors would be the adjusting mechanism). It is hence possible that the neutrality is somewhat more general than suggested in the earlier literature. But there are still strong indications that the equality between origin- and destination-based tax systems is sensitive to a number of implicit assumptions in the earlier analyses. To take just one example, Grossman (1980) shows that the two tax systems are not equivalent when generalizing the model to include trade in intermediate products, an extension that a priori might seem rather innocuous in this

context.

In our view, the main lesson to draw from the earlier literature is, as pointed out also by Dong and Whalley (2009), that what matters when general equilibrium effects are taken into account, is not the absolute level of border taxes, but the difference in rates across sectors and products.

2.2 “Strategic” Effects on EP Decisions

Studies focusing on “allocational” effects of BTAs implicitly (and in rare instances explicitly) assume that there are no responses to BTA in terms of changes in other countries’ EP. It appears however, that one of the purposes of BTAs is to induce other countries to adopt similar EP to those pursued by the importing countries. There are thus differences between the ex post facto effects of the imposition of taxes, and the imposition of a BTA *scheme* affecting future decision making. Following the economic literature, we will refer to induced changes in the behavior of other decision makers, following from the imposition of a BTA scheme, as “strategic” effects. Several types of strategic effects have been discussed in the policy literature.

For instance, the imposition of a BTA regime may affect exporters’ incentives to comply with a MEA. A very simple illustration of the decision problem with regard to a BTA in such a case is provided in Figure 2. An economic analysis of the BTA scheme would then assess the difference in outcome depending on whether the importing country decides to impose a BTA scheme or not.

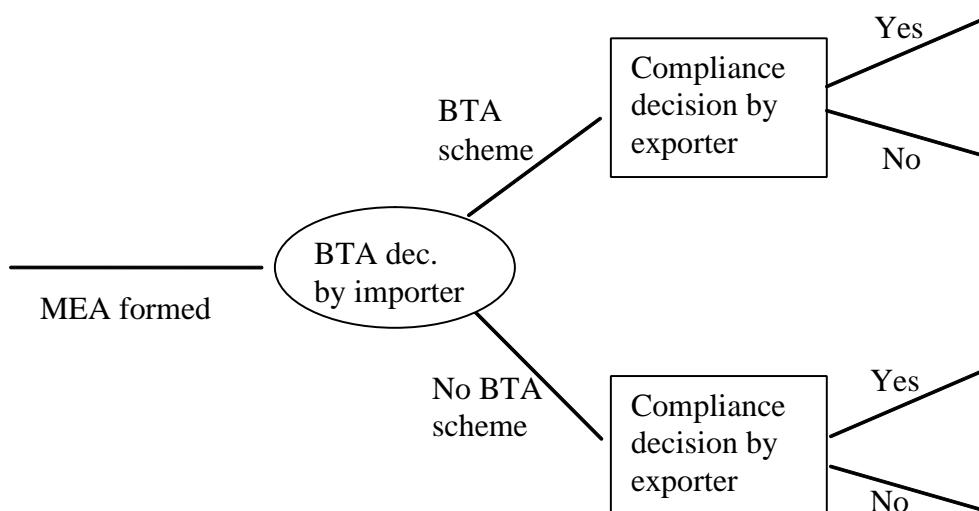


Figure 2

A very similar type of possible strategic impact of a BTA regime is to affect the unilateral EP decision of an exporting country that has decided *not* to participate in a MEA. Such a country still has to decide on its EP, and it may choose more or less ambitious policies.

A third possible strategic impact of a BTA scheme is to *influence the negotiations concerning a MEA*. This may concern both the willingness to form a MEA, as well as the undertakings in such an agreement. There are several ways in which this might occur. One possibility is that the *expectations* concerning the future imposition of a BTA influences negotiations concerning the MEA. Another possibility, illustrated in Figure 3, is that a commitment to a BTA ex ante MEA negotiations may impact their outcome. The possible developments should the BTA regime not be chosen is for expositional convenience not illustrated in the Figure, but is just indicated with a dashed arrow. Of course, this branch would also have to be considered.

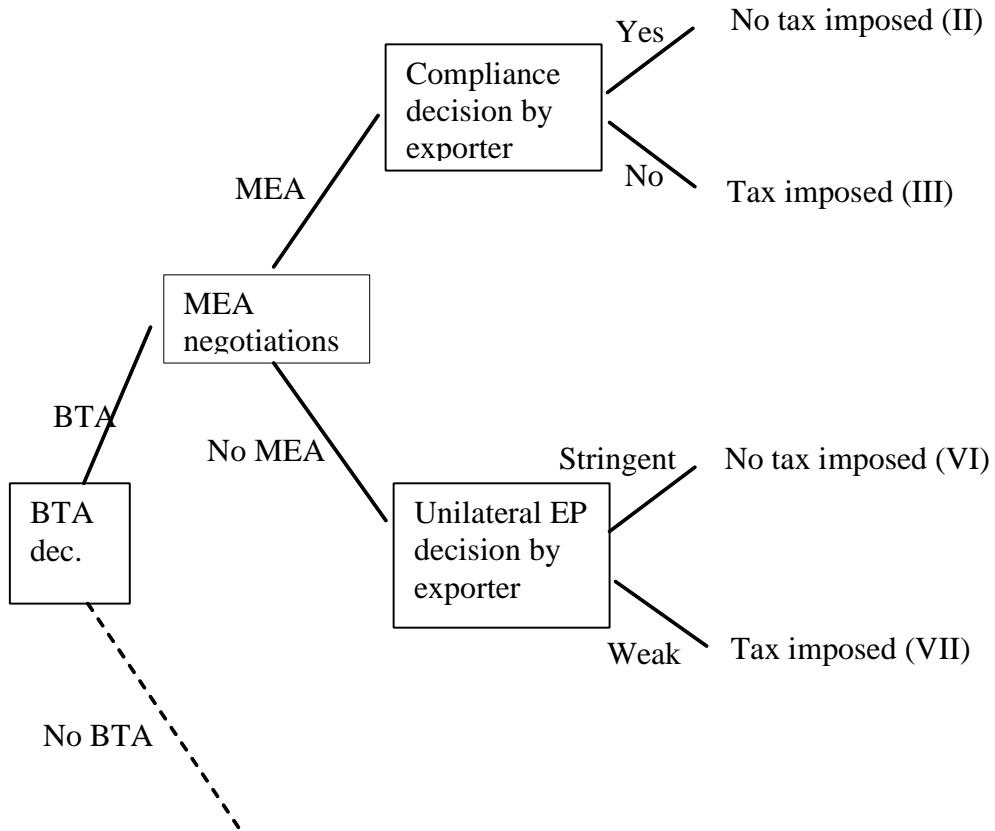


Figure 3

It seems plausible that a BTA would induce exporting countries to change their EPs. For instance, they should have incentives to improve their standards not to forego surplus that would otherwise accrue to the importing country as tax revenue. But our purpose is not to suggest any particular impact of BTAs in this regard, but to argue that there may be important strategic effects of BTAs on exporting countries EPs, and that these need to be considered when evaluating the pros and cons of BTAs. Unfortunately there are few formal economic analyses of this sort, to the best of our knowledge. A recent exception is the study by Tian, Whalley and Cai (2009), which employs a CGE model to investigate how high carbon tariffs have to induce e.g. Brazil to join a climate agreement.

2.3 BTA Interaction with the Trade Policy Regime

It is natural, in light of actual GHG emissions, to analyze the impact of carbon taxes in settings where exporting countries pursue inadequate EP. It is also natural that studies of such settings tend to conclude that these schemes yield environmental and often also welfare benefits (albeit that the estimated effects quantitatively speaking often may be modest). At the same time, such findings do little to comfort critics of BTA schemes, since these studies typically assume away the problems critics fear will arise.

A major source of criticism of BTA schemes concerns their relationship to the trade policy regime. There are several aspects of BTAs that critics find potentially troublesome. In what follows we will briefly point to some of these issues.

2.3.1 Protectionist Imposition of Carbon Taxes

An often expressed fear in trade policy circles is that border taxes will be imposed not only to combat environmental externalities, but also for *protectionist* purposes. For instance, taxes may be imposed in situations where they are not called for, or they may be larger than necessary in situations with environmental externalities. This critique would thus argue that the relevant sequence of decisions is not as illustrated in Figure 3, but rather something along the lines of Figure 4.

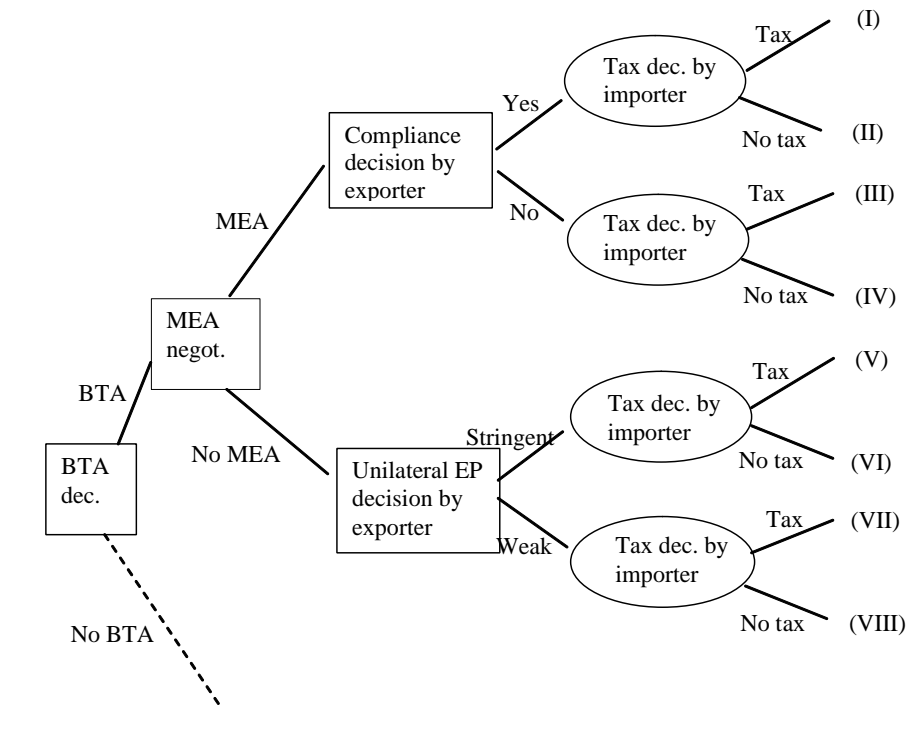


Figure 4

In this setting the importing country hence first decides whether to impose a BCA scheme. If it is imposed, the countries negotiate a possible climate agreement (for simplicity we disregard the case where there is no BTA). The negotiations may either produce an agreement (MEA), or may fail to produce an agreement (No MEA). If there is a MEA, the exporting country can decide to comply with the agreed undertaking (Yes), or not to comply with the agreed undertaking (No). If there is no MEA, country B may decide unilaterally to impose a stringent EP (Stringent), or a weak EP (Weak). For each of the four possible outcomes with regard to the exporting country's EP, the importing country decides whether to impose a carbon tax (Tax), or to not impose a tax (No tax). Hence, in the case where a BTA is imposed, there are eight different outcomes, in four of which no tax is imposed, and in four of which a tax is imposed.

The depicted situation may seem complicated, but still lacks many central aspects of the real world problem. For instance, it does not take into account the nature of the commitment in case of a MEA. It is likely to make a significant difference to country A's incentives whether the undertakings are stringent or not. It also assumes the BCA is introduced prior to the negotiations concerning the MEA, rather than afterwards, for instance as a response to a failure to reach an agreement. Also, there is no interaction with trade negotiations. We will return briefly to these issues below.

The difference introduced here relative to the setting depicted in Figure 3, is hence that the importing country can unilaterally decide taxes, regardless of whether there is compliance, in the case where a MEA has been formed, or whether the exporting country pursues stringent EPs, in a situation where there is no MEA. The existence of the BTA scheme thus creates possibilities to impose border taxes, allegedly for environmental reasons, whenever this happens to be politically suitable to the incumbent importing country government. The fear is thus that taxes will be imposed either when the exporting country abides by the MEA – denoted outcome (I) – or when there is no agreement, but the exporting country unilaterally pursues a stringent EP – outcome (V). The imposition is pure protectionism in both these instances. Also, the taxes that are imposed in the more legitimate situations (III) and (VII) may be larger than justified to combat the environmental externality. Such protectionist imposition of carbon tariffs must obviously be taken into consideration also when evaluating the desirability of a BCA scheme.

The fear for the abuse of BTA schemes stems from ample experiences in the trade policy area of the willingness and ingenuity of governments to let protectionist motives influence policy making. For instance, there seems to be a close parallel here with the anti-dumping regime, which allows governments to unilaterally impose duties on imported products when they have been priced “too low” by exporting firms. The rules concern-

ing when duties can be imposed, and how large the duties can be, etc., have become increasingly opaque, and the anti-dumping regime is consequently today considered as a main instrument for protectionism. It is highly likely that the calculations of duties in a BTA scheme will be equally complex. There are a number of problems involved just in calculating the amount of GHG emitted during the production process itself. But if the adjustment is only done for this part, exporters could circumvent large part of the taxation by effectively using purely trading firms for the exports. It is therefore necessary to somehow adjust for the emissions that stem from the production of the inputs into exported product, and preferably also for the emission during the whole chain of production of these inputs. Some of these products might in turn have been imported, and thus been produced under other taxation schemes than the one in the exporting country. It is obvious that the methods of calculation will by necessity be both highly arbitrary and extreme complex. Similar issues arise in case of BTAs in the form of emission allowance schemes.

Another close parallel can be drawn with the “rules-of-origin” in developed country preferential tariff agreements for importation from developing countries. The rules-of-origin are meant to prevent exporters in other countries than those receiving preferences to take advantage of the low tariffs offered through the preference scheme, by exporting through these countries. These rules have become extremely complex, and are occasionally so administratively onerous to comply with that exporting firms in preference-receiving developing countries deliberately choose to enter e.g. the European Union (EU) under higher MFN tariffs, this requiring much less documentation. While some form of rules-of-origin is necessary, it is often suggested that developed countries deliberately device these rules in such a fashion in order to take back with one hand what they have given away with the other. It is likely to be necessary to keep track of the origins also in the context of BCAs: the intermediate products used in the production of an imported product may themselves be imported. If so, the extent to which the production of these intermediate products have given rise to emissions will depend where they have been produced, to the extent that countries pursue different EP. Again, the complexity of these rules is likely to leave scope for protectionism.

There is to the best of our knowledge very little formal analysis of the possibility for using BTAs in protectionist fashion. Two of the few exceptions we know of are the papers by Holmes, Rollo and Reilly (2009a and b). There is clearly needed much more work to evaluate the potential for protectionist use of BTAs.

2.3.2 The Slippery Slope Argument

A related concern is that the introduction of BTA schemes in the area of environmental externalities will open the door for similar arrangements in other policy areas. For instance, there may be a pressure in countries employing BTAs for the sake of the climate, to not only address the competitiveness and leakage concerns in this area, but to do the same for industries that e.g. compete with imports that benefit economically from less safe working environments, or why not, just from lower wages. It can be argued that imports are eroding the efforts to maintain high standards also in these latter cases, and that BTAs should be imposed to level the playing field.

2.3.3 The Interaction with Trade Negotiations

In the discussion thus far we have implicitly assumed that all other policies, including trade policies, remain unchanged. It is as always an empirical question whether such an assumption is warranted. If BTAs are limited to be employed in a few narrowly defined sectors, this may be fine. But if they have significantly broader coverage (without imposing uniform taxes across all products – see the discussion above), the assumption is more troubling. In particular, one should in such instances expect the imposition of BTAs to affect trade negotiations, and negotiated trade agreements to affect the use of BTAs.

Bringing trade negotiations into the picture raises the rather fundamental question of why the reductions of trade flows that the BTAs seek to achieve are not handled in the organizational context where trade barriers are determined – through trade negotiations? One possible reason is of course that the product classification system that is being used in trade negotiations – the Harmonized System (HS) – does not allow for distinctions according to the environmental properties of the production processes of imports. However, it would be possible for members of the WTO to propose amendments to the HS that if implemented would enable importing countries in their tariff schedules to make such distinctions. This would mean that the level of these barriers become objects of negotiations, and thus that their levels are more likely to be globally optimal compared to when they are unilaterally determined. To our knowledge, no such discussion has taken place so far in the context of the HS Committee.

2.4 A Simple Model Illustrating Some of the Complexities Concerning BTAs

In order to just hint at the complexity of the issues raised in Section 2.3, we will here employ an extremely simple, standard (quadratic) partial equilibrium model in which production gives rise to an environmental externality, which could be thought of as climate change. Details concerning the derivations of the results to follow can be found in the Appendix.

2.4.1 The Model

Consider a world in which there are two countries, Home and Foreign. We will focus on just one perfectly competitive sector where Home imports from Foreign, but in the background there is a symmetric sector where the roles of the two countries are reversed, ensuring two-way trade. Home and Foreign firms have the same quadratic cost functions, but all consumption takes place in Home. Foreign hence exports to Home, and there is an import-competing domestic industry in Home.⁵

The complicating feature from a policy point of view is that the global climate is more adversely affected, the larger is the global production (due, say, to the release of CO₂ in production). The damage is quadratic in global production, and hence increases at an increasing rate in production, and it does not matter from a climate point of view where production occurs.

Home has two policy instruments by which to affect production: a specific carbon tax t_H levied on domestic production, and a specific import tariff τ , and Foreign has a specific carbon tax t_F levied on its domestic production. Governments are assumed to maximize the social welfare of their respective country.⁶ For the Home country it is given by the sum of domestic consumer surplus, Home producer surplus (or profits), and government revenue, less the climate damage. Since there is no consumption in Foreign, Foreign welfare consists of the sum of Foreign producer surplus and Foreign government revenue, less the climate damage. Hence, the climate damage affects both countries equally. Finally, the global welfare measure is the sum of the welfare of the two countries.

⁵Instead of generating the direction of trade by assuming that all consumption is in Home, we could assume e.g. that the demand is the same in both countries, but Foreign firms produce at a lower cost (reflecting a comparative advantage in the product).

⁶Social welfare maximization is not assumed because we believe that it is the most accurate description of actuality, but partly because it is analytically the simplest, and partly since it provides the standard base case against which to compare perhaps more realistic politically-influenced formulations of government incentives.

The assumptions of the model are designed to lead to the simplest possible representation of a global economy in which national governments use carbon taxes and a tariff to promote national interests. For each institutional setting we consider it is possible to completely determine the economic outcome in terms of production levels, climate impact, welfare levels, etc., making it possible to easily study the importance of e.g. the order in which the governments set their policies, whether the tariff is set unilaterally or negotiated in a trade agreement, etc..

Before examining a number of different scenarios for the determination of the tariff and carbon taxes, let us first point to a basic feature of this economy. Suppose that there are no carbon taxes, and that the import tariff is initially also nil. A small increase in the tariff will then *increase* both Home and Foreign welfare, and hence by necessity also global welfare. Why? Absent the environmental problem, the global economy would be fully efficient. In such a situation, the introduction of a very small tariff would not have any impact, but as the tariff is increased, global welfare would be reduced. In the present case however, the small tariff would have the additional consequence of reducing the climate problem, by reducing total production (Home production would expand but not enough to fully compensate the reduction in Foreign production), and this is what creates the gain from the introduction of a small tariff.

Have we then shown the desirability of a BTA scheme? We would argue no. What has been shown is the desirability of combatting the externality, and we have removed the possibility to do this with the instruments that are directly designed for this task – the carbon taxes. Instead, for a scheme to classify as a BTA, it would seem that it should fulfill at least two properties:

1. As the name suggests, it should involve an *adjustment* that is made in order to levy a playing field. This in turn requires that the tax in the importing country is higher than that paid by the exporting firms.
2. The desirability of the BTA should hinge on the *existence of Home carbon taxation*. If it is desirable regardless of whether a carbon tax is imposed in the importing country, it seems to be solving some other problem.

2.4.2 Scenario 1: Carbon Taxes are Unilaterally Determined

A more interesting experiment would thus be consider a situation in which the two countries impose carbon taxes, to see whether there global welfare would benefit from something that more looks like a BTA. To this end, assume that the two countries simultaneously set the carbon taxes to maximize their respective social welfare, with the tariff set

at 0. The chosen levels will then depend on the tariff, and it can readily be shown that Home will set a *lower* carbon tax than Foreign. Why? The reason is that in contrast to Foreign, Home *protects consumer interests*. The higher is the carbon tax, the higher is the consumer price, and the lower is Home welfare (disregarding climate impact). Home also has the standard commercial interest in imposing a tariff, which makes it optimal for an importing country to unilaterally impose a tariff due to the terms-of-trade gain. These two considerations add additional incentives for Home to keep a low carbon tax relative to Foreign's incentives.

As it turns out, it would again improve global welfare to introduce at least a small tariff. But the fact that Home sets a lower carbon tax than Foreign suggests that it would not be correct to call this a border tax *adjustment* either, since implicit in this expression is the presumption that the importing country firms are disadvantaged by facing a higher carbon tax. Hence the first criterion above for a tariff qualifying as a BTA is not fulfilled. Nor can it occur in the context of this model that the gain to introducing the tariff hinges on Home having a carbon tax. (What can be shown though, is that the globally optimal tariff is higher, the higher is the Home carbon tax.)

2.4.3 Scenario 2: Carbon Taxes and the Tariff are Unilaterally Determined

In the previous section we considered the impact of *introducing* a small tariff, assuming that carbon taxes were unilaterally determined. More interesting is a situation where both carbon taxes and the tariff are unilaterally determined. It can be shown that in this scenario, Home will indeed levy a higher carbon tax than Foreign. So from this point of view there does seem to be, at least potentially, scope for a BTA. It can also be shown that it is indeed warranted from a global welfare point of view with a tariff, given the carbon tax levels.

The problem is however, that the tariff Home will choose is too high, resulting in too high total taxation of the imported product (the sum of the carbon tax and the tariff), and too low taxation of Home production. This will from a global point of view distort the allocation of production, with an overproduction in Home relative to Foreign.

2.4.4 Scenario 3: A Trade Agreement with Myopic Negotiators

The setting in the preceding section is a useful benchmark. But since it assumes that the import tariff is unilaterally set, it does not allow for the tariff to serve as a tax *adjustment*. In order to capture this possibility, we will consider two scenarios in which the tariff is negotiated rather than unilaterally set. For both scenarios we assume that negotiators do

not "leave anything on the table", in the sense that they choose the tariff that maximizes their joint welfare.⁷ The two scenarios differ in whether negotiators take into consideration any impact of their agreement on the setting of carbon taxes.

In this section we consider the "myopic" scenario where negotiators do not take any such effects into account. This could either represent a situation where tariff negotiations and the setting of national carbon taxes occur simultaneously, or a situation where tariff negotiations occur before the unilateral determination of carbon taxes, but where negotiators do not see the implications of their agreement for these taxes. We assume though that negotiators do take into consideration how the tariff will affect production in the two countries, and thus indirectly consumer and producer welfare, and the climate (government revenue is from a global perspective just a transfer and wash out).

The fact that the tariff is negotiated rather than unilaterally set by Home implies that it will be lower, as would conventionally be expected. At the same time, it is optimal for Home to set a lower carbon tax, the lower is the tariff, and it is optimal for Foreign to set a higher carbon tax, the lower is the tariff. Trade negotiators do not factor these relationship into the determination of the tariff level, since they are assumed to be myopic. But since the tariff will be lower with the negotiations for standard reasons (also Foreign welfare is taken into consideration for the tariff setting), the outcome with trade negotiations will feature lower carbon taxation in Home and higher taxation in Foreign, than with unilateral tariff setting.

The prospect for a BTA looks better in this setting than in those above. First, Home here imposes a higher carbon tax than does Foreign, so Home could use this to argue that it is protecting the environment more than Foreign. (But it would then neglect the fact that the total taxation of the Foreign product is *higher* than the total taxation of its own product.) Second, Home would prefer a higher tariff than the negotiated one. Third, global welfare would be higher, if Home could increase the tariff. The reason for the last property is that an increase in the tariff would induce desirable changes in carbon taxes, changes that negotiators in this scenario fail to appreciate.

2.4.5 Scenario 4: A Trade Agreement with Forward-Looking Negotiators

We now turn to the second trade agreement scenario, but one where trade negotiators take into full consideration how their agreement on the tariff will affect future unilateral decisions on carbon taxes – what we denote the agreement with *forward-looking* trade negotiators.

⁷This is a standard assumption in all economic analysis of trade agreements.

The outcome will in this case have some interesting features. First, the trade agreement will lead to a *higher* tariff compared to when trade negotiators are myopic. The tariff will even be higher compared to when the tariff is set unilaterally and simultaneously with carbon taxes! The reason is hence related to the fact that negotiators take into consideration how the carbon taxes adjust to the negotiated tariff. A higher tariff has the virtue of driving up the Home carbon tax, which is too low from a global point of view.

As a result of the higher tariff and the induced changes in carbon taxes, the forward-looking trade agreement will lead to lower total production, and thus less welfare from consumption, compared to the myopic agreement case. But the mirror image is that the climate will be better with the trade agreement than with unilateral tariff setting. The latter effect will dominate from a global welfare point of view.

Will this qualify as a scenario in which a BTA could be rationalized? Just as in the case of myopic negotiators, Home imposes a higher carbon tax than does Foreign (albeit lower total taxation). However, in this case, the tariff will actually be too *high* from Home's unilateral point of view, in the sense that it would prefer to lower the tariff regardless of whether the Foreign carbon tax remain constant or adjust in an optimal fashion from Foreign's point of view. Hence, the scenario could hardly support a BTA.

2.4.6 Scenario 5: A Trade Agreement with Commerically-Minded, and Myopic Negotiators

Our final – and unfortunately perhaps most realistic – scenario is where trade negotiators disregard the climate impact of their agreement, as well as the impact on environmental policies. Within the setting of the model, they would then ideally prefer free trade and no carbon taxation, since this would maximize global consumer and producer surplus. But a zero tariff would induce governments to impose positive carbon taxes, and this would make a zero tariff no longer optimal from the point of view of trade negotiators, since there would then be too little trade from a global point of view. To remedy this, they would actually prefer an export subsidy. But assuming that this is infeasible, the best they can achieve is to pursue free trade.

This type of behavior would yield larger volumes of production and consumption, than any other scenario. But it would lead to the worst climate, and the lowest global welfare, among the scenarios. Furthermore, in this case, Home would levy a lower carbon tax than Foreign, so it does not seem to provide any support for a BTA.

2.5 Conclusions

A first purpose of this brief discussion of economic aspects of BTAs has been to shed a little light on an extremely large and unwieldy literature economic literature on BTAs. Much of this literature assume setting in which the allocational effects of BTAs are desirable almost by necessity. As emphasized above, these analyses side-step several aspects of BTA schemes that critics point to as potentially problematic. For instance, they may be used for partly protectionist reasons, causing taxes to be higher than is adequate from an environmental point of view, or to be imposed in situations where they should not be imposed at all. BTAs may also invite political pressure for BTAs in other policy areas, and they may interact with trade negotiations. There is very little economic (or legal) analysis of these types of concerns, and it is not even clear how much that can be done in this regard. But in our view, as long as the likelihood and costs of these concerns are not addressed, the analysis of BTAs is highly incomplete.

To provide a little more substance to our claims, we have also considered an extremely simple formal model. The purpose has not been to prove or disprove the arguments in favor of BTAs, but to shed a little light on some of the aspects that the environmental economics literature has tended to disregard, such as the possibility that BTAs are not imposed to protect the climate but to promote government interests more generally, and the intricate interaction between BTAs, unilateral environmental policies, and the trade regime.

The model assumed that government policies, including carbon taxes, are not designed so as to minimize climate damage, but like any other policy, so as to maximize governments' objective functions. The latter were taken to be social welfare, but the analysis could easily be extended to incorporate "political" elements. For instance, because of lobbying by the import-competing industry, governments may put more weight on their producer surplus. When the governments levy taxes and the tariff, they thus take into consideration the commercial benefits from doing this. It has also been assumed that the trade regime affects the unilateral determination of carbon taxes, and that trade negotiators may possibly take into consideration the consequences of a trade agreement for the climate. The model thus captures some interaction between these two policy arenas. Consequently, the model incorporates some of the elements that are of concern to critics of BTA schemes, albeit in extremely simplistic fashion.

A related purpose has been to emphasize that a BTA is something more than just a tariff, and that an argument in favor of a BTA thus needs to establish more than just the desire of an importing country to unilaterally impose a tariff. We proposed a couple of

such criteria, one being that the importing country levies higher carbon taxes than the exporting country, and the other being that there is a global gain from the imposition of a BTA tariff on top of a negotiated tariff, that stems from the higher domestic carbon taxation.

As it turned out, even in the context of this extremely simple, but archetypical, model it was not straightforward to identify any scenario that would squarely point to a case for a BTA. The scenario that came closest to supporting a BTA was the one in which trade negotiators disregard the impact of the tariff agreement for the determination of carbon taxes, but do take climate implications into account.

A more general finding in the formal analysis is the importance of the role played by the objectives and sophistication of trade negotiators. With regard to objectives, a "trade agreement" can be an agreement that is designed only with a view on the implications for trade – the commercially-minded negotiators above. Alternatively, it can be an agreement that regulates trade instruments, but that is designed with a view toward the effect on total welfare, climate included. In the latter case, trade policy and climate policy becomes intricately entwined. Turning to the sophistication of negotiators, we have seen that it makes a tremendous difference to the prediction of the model whether they take into consideration the impact of the trade agreement for environmental policies. When trade negotiators take such effects into account, the trade agreement, even though it only binds a trade instrument, effectively becomes as much environmental policy as trade policy.⁸ In this model, this has the consequence that the negotiated tariff is higher than what would be unilaterally chosen by the importing country. Of course, such an undertaking would appear alien in the current GATT, but could be . But what this result does show is that if countries were to take full account of the consequences of trade negotiations for the climate, new forms of conflict of interest might be brought into the WTO. While the tariff has the usual negative impact on the commercial interest of the trading partner, it will also have beneficial effects on the climate, and importing countries have incentives to undersupply the latter type of effects.

Finally, the fact that this simple model yields limited support for BTAs does not imply that other formulations could provide a more convincing case for such arrangements. For instance, it seems straightforward to generate scenarios where a richer country pursues a more ambitious climate policy, and where there may thus be carbon leakage. But such a scenario would raise new issues concerning the appropriateness of BTAs. For instance, is it globally desirable to let richer countries impose tariffs on poorer countries since they do not choose the same level of climate regulation? We do not know the answer to this

⁸The importance of the perceptions of negotiators is also discussed in Horn (2006).

question, but just want to point out that while a reformulation of this standard trade model to solve some of the problems it has to generate a case for BTAs may give rise to new problems.

3 Legal GATT Instruments of Relevance to BTAs

The purpose of this Section is to present the relevant legal background to our discussion on BTAs/BCAs GATT rules. Since BTAs/BCAs are domestic instruments they must comply with Art. III GATT. This provision covers, in principle, all domestic instruments with two exceptions: subsidies and government procurement have been explicitly carved out from its coverage. Following the advent of the WTO, the original GATT (1947) has been superseded by a new instrument, the GATT 1994 which comprises not only the original text but also all decisions by the GATT CONTRACTING PARTIES, that is, the highest organ competent to adopt decisions that bind the GATT membership. One such decision is the report of the *Working Party (WP) on Border Tax Adjustments*.

3.1 What Was the WP Requested to Do?

The WP was requested to pronounce on the GATT-consistency of practices by the GATT contracting parties referred to as *border tax adjustments*. In the words of the drafters of the WP final report, the mandate was (§ 1):

Acting under paragraph 1 of Article XXV and with a view to furthering the objectives of the General Agreement, and taking into account the discussions in the Council:

1. To examine:
 - (a) The provisions of the General Agreement relevant to border tax adjustments;
 - (b) The practices of contracting parties in relation to such adjustments;
 - (c) The possible effects of such adjustments on international trade.
2. In the light of this examination, to consider any proposals and suggestions that may be put forward; and
3. To report its findings and conclusions on these matters to the Council or to the CONTRACTING PARTIES.

In short, the WP would examine the consistency of BTAs with the GATT rules, which means that, a priori, one could not exclude that it recommends a narrowing down of the scope of Art. III GATT. As we will see in more detail infra, this is exactly what happened.

The term border tax adjustment is explained in § 4 of the final report:⁹

... as any fiscal measures which put into effect, in whole or in part, the destination principle (i.e. which enable exported products to be relieved of some or all of the tax charged in the exporting country in respect of similar domestic products sold to consumers on the home market and 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.)¹⁰

The mandate hence included *any* fiscal measure. Further, § 5 of the final report makes it clear that, for a measure to be considered a BTA and thus be covered by the WP report, the adjustment does not have to take place at the border, that is, at the moment a good goes through customs; it can take place at a later stage, that is, after the importation-related procedures have been completed, assuming, of course, that the rationale for its imposition is the crossing of the border. Hence, the work of the WP concerned instruments which normally come under the purview of Art. III.2 GATT.

Art. III.2 GATT is not the only GATT legal provision that is relevant when it comes to operating border tax adjustments. The members of the WP agreed that five other GATT legal provisions were relevant in the examination of the GATT-consistency of BTAs: Arts. I, II, VI, VII, XVI GATT.

Art. II.2(a) GATT provides that:

Nothing in this Article shall prevent any contracting party from imposing at any time on the importation of any product:

(a) a charge equivalent to an internal tax imposed consistently with the provisions of paragraph 2 of Article III in respect of the like domestic product or in respect of an article from which the imported product has been manufactured or produced in whole or in part.

⁹GATT Doc. BISD 18S/97ff.

¹⁰The *destination principle* was taken over from bilateral agreements negotiated in the 1930s, such as the agreement of 6 May 1936 between the United States and France, see § 10 of the Annex to the *Working Party report on Border Tax Adjustments*, op cit. See also Irwin et al. (2008). Economists have used more or less the same definition for the term BTA. This is, for example, how Johnson and Krauss (1970) describe border tax adjustments (pp. 596-597): “A border tax, properly interpreted, is a tax imposed when goods cross an international border, and as such must be inimical to international trade and therefore to the achievement of the economic benefits of international specialization and division of labour. A border tax adjustment, on the other hand, is an adjustment of the taxes imposed on a producer when the goods he produces cross an international border. ... Under the origin principle, a tax is imposed on the domestic production of goods, whether exported or not, and under the destination principle, the same tax is imposed on imported goods as on domestically-produced goods destined for consumption by domestic consumers, while domestically-produced goods destined for consumption by foreigners enjoy a rebate of the tax. The origin principle involves no tax adjustment, but the destination principle involves a border tax adjustment to the full extent of the tax.”

Thus, this provision makes it clear that the trading partners can impose (domestic) taxes beyond customs duties to the extent that their taxes observe the discipline embedded in Art. III GATT. Recently, the AB, in its report on *India – Additional Import Duties*, confirmed this understanding of the ambit of Art. II.2(a) in the following terms (§ 153):¹¹

Article II:1(b) clarifies that the tariff binding in the relevant column of a Member’s Schedule of Concessions provides an upper limit on the amount of OCDs and ODCs that may be imposed. Article II:2, in turn, clarifies that nothing in Article II, including Article II:1(b), shall prevent a Member from imposing on the importation of a product: (i) a charge equivalent to an internal tax imposed consistently with Article III:2 in respect of a like domestic product; (ii) an anti-dumping or countervailing duty applied consistently with Article VI; or (iii) fees or other charges commensurate with the cost of services rendered. The chapeau of Article II:2, therefore, connects Articles II:1(b) and II:2(a) and indicates that the two provisions are inter-related. Article II:2(a), subject to the conditions stated therein, exempts a charge from the coverage of Article II:1(b).

Art. I GATT also comes into play because, unless respected, trading partners could afford a trade advantage by, for example, adjusting taxes for goods of a certain origin and not for others. The Working Party also had to consider Art. XVI GATT, which allows trading partners to exempt from taxation goods destined for consumption abroad without qualifying similar practices as subsidy, and Art. VI GATT because, unless otherwise specified, the lower price of a good is being exported (resulting from non-taxation) *could* qualify as dumping. Finally, Art. VII GATT was also relevant since a BTA should not be equated to a customs fee or formality that is covered by this provision. Recall that customs fees and formalities must be commensurate to the cost of the service rendered (as per the adopted panel report on *US – Custom User Fee*); a BTA is normally unrelated to the cost of service rendered –indeed very often no service at all is being rendered.¹² If BTAs were to be considered as coming under the purview of Art. VII GATT, they would thus, be running afoul this provision.

¹¹See Conconi and Wauters (2010) for an economic/legal discussion of the *India – Additional Import Duties* dispute.

¹²There is no formal *stare decisis* (binding legal precedent) in the WTO. Adopted panel reports, nonetheless, are expected to be followed by subsequent panels dealing with the same issue since, by virtue of Art. XVI of the *Agreement Establishing the WTO*, they provide guidance as to the understanding of the terms of the legal provision that they were called to interpret, see Mavroidis (2008).

3.1.1 The Outcome

The negotiators agreed that the *destination principle* circumscribed the taxes that could be lawfully adjusted. § 4 of the final report of the WP explains the *destination principle* in the following terms:

... which enable exported products to be relieved of some or all of the tax charged in the exporting country in respect of similar domestic products sold to consumers on the home market and 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.

Taxation could thus, in principle be adjusted by both the importing and the exporting state. The next question was who should, or rather who should not perform the adjustment?

The GATT contracting parties reached agreement on some measures, and did not on *many* others. The extent of their agreement is reflected in the following paragraph:

... the Working Party concluded that there was convergence of views to the effect that taxes directly levied on products were eligible for tax adjustment. Examples of such taxes comprised specific excise duties, sales taxes and cascade taxes and the tax on value added. It was agreed that the TVA, regardless of its technical construction (fractioned collection), was equivalent in this respect to a tax levied directly—a retail or sales tax. Furthermore, the Working Party concluded that there was convergence of views to the effect that certain taxes that were not directly levied on products were not eligible for tax adjustment. Examples of such taxes comprised social security charges whether on employers or employees and payroll taxes.¹³

The GATT contracting parties also agreed to provide information if requested, regarding the reasons for, and the calculation of, tax adjustment (§ 17 of the final report):

It was generally agreed that countries adjusting taxes should, at all times, be prepared, if requested, to account for the reasons for adjustment, for the methods used, for the amount of compensation and to furnish proof thereof.¹⁴

¹³See § 14 of the final report.

¹⁴On the allocation of burden of proof in GATT/WTO, see Horn and Mavroidis (2009).

There was divergence of views regarding the eligibility for adjustment of *taxes occultes* and some other taxes such as *property taxes*. The scarcity of complaints with respect to either of these two taxes however, persuaded negotiators to stop negotiating on them (§ 15 of the final report):

The Working Party noted that there was a divergence of views with regard to the eligibility for adjustment of certain categories of tax and that these could be sub-divided into

(a) “Taxes occultes” which the OECD defined as consumption taxes on capital equipment, auxiliary materials and services used in the transportation and production of other taxable goods. Taxes on advertising, energy, machinery and transport were among the more important taxes which might be involved. It appeared that adjustment was not normally made for taxes occultes except in countries having a cascade tax;

(b) Certain other taxes, such as property taxes, stamp duties and registration duties ... which are not generally considered eligible for tax adjustment. Most countries do not make adjustments for such taxes, but a few do as a few do for the payroll taxes and employers’ social security charges referred to in the last sentence of paragraph 14.

It was generally felt that while this area of taxation was unclear, its importance - as indicated by the scarcity of complaints reported in connexion with adjustment of taxes occultes - was not such as to justify further examination.¹⁵

Finally, there was agreement between negotiators that some taxes, such as *cascade taxes*, were eligible for adjustment, the modalities for adjusting them though were not clear (§ 16 of the final report):¹⁶

The Working Party noted that there were some taxes which, while generally considered eligible for adjustment, presented a problem because of the difficulty in some cases of calculating exactly the amount of compensation. Examples of such difficulties were encountered in cascade taxes. For adjustment, countries operating cascade systems usually resorted to calculating average rates of rebate for categories of products rather than calculating the actual tax levied on a particular product. It was noted, however, that most cascade tax systems were to be replaced by TVA systems, and that therefore the area

¹⁵On the extent of disagreement, see also Genasci (2008).

¹⁶A cascade tax is a turnover tax which is applied on every stage of the production process.

in which such problems occurred was diminishing. Other examples included composite goods which, on export, contained ingredients for which the Working Party agreed in principle it was administratively sensible and sufficiently accurate to rebate by average rates for a given class of goods.

The preceding analysis unambiguously supports the conclusion that the *Working Party on Border Tax Adjustments* did not manage to resolve all ambiguities and disagreements regarding tax adjustability. Disagreements between trading partners regarding similar issues continued to persist and some of them found their way into GATT/WTO adjudication. Notoriously, the United States subsequently enacted the *DISC*-, and *FSC*-legislations, both of which were condemned, the first by a GATT panel, the second by a WTO panel and the AB.^{17,18} Nevertheless, there was agreement in the WP concerning at least some of the taxes. Note that nowhere does the report outlaw the use of BTAs for purposes of environmental protection. Hence, we can conclude that the narrowing down of the scope of Art. III GATT that took place through this report did not affect the possibility for countries to enact BTAs in order to advance environmental goals.

3.1.2 The Legal Significance of the WP Final Report

The report of the WP on BTAs was adopted by the GATT CONTRACTING PARTIES, that is, the highest organ of the GATT and the sole competent to adopt similar acts. The legal value of such acts is addressed in GATT, as it has been amended following the successful conclusion of the Uruguay round, albeit in unclear terms: there is doubt whether the WP report is a decision by the CONTRACTING PARTIES, and thus come under the purview of Art. 1(b)(iv) GATT 1994, or whether it is part of the GATT *acquis*, and then come under the purview of Art. XVI of the *Agreement Establishing the WTO*. No matter how it is classified, the WP report will have legal significance. If, however, it comes under the former it should be regarded as binding on all WTO Members, whereas if it comes under the latter it should be regarded as creating *legitimate expectations* that WTO practice will be guided by it. We explain.

The current GATT-agreement is not the same agreement that was signed in 1947. Its content has been substantially modified, even though the negotiators during the Uruguay

¹⁷ *US – DISC*, its GATT predecessor, was adjudicated during the GATT years. At stake was a US tax legislation on *Domestic International Sales Corporations*. In brief, a US company that would qualify as a DISC company would not be subjected to US federal income tax on its current or retained export earnings. Following a complaint by Canada and the European Community, the panel found that the US tax legislation constituted an export subsidy and was thus inconsistent with Art. XVI GATT. See GATT Doc. BISD 23S/98, and 28S/114. See also the very thorough analysis of the case by Jackson (1978).

¹⁸ On the overall stance of adjudicating bodies with respect to BTAs, see Bhagwati and Mavroidis (2004), and Démaret and Stewardson (1994).

Round agreed to add to the original text all adopted decisions by the GATT CONTRACTING PARTIES since 1947. The new agreement has been named the GATT 1994 and it comprises, in addition to the GATT 1947, a number of amendments, including the following:

(b) the provisions of the legal instruments set forth below that have entered into force under the GATT 1947 before the date of entry into force of the WTO Agreement:

...

(iv) other decisions of the CONTRACTING PARTIES to GATT 1947;

The term *other decisions* is unclear. The panel on *Japan – Alcoholic Beverages II* held that adopted panel reports form an integral part of GATT 1994 as they are “other decisions of the Contracting Parties to GATT 1947” within the meaning of Art. 1(b)(iv) of GATT 1994.” (§ 6.10). The AB disagreed with the panel, and argued that the “decision” to adopt a panel report is not a “decision” within the meaning of Art. 1(b)(iv) GATT 1994, though it did acknowledge that adopted reports are “an important part of the GATT *acquis*.” (p. 15). The term “GATT *acquis*” is a creation of the AB, which only clarified the meaning of this concept subsequently in *US – Shrimp (Art. 21.5 – Malaysia)*. We quote from §§ 108 - 109:

In this respect, we note that in our Report in *Japan – Taxes on Alcoholic Beverages*, we stated that:

Adopted Panel Reports are an important part of the GATT *acquis*. They are often considered by subsequent panels. They create legitimate expectations among WTO Members, and, therefore, should be taken into account where they are relevant to any dispute.

This reasoning applies to adopted Appellate Body Reports as well. Thus, in taking into account the reasoning in an adopted Appellate Body Report — a Report, moreover, that was directly relevant to the Panel’s disposition of the issues before it — the Panel did not err. The Panel was correct in using our findings as a tool for its own reasoning. Further, we see no indication that, in doing so, the Panel limited itself merely to examining the new measure from the perspective of the recommendations and rulings of the DSB. (*italics in the original*).

Hence, it turns out that what the AB meant by the term *acquis* was the legitimate expectations of WTO Members to see that relevant prior case-law will duly be taken into account in future disputes, even though there is no *legal* obligation to follow the findings and conclusions of GATT panels. This issue arose again in the context of the dispute that led to the panel report on US – FSC, where the panel was of the view that *decisions* to adopt reports should come under Art. XVI of the *Agreement Establishing the WTO* (WTO Agreement). Such decisions are not binding on subsequent panels as Art. XVI WTO Agreement itself provides that:

... the WTO shall be guided by the decisions, procedures and customary practices followed by the CONTRACTING PARTIES to GATT 1947.

Consequently, the legal effect of adopted GATT reports is not to bind subsequent panels dealing with the same issue, but simply to provide “guidance.”

On appeal, the AB in its report on *US – FSC* followed a rather convoluted reasoning even though it ended up ultimately following the panel’s conclusion (§§ 108-115). Previous decisions by GATT panels are *usually* referred to as support for findings already reached: they thus, operate as supplementary means of interpretation in accordance with Art. 32 of the *Vienna Convention on the Law of Treaties* (VCLT); the WTO judge does not *have to* have recourse to them.

In light of this discussion, it seems that the better arguments lie with the view that the WP report should come under Art. 1(b)(iv) GATT 1994. After all, the WP was not convened to adjudicate a dispute between two GATT contracting parties; it was requested to discuss the treatment of tax adjustments at the GATT-wide level.¹⁹ In subsequent practice, a number of WTO panel and AB reports have referred to this report, without however classifying it either as part and parcel of Art. 1(b)(iv) GATT 1994 or under Art. XVI WTO Agreement.²⁰ But even if one takes the view that it should be considered to be part of the GATT *acquis*, rather than be accepted as a decision, it would still retain legal value as explained above. The fact that it has been often cited in WTO case-law leaves little room for doubt that recourse to it will be made again if, for example, the question whether payroll taxes can be adjusted comes up.^{21,22}

¹⁹Although the term WP was often reserved for what is now always referred to as a GATT panel, that is, an adjudicating body.

²⁰See for example, the panel and AB report on *Japan – Alcoholic Beverages II*.

²¹Note, nonetheless, that, arguably, the ambit of Art. III GATT is *also* prescribed by the default rules regarding allocation of jurisdiction, as argued in Horn and Mavroidis (2008).

²²See Mavroidis (2007, 2008) for a more detailed discussion of the significance of the WP report.

3.2 The Coverage of Art. III After the WP Final Report

In light of the legal significance of the WP report on BTAs, it is to be expected that WTO adjudicating bodies will outlaw as GATT-inconsistent those taxes that were agreed to be treated as non-adjustable, such as payroll taxes. It *could* further be the case that WTO adjudicating bodies outlaw as GATT-inconsistent any other tax (not mentioned in the report of the WP) which exhibits features similar to those explicitly mentioned. Such a conclusion is warranted if adjudicating bodies were expected to view the taxes explicitly mentioned as forming an integral part of an indicative list (a rather safe assumption).

4 How Would a WTO Adjudicating Body Evaluate the Legality of a BCA?

In order to shed light on the role of BCAs/BTAs under the WTO Agreement, we will consider the case where an otherwise identical product is produced in an exporting country, with a production technology that emits more GHG emissions per unit of output compared to when the product is produced in the importing country. The importing country levies a GHG emissions tax on domestic production, and also operates a BTA scheme that taxes the imported product the same way that the domestic product is being taxed. The exporting country does not operate such a scheme.

Clearly, central to the adjudicating body's determination would be to evaluate the compatibility of the BTA scheme with Art. III GATT. It would then interpret the text of Art. III GATT to imply the following:

1. Art. III GATT does not request from WTO Members to adopt internationally efficient policies: it simply imposes certain non-discrimination restrictions on the difference in taxation of imported and local products. This means that inefficient but non-discriminatory taxation is perfectly consistent with the GATT rules. Hence, the adjudicating body will not inquire into the efficiency of the measure when evaluating the Art. III claim (the effect of the measure, in other words, is immaterial in case law);
2. if the imported goods are like, they should be taxed equally;
3. if the two products are unlike, they might still qualify as *directly competitive or substitutable* (DCS) products. In this case, some tax differential between the two products is permissible, if it is not *applied so as to afford protection* (ASATAP) to

domestic production. (If the products are neither like nor DCS, the importing WTO Member can of course treat the two products in any differential manner it wants.)

Would the two products in our example be considered by the panel/AB as like? Since the concern is a fiscal instrument, the directly relevant cases are the AB reports on *Japan – Alcoholic Beverages II*, and *Korea – Alcoholic Beverages*. In these two cases the AB established that for two products to be like they must:

1. be DCS;
2. share the same (detailed) tariff classification.

It is consumers' perceptions that will decide whether two products are DCS: recourse to econometric indicators (cross price elasticity) is not *passage obligée*; in the AB's view recourse to elements such as consumer preferences, end uses, physical characteristics are appropriate means to define whether two goods are DCS. In short the two methods (econometric-, non-econometric indicator) are equivalent in case law.

In *EC – Asbestos*, adjudicated after *Japan – Alcoholic Beverages II*, the AB contributed additional understanding of likeness. This case concerned the consistency of a non-fiscal instrument (a sales ban) with Art. III.4 GATT. As such it is only indirectly relevant to border taxes. The AB did however further interpret the marketplace-test as established in the two cases mentioned above. It did not state that its interpretation of the test was confined to Art. III.4 GATT, and it could thus be expected that it will apply this approach in cases involving fiscal instruments as well. Then, what did the AB add in this case? Recall first that the EU distinguished between asbestos-containing and asbestos-free construction material, allowing the sale of the latter and banning the sale of the former. Canada complained, arguing that the two products were like and therefore differential treatment was not justified. The panel had found that two products were like by referring to marketplace-criteria. In a dramatic overturning of the panel decision, the AB decided that the two products were unlike: remarkably, the AB overturned the outcome while sticking, in name at least, to the marketplace-test: in the eyes of the AB, knowing that one construction material contains asbestos and that the other one does not, and further knowing the health hazard associated with consumption of the asbestos-containing product, a "reasonable" consumer would not treat the two as like products. Since the two products are unlike, the EU was legitimized to treat them in unlike manner.²³ It thus seems as if non-econometric arguments concerning likely consumer perceptions may suffice in the case of products with impact on human health.

²³See the analysis of Horn and Weiler (2007).

What does all this mean for the border tax adjustment case? It appears as is for the AB, public health has a higher value than other regulatory objectives.²⁴ But it is often difficult, if not impossible altogether, to establish a bright line delineating the scope of environmental protection from that of public health: in the long run, there is a presumption (at the very least) that environmental hazards affect human health. Hence, by the same reasoning as in *EC - Asbestos*, a WTO adjudicating body will ask whether a reasonable consumer would distinguish between a climate-friendly and climate-unfriendly good. One can only guess as to the outcome of such a deliberation. On the one hand, it seems politically opportune, and perhaps also legitimate (in light of the health consequences), to elevate the environment to the same hierarchical value as is bestowed public health.²⁵ This would suggest a similar treatment. But there are several obstacles to doing this. First, there is an important distinction between the buyer's decision regarding asbestos-containing or asbestos-free materials, and the purchasing decision regarding products that differ in the extent of GHG emissions: in the former case, buyers may prefer to purchase asbestos-free construction material for the benefit of their own health. The AB also referred to the threat of future litigation facing industrial buyers of asbestos-containing products. In the case of climate change, such arguments could hardly be made. Each buyer's consumption of a climate-unfriendly good has negligible impact on the buyer's health – instead, the environmental impact is largely an *externality*. A consumer may well disregard the environmental impact of his or her purchases, and this is indeed the *reason* for the need to regulate. But this would not constitute a legitimate reason for imposing the measure, according to the logic of *EC - Asbestos*. And if the argument were to be accepted also in the case of climate change, the same argument would have to be accepted in future disputes concerning differential treatment of goods that are produced using child labor, and/or in industries using more lax labor standards, etc. In sum, it does not seem as if this would be a suitable path for an adjudicating body to tread.

Even if the products are found to be unlike, they can still be found to be DCS, and violate the discipline for such product pairs. Two products are DCS, according to the Interpretative Note ad Art. III GATT if they are in competition. Case law, *Korea - Alcoholic Beverages* being the most recent pronouncement, has underlined that this is a question of actual consumer behavior (even though the AB has also found that Art. III.2 and Art. III.4 GATT are coextensive, and its findings concerning *like* products are in principle applicable to the term DCS as well). Hence, applied to the scenario discussed above, to the extent that the imported climate-unfriendly good is treated sufficiently dif-

²⁴See the analysis of Sykes (2003).

²⁵Recall the discussion above regarding *stare decisis* in the WTO legal order.

ferently by consumers than the locally –produced climate-friendly versions, the importing state is free to tax the former at it wishes. If not, the question will be whether the tax differential by the importing country is applied so as to afford protection to domestic production. If the tax differential is more than both *de minimis* and *substantial* – which we presume it to be – then the tax scheme will be found in violation of Art. III GATT, and the importing state will have to defend its measure through recourse to Art. XX GATT.²⁶

If invoking Art. XX GATT, the importing state will probably prefer to take recourse to Art. XX(g) GATT, whereby it will be requested to demonstrate that its measure relates to the protection of an *exhaustible natural resource*. In *US – Gasoline*, the panel held that clean air was an exhaustible natural resource (§ 6.37).²⁷ The dispute related to the implementation by the US of its *Clean Air Act* of 1990, to control toxic and other pollution caused by the combustion of gasoline manufactured in, or imported into, the US. For procedural reasons the AB did not rule on this issue, and, as a result the panel’s finding remained intact.

Art. XX(g) GATT includes two requirements that must be cumulatively met for a measure protecting exhaustible natural resources to be judged GATT-consistent:

1. it must *relate to* the conservation of *exhaustible natural resources*; and
2. it must be made effective in conjunction with *restrictions on domestic production or consumption*.

We take each point in turn. The panel in its report on *US – Gasoline*, applied the GATT panel’s reasoning and conclusion in *Canada – Herring and Salmon* as to the interpretation of the term *relating to*: in this panel’s view this term was tantamount to the term *primarily aimed at*. The AB disagreed. It noted in its report on *US – Gasoline* that although case law had construed the term in this way, the AB was not at ease with this understanding, even though the parties to the dispute seemed to endorse it (pp 18 and 19):

All the participants and the third participants in this appeal accept that a measure must be “primarily aimed at” the conservation of exhaustible natural resources in order to fall within the scope of Article XX(g). Accordingly, we see

²⁶The AB coined the terms *de minimis* and *substantial* in *Chile – Alcoholic Beverages*, but has so far not explained their substantive content.

²⁷In its report on *US – Shrimp* the AB held that the term *exhaustible natural resources* should not be confined to non-living resources.

no need to examine this point further, save, perhaps, to note that the phrase “primarily aimed at” *is not itself treaty language and was not designed as a simple litmus test for inclusion or exclusion from Article XX(g)*. (emphasis added)

In its report on *US – Shrimp*, the AB took distance from prior practice, holding that relating to means that a measure need not *primarily aim at* a particular means to meet the standard set in this paragraph. Even if this were not the case, that is, even if the measure aimed at something else but still contributed to the conservation of exhaustible natural resources it could still qualify as consistent with this paragraph (§ 141):

In its general design and structure, therefore, Section 609 is not a simple, blanket prohibition of the importation of shrimp imposed without regard to the consequences (or lack thereof) of the mode of harvesting employed upon the incidental capture and mortality of sea turtles. Focusing on the design of the measure here at stake, it appears to us that Section 609, *cum* implementing guidelines, is not disproportionately wide in its scope and reach in relation to the policy objective of protection and conservation of sea turtle species. The means are, in principle, reasonably related to the ends. The means and ends relationship between Section 609 and the legitimate policy of conserving an exhaustible, and, in fact, endangered species, is observably a close and real one. (emphasis in the original).

Arguably, this standard is more *deferential* towards the regulating WTO Member than the previously employed *primarily aimed*-standard, since even measures which do not *primarily aim at* the conservation of *exhaustible natural resources* can be justified through recourse to Art. XX(g) GATT, assuming that they *reasonably relate* to the objective stated in this provision.

Art. XX(g) GATT further requires that, when imposing trade restrictions to protect *exhaustible natural resources*, WTO Members also adopt measures aimed at restricting domestic consumption or production (as the case may be). In its report on *US – Gasoline*, the AB explained that the requirement to demonstrate that import-restricting measures are taken in conjunction with domestic measures aimed at the conservation of exhaustible natural resources was an even-handedness requirement. It went on to stress that there was no need for an *effects-test* in order to comply with Art. XX(g) GATT in this respect (pp 20–1):

... the clause “if such measures are made effective in conjunction with restrictions on domestic product or consumption” is appropriately read as a requirement that the measures concerned impose restrictions, not just in respect of imported gasoline but also with respect to domestic gasoline. The clause is a requirement of *even-handedness* in the imposition of restrictions, in the name of conservation, upon the production or consumption of exhaustible natural resources.

... if *no* restrictions on domestically-produced like products are imposed at all, and all limitations are placed upon imported products alone, the measure cannot be accepted as primarily or even substantially designed for implementing conservationist goals. The measure would simply be naked discrimination for protecting locally-produced goods.

We do not believe ... that the clause “if made effective in conjunction with restrictions on domestic production or consumption” was intended to establish an empirical “effects test” for the availability of the Article XX(g) exception. (emphasis in the original).²⁸

In its report on *US – Shrimp* the AB effectively faced the question whether Art. XX(g) GATT included a jurisdictional limit, in the sense that WTO Members could intervene to protect *exhaustible natural resources* only *within* their jurisdiction, as the latter is defined by public international law (PIL). But the AB refrained from addressing this question whether the US measure respected the *territoriality principle*. In § 133 of the report the AB states:

We do not pass upon the question of whether there is an implied jurisdictional limitation in Article XX(g), and if so, the nature or extent of that limitation. We note only that in the specific circumstances of the case before us, there is a sufficient nexus between the migratory and endangered marine populations involved and the United States for purposes of Article XX(g).

Applied to our example above, it seems as if the importing country will not find it hard to defend its BTA under Art. XX(g) GATT: clean air is an exhaustible natural resource; the carbon tax scheme described above certainly *relates to* its protection since a rational connection between this measure and the objective can be established; the even-handedness requirement is also respected since domestic producers must respect similar

²⁸An example of an even-handed measure is offered in §§ 144–5 of the AB report on *US – Shrimp*.

environmental standards by reason of adherence of the importing state to the *Kyoto Protocol*.²⁹

Let us finally say a few words about the likely treatment of a non-fiscal BCA. The text of Art. III.4 GATT stipulates two necessary criteria for a violation:

1. the imported and the domestically produced goods are *like*; and
2. the measure affords a *less favorable treatment* (LFT) to the imported good.

As mentioned above, the term *like* in this provision is coextensive with the term DCS in Art. III.2 GATT. Moreover, the AB in its *EC – Asbestos* case law established that the term LFT has symmetric meaning with the term ASATAP. If the two products are found to be like, the importing state can still exonerate the measure by demonstrating that the reason for differential treatment is not to afford protection to domestic goods. The AB made this potentially important point clear in its report on *Dominican Republic – Import and Sale of Cigarettes* (§ 98), where it held:³⁰

The Appellate Body indicated in *Korea – Various Measures on Beef* that imported products are treated less favourably than like products if a measure modifies the conditions of competition in the relevant market *to the detriment of imported products*. However, the existence of a detrimental effect on a given imported product resulting from a measure does not necessarily imply that this measure accords less favourable treatment to imports *if the detrimental effect is explained by factors or circumstances unrelated to the foreign origin of the product, such as the market share of the importer in this case*. (emphasis added).

Unfortunately, we are still in the dark as to what is necessary to demonstrate in order to absolve the burden of proof embedded in the last sentence of the quoted passage. Does the invocation of an objective included in the challenged measure suffice?³¹ If not, does rational connection between the means adopted and the ends sought suffice? We are inclined to believe that a positive response to this latter question suffices for a WTO

²⁹The EU will be well advised to invoke Art. XX(g) and not Art. XX(b) GATT for a number of reasons: the relating to-test is less demanding than the *necessity* test since a restrictive option will be upheld under the former if it relates to the invoked objective but not under the latter. In other words, an internationally inefficient practice can be judged GATT-consistent under Art. XX(g) GATT. This is at best doubtful under Art. XX(b) GATT.

³⁰“Potentially”, since it is not yet clear to what extent the AB is willing to take into consideration e.g. the rationale behind a measure.

³¹*Ex post facto* justifications have been deemed inadequate in prior case law, see the AB report in *Japan – Alcoholic Beverages II*.

Member to be absolved of any liability under Art. III.4 GATT: otherwise, the AB would have indicated what more the respondent would have to show in order to successfully respond to a challenge of inconsistency of its practices with this provision.

Last but not least, WTO law will allow BCAs/BTAs that promote a social concern (environmental protection) and are being applied in accordance with the requirements indicated above. It will not tolerate BCAs/BTAs that are imposed solely in order to address competitiveness concerns: the first paragraph of the NT provision (Art. III.1 GATT) makes it clear that domestic instruments should not be used so as to afford protection to domestic production. As we will attempt to explain in the next Section, this objective, to which we subscribe, is better served if the approach of the WTO adjudicating bodies is modified along the lines we suggest.

Finally a couple of words on the status of an MEA under WTO rules which is at best uncertain: on the one hand, the AB *seems* to suggest *some* (unspecified) relevance of MEAs in its *US – Shrimp* report, where, first it invokes the *Convention on the International Trade of Endangered Species* (CITES) convention and then provides its own definition of what an *exhaustible natural resource* is. We are thus in the dark as to the legal relevance of CITES: is it *context*, or *supplementary means* in the VCLT sense of the terms, or is it irrelevant? On the other hand, the subsequent panel on *EC – Approval and Marketing of Biotech Products* categorically stated that MEAs have no status in WTO law unless if signed by the totality of WTO Members.³²

5 How Should the Legality of BTAs/BCAs be Evaluated

The purpose of this Section is to discuss our preferred approach and show our differences with what has been exposed so far. In a nutshell, we propose that when reviewing challenges against BTAs/BCAs, panels should be constructing Art. III GATT in its legal context, that is, taking into account the *default rules* of public (customary) international law allocating jurisdiction. This is a matter of legal compulsion since all WTO Members, by virtue of their appurtenance to the international community, must act in respect of the *default rules*. Controlling for them has two important consequences:

1. WTO Members will have to exercise jurisdiction in *reasonable* manner. The *default rules* include an element of proportionality and outlaw disproportional exercise of

³²See Mavroidis (2008) who concludes that the status of MEAs in WTO law is at best uncertain.

jurisdiction. This could be particularly important in cases where countries take measures to address environmental hazards that do not affect them at all (we will provide illustrations to this effect in what follows).³³ Recourse to the *default rules* opens the door to the relevance of MEAs in the WTO legal order. To avoid misunderstandings, *default rules* are not a *passage oblige* in this context.

2. When more than one countries can legitimately exercise jurisdiction, the default rules encourage reasonable (that is, not disproportionate) exercise of jurisdiction, and even recourse to bargaining solutions in order to avoid jurisdictional conflicts (or, even, higher transaction costs). MEAs can of course also serve as bargaining solutions to address problems that affect more than one jurisdiction.

We start this Section with an overview of the legal doctrine regarding the consistency of BCAs/BTAs with the GATT rules. We will then explain our preferred approach and will thus, establish our disagreements not only with the current construction of GATT law (as we saw in Section 4), but also with other authors who have investigated this issue.

5.1 The Position of the Legal Doctrine

A number of authors have focused on the issue whether tax distinctions can be based on production process methods (PPMs) that have not been incorporated in the final product, a natural focus given the nature of GHG emissions. Pauwelyn (2007) argues that a textual reading of Art. II.2(a) GATT suggests that regulatory distinctions based on non-incorporated PPMs are illegal. He correctly points to the fact that in the notorious *Superfund* dispute the panel did not explicitly pronounce on this issue.³⁴ Recall that Art. II.2(a) GATT reads:

Nothing in this Article shall prevent any contracting party from imposing at any time on the importation of any product:

- (a) a charge equivalent to an internal tax imposed consistently with the provisions of paragraph 2 of Article III* in respect of the like domestic product or in

³³Compare with the approach of WTO adjudicating bodies as discussed in Section 4: the current construction of the WTO regulatory framework probably (depending on how much one sees in the AB report on *US – Shrimp* which discusses the nexus between the regulator and the regulated activity) does not outright disallow measures which address environmental hazards that do not affect the regulating state. If however, this is indeed the case, then how can WTO adjudicating bodies claim that they still construct GATT law so as to allow for measures that promote social values while disallowing measures motivated by competitiveness-related concerns? While we do not exclude that a WTO Member might wish to address local environmental hazards that do not affect it and still not be motivated by competitiveness concerns, the presumption is much stronger when the hazard is trans-boundary.

³⁴GATT Doc BISD 34S/136.

respect of an article from which the imported product has been manufactured or produced in whole or in part;

Pauwelyn (2008) concludes that the question whether WTO Members can adjust taxes on similar grounds (to counteract non incorporated PPMs) is at best an open issue, and should probably be given a negative response. Similar thoughts have been expressed by Roessler (1996) and (2003).

Howse and Eliason (2008) disagree with Pauwelyn, arguing that border tax adjustments under Art. III GATT already are permissible. They adopt a contextual reading of Art. II GATT and borrow from the Agreement on Subsidies and Countervailing Measures to make the point that when Art. II.2 GATT speaks of manufacturing it should be understood as encompassing the process from which the final product is derived without asking the question whether the process has been incorporated in the final product or not.

Hufbauer et al. (2009) are not as categorical as Pauwelyn: they cast doubt on the consistency of BTAs/BCAs with WTO law but prefer to evaluate whether this is indeed the case under Art. III GATT (and, depending on the facts of the case, under the SCM Agreement). Potts (2008) provides a thorough analysis of similar measures under Art. III GATT and its conclusions are generally in line with our analysis in the preceding Section. The same holds for Quick (2008) who, however, emphasizes the Art. XX GATT angle.

With this in mind we can now turn to our preferred approach.

5.2 Our Preferred Approach to Evaluating BCAs

Our argument is broadly structured as follows:

1. Art. II GATT deals with bound tariffs. But there are no tariff classifications included in the Harmonized System that make distinctions based on non incorporated PPMs (some classifications deal with inputs and/or their final products). It is thus only normal that Art. II.2(a) GATT refers to inputs and final products. Consequently, Art. II GATT was not intended to *circumscribe the ambit of Art. III GATT*.
2. Art. III GATT contains no *exhaustive* list of measures WTO Members can use. The *only* legal instrument in the WTO outside GATT 1947 that could restrict the right of Members to use BTAs, is the WP on BTAs. As discussed above, this report reflects the agreement of the WTO Membership (since this report is integral part of GATT 1994) that some domestic instruments (e.g., income taxes) cannot legitimately form

the subject matter of BTAs by the importing state. But environmental BTAs have not been included in this agreement. There are hence no explicit restrictions on the use of BTAs in the WTO Agreement. This is legally significant, since the presumption in international law is that *unless* an international discipline has been agreed, states are free to unilaterally define preferences.

3. The legitimacy of BTAs is, absent international agreements on BTA (for instance, in the context of a MEA), fundamentally a question of jurisdiction. The *default rules* allocating jurisdiction (territoriality, nationality) in public international law can substantially advance legal security. Although concurrent exercise of jurisdiction cannot be outright excluded, the *default rules*' principle of *reasonableness* in the exercise of unilateral jurisdiction (which is compulsory), as well as their reference to *bargaining solutions* (which are encouraged) can help avoid concurrent exercise of jurisdiction by various states which is problematic when the substantive law differs across the states exercising jurisdiction.
4. The substantive consistency of exercised jurisdiction with the WTO rules will arise if, and only if, the measure is permissible under the *default rules*: in its report on *India – Additional Duties*, the AB held that the legal benchmark to evaluate the *substantive* consistency of a measure (BTA) with the WTO is provided by Art. III GATT (and, if need be, by Art. XX GATT).

Let us now turn to a more detail description of our argument.

5.2.1 Art. III GATT: only the plain text?

Art. III GATT requires WTO Members to not afford protection to domestic production through their domestic instruments. The GATT does not impose any common policies on WTO Members; they remain free to define their policies regulating fiscal matters, competition, public health, the environment, etc., in any manner they deem it appropriate. The GATT does not put into question the resulting regulatory diversity. Put differently, Art. III GATT is meant to equate conditions of competition *within* markets, *not across* markets.

A study of the negotiating record of the NT provision points to two conclusions:³⁵

1. This provision was thought as an *anti-circumvention* device, that is, as a means to safeguard the value of tariff concessions that would be exchanged in the first multilateral negotiation in Geneva (1948);

³⁵See Irwin *et al.* (2008).

2. With the exception of specific domestic instruments that have explicitly been exempted from coverage in the body of the provision, NT was meant to cover all domestic instruments, whether of fiscal- or non fiscal nature.

Neither the NT provision, nor the GATT more generally, include any explicit specification of the permissible jurisdictional reach of the WTO Members' domestic policies that are covered by the NT provision; the NT provision is concerned only with the issue how domestic instruments can be practised. But the GATT is still permeated by the notion that WTO Members retain sovereignty over domestic policies, as long as such instruments are not used for protectionist purposes. Absent such an understanding the whole GATT loses its effectiveness.

To demonstrate this point, consider a world consisting of two countries that can trade. Each government has access to one type of domestic policy instrument, taxes, and to one trade instrument, tariffs. Taxes can only be levied on economic activities, such as production, sales, and consumption of goods. Tax policies are perfectly enforceable, so any tax that is levied can also be collected without administrative costs, regardless of where the activity occurs. When setting its policies, each government is only concerned with the interests of its nationals.

Assume, first, that there are absolutely no jurisdictional restrictions on permissible policies.³⁶ The exact tax/tariff schemes that the countries would choose in the absence of any form of policy coordination with other countries, would depend on the details of the situation. But since governments have the possibility to tax any activity occurring in this hypothetical world, they would typically find it profitable to tax foreign as well as domestic activities. What is clear is that, since the governments often disregard foreign interests when deciding on their tax schemes, the possibility of taxing foreign activities would introduce beggar-thy-neighbour-like features in the tax schemes. An agreement binding border instruments would in all likelihood have no impact at all, absent jurisdictional rules: in this world, there would be no need to use trade instruments, since the possibility to tax foreign activities directly offers a more attractive means for beggar-thy-neighbour behavior.

Suppose next that the agreement on tariffs is coupled with a NT-like provision that restricts tax treatment of products in the domestic territory. It is hard, in general, to say whether such an agreement would have any impact at all. But the possibility would still remain to *tax activities taking place in the foreign economy*. As a result, very little, if anything, would be achieved through this agreement.

³⁶This scenario is also discussed in Horn and Mavroidis (2008).

As a final case, suppose instead that the agreement on tariffs and quotas is coupled with a jurisdictional rule, prohibiting taxation of activities in the foreign country. In contrast to the previous two examples, this agreement is likely to have some impact. Note however, that the “trade part” of this agreement is immaterial, since the outcome is likely to be the same even if the bindings of the trade instruments were omitted. This will be the case, since, absent restrictions on domestic policies, the importing country can use production subsidies and consumption taxes to mimic trade barriers.³⁷ In order to ensure that an agreed tariff reduction is meaningful, it must thus, at the very least, be accompanied by some form of restriction on the use of domestic policies.

The point we want to make through this abstract reasoning is that *the GATT is based on implicit jurisdictional principles* –the agreement would probably be meaningless absent adherence to these principles.

5.2.2 Enter the Default Rules

The *default rules* allocating jurisdiction across state actors are part and parcel of public international law.³⁸ There are two common bases included in the *default rules* concerning jurisdiction: the *territoriality principle* - and the *nationality principle*, which could be summarized as follows:

1. The rules apply in situations where:
 - (a) we are neither in the realm of universal jurisdiction;³⁹
 - (b) nor has a bargaining solution (international agreement) been negotiated;
2. A state can lawfully exercise prescriptive jurisdiction:⁴⁰
 - (a) on all activities occurring in its own territory (*territoriality principle*);

³⁷For instance, a production subsidy (which is a negative tax) and a consumption tax of equal magnitude (levied on the domestic as well as the imported product) can perfectly mimic a tariff of this magnitude.

³⁸In this paper we will refer alternatively to PIL and customary international law (CIL) and use them as equivalent terms for the needs of this paper: this is so, since the rules concerning allocation of jurisdiction form integral part of CIL, which itself forms integral part of PIL.

³⁹This basis comes into play for cases such as terrorism.

⁴⁰There are other bases as well which, exceptionally, might be relevant, such as the passive protective principle, whereby a state can claim jurisdiction on activities occurring outside its jurisdiction *and* aiming at one of its nationals. Anyway, this basis is of no interest to this paper. By the same token, there is widespread acknowledgement of the *protective principle*, which enables states to exercise jurisdiction against activity occurring outside its territory aiming at its national security, and there is special jurisdiction for activities occurring aboard vessels, aircrafts and spacecrafts: none of these two bases is of direct relevance to this paper.

(b) over its nationals, even for acts, omissions committed outside its territory (*nationality principle*);

(c) In case of conflict between the two bases, the *territoriality principle* prevails;^{41,42}

3. In case there are *effects* from an activity taking place in the territory of one state in the territory of other states, or in case the effects of an activity are spread over different states, all affected states are, in principle, competent to exercise prescriptive jurisdiction (*effects doctrine*).

A crucial issue is the magnitude of the effects that suffice for the effects doctrine to be applicable. The *American Law Institute's* prominent restatement of *Foreign Relations Law of the United States* (hereinafter the *Restatement*) takes the view that, at the very least, a jurisdiction must demonstrate *substantial*, *direct*, and *foreseeable* effects upon its territory to legitimately exercise jurisdiction.⁴³ What exactly *substantial*, *direct*, and *foreseeable* means is unclear in general, and will necessarily depend on the case at hand. Using the example of an environmental damage in case of a river, it seems reasonable to interpret these terms as follows:

1. the effects will be *direct* if nothing intervenes between the upstream pollution of the river and environmental damage downstream;
2. they will be *foreseeable* if the direction of the flow is clear; and
3. depending on the extent of the environmental pollution, the effects could be *substantive*.

⁴¹Indeed, from early on it has been accepted that states cannot regulate in an extra-territorial manner. Viewed from this perspective the (ongoing) discussion on the nature of international law (in which some take the view that absent permissive international rules, no unilateral exercise of jurisdiction is permissible, and some argue that international law can impose limits only to the exercise of unilateral jurisdiction) is futile. For the type of situations that are of interest here, it will inevitably be the case that more than one jurisdiction believe it can exercise jurisdiction. See Dunoff (2005), and Buxbaum (2006).

⁴²The interpretation of the term *conflict* is crucial here. Some states interpret it strictly, understanding conflict as a situation where the individual concerned cannot simultaneously comply with the legislation of two (or more) states. Others have adopted a looser standard, leaning against the comity principle; some states will weigh the respective interests to regulate a particular transaction and will give allow another state to regulate the transaction if they judge that it has more of an interest to do so, even if the individual concerned could, in theory at least, comply with both regimes.

⁴³See *Restatement of the Law Third, Foreign Relations Law of the United States* (1990) at p. 238. The Restatement is considered to be an authentic description of international law practice, and it is routinely cited in judgments of the highest courts around the world. It has thus exercised a *de facto* persuasive effect on courts in the United States and around the world. See also The Restatement op. cit. at pp. 244ff.

Being part of customary international law, the meaning of the *default rules* should ultimately be determined by state practice, and by the decisions by international courts, as well as arbitral bodies. But state practice provides us, alas, with incoherent responses: some states liberally assert jurisdiction, and other states are more conservative.⁴⁴ The lack of clarity in state practice with respect to *reasonableness* in the exercise of jurisdiction is echoed in lack of unanimity in doctrine when addressing this issue, exemplified in the divergent views of Kramer (1995) and Lowenfeld (1995) regarding the manner in which the US Supreme Court addressed the jurisdictional issue in the highly contentious *Hartford Inc.* case, which provoked the disapproval of the UK government claiming it alone had the right to prescribe jurisdiction over this particular transaction.⁴⁵ The fact that there is occasional disagreement among states when it comes to practising restraint does not mean that the requirement for *reasonable* exercise of jurisdiction has subsided. Moreover, to avoid that this is the case, public international law encourages the negotiation of *bargaining solutions*, that is, contractual arrangements which address the jurisdictional conflict and promote a course of action that should be followed by all signatories. MEAs are very much a *bargaining solution*.

Recourse to *default rules* thus acts as a break beyond that imposed by the report of the WP on BTAs: for instance, a WTO Member will find it hard to demonstrate that its measures are necessary in order to promote environmental protection when addressing an environmental hazard that occurs outside its jurisdiction and that does not affect the environment in the Member's territory, since it will have to show *direct, substantial* and *foreseeable* effects stemming from this hazard into its market. Recall that, the WP on BTAs did not outlaw such measures. Moreover, in cases of uncertainty as to who should exercise jurisdiction, *bargaining solutions* (say in the form of MEA) emerge. A few remarks are pertinent:

1. MEAs normally specify who can intervene to regulate a particular transaction coming under its purview, and thus allocates jurisdiction;
2. The question of substantive consistency of a measure with the MEA is more delicate:
 - (a) It is clear that, unless the MEA codifies customary international law, third parties do not have to abide by it, by virtue of the legal maxim *pacta tertiis nec*

⁴⁴For example, the United States has been often criticized for its policy in this respect both in the field of human rights, and in the field of international business transactions for asserting jurisdiction in too liberal a manner, see Lowenfeld (1995).

⁴⁵In this vein, for example, in our 2008 paper we found diverging state practice regarding the treatment of trans-boundary moral externalities, leading us to conclude that the state of law on this issue is unclear.

nocent nec prosunt. This principle has little effect though, since the importing state can anyway request from the exporter conformity with its legal system, irrespective whether the latter has been defined unilaterally or through an MEA. In other words, a WTO Member can request compliance with its laws (which mirror the MEA in which it participates) without invoking the MEA. The substantive content of the MEA would thus be *de facto* but not *de jure* relevant;

- (b) The question can legitimately be raised whether WTO Members can, through an MEA, modify the WTO contract? The straightforward response is no: amendments of the contract can take place only through the procedure established in Art. X of the *Agreement Establishing the WTO*. So the *substantive obligations* of an MEA explaining how to deal with say sea turtles by definition do not modify the GATT, since the GATT does not deal with this issue at all. An MEA, nonetheless, can encroach on the GATT if it, for example, requests that certain environmentally unfriendly goods be excluded from the markets of its signatories. Then the question will arise of whether these products are *like* more environmentally friendly products will arise. If the two sets of products are considered *like*, the differential treatment might be GATT-inconsistent. But the answer to the latter question does not depend on whether an MEA has been signed or not: WTO Members can unilaterally decide their environmental policies to this effect. An MEA, if at all, will be evidence of extra legitimacy for certain social choices (in the sense that the regulating state is not alone in thinking in this way, but one of several like minded WTO Members). In other words a panel should address the question whether such regulatory distinctions are permissible under the GATT as it has developed through case law over the years, irrespective of the invocation of an MEA. Trachtman (1999), coming from a different angle, points to the same direction: the MEA will serve as interpretative element of an instrument coming under the purview of Art. III GATT (how do some WTO Members understand environmental protection for say GHG emissions). As to whether some can decide for all, our response under point 1 above obtains here as well.

6 Concluding Remarks

There is increasing political pressure in several countries to complement more stringent climate policies with some form of BCA/BTA regime. This raises two obvious questions from the point of view of an international regulation of such regimes. A first question concerns their desirability. It is clear that governments may enjoy the protection they yield, if nothing else, for the same reason that they enjoy other forms of protectionism. But for an international regulation the interesting question is whether they are in some sense globally desirable? The second question of interest concerns their legality under the WTO. Is it likely that a WTO adjudicating body would accept a BCA/BTA scheme as legal, and should they?

To shed light on the desirability of BCAs/BTAs, it is necessary to undertake an economic analysis of their effects. While there is a substantial literature in environmental economics that highlight aspects of in particular BTAs, this literature for the most does not seem to address the type of concerns that critics of the proposals to introduce BTAs/BCAs point to, which relate for instance to the possibility that they will be used to pursue protectionist purposes rather pure climate goals.

To illustrate some of the complexities involved in providing argument in favour of using BTAs, we employed a very simple economic model. The model allows for a certain degree of interaction between tariff setting and the unilateral determination of carbon taxes. Also, carbon taxation is pursued to promote the general objectives of the respective government; that is, governments are not oblivious to the effects of these policies on say producer and consumer welfare. Among other things, the model points to the importance of the objectives and perceptions of trade negotiators, suggesting that when negotiators take full account of their decisions not only for commercial interests, but also for the climate, the role of trade negotiations may become quite different from what it currently is.

The main focus in the paper has been on the second question, whether BTAs are lawful under the WTO. The relevant legal provision to discuss substantive consistency of a BTA/BCA with the WTO law is Art. III GATT. Unfortunately, the text of the provision is too vague to make allow a direct judgment on the legality of these schemes, and despite 60 years of case law, and a Working Party assigned the task of delimiting the legality of BTAs, it is still not clear how a WTO adjudicating body would treat a complaint. (What seems more predictable however, is that a BCA/BTA could be designed such that an Art. XX(g) exception would be granted.)

To address this unsatisfactory state of affairs concerning the ambit of Art. III GATT,

we propose that when interpreting Art. III GATT, adjudicating bodies should first ask the question whether the importing state has the right to regulate. This is basically a question of the allocation of *jurisdiction*, and therefore takes the analysis within the four corners of the *default rules* allocating jurisdiction across states. As interpreted, for a state to have jurisdiction, these rules require that there are *direct, foreseeable* and *substantial* effects on the states territory. They also require that states exercise jurisdiction in *reasonable* manner. These restrictions are likely to significantly circumscribe the possibility of to pursue BTAs in general, but at the same time seem likely to accept climate-related BTAs. For instance, by imposing the requirement for reasonable exercise jurisdiction, the *default rules* reinforce the objectives sought by Art. III GATT, that is, to ensure that recourse to domestic instruments will not be made in order to address competitiveness concerns of the regulator.

An explicit reliance on the *default rules* would also remedy a closely related weakness in the current case law, which is the role of MEAs. The rules emphasize the desirability of bargaining solutions (such as MEAs) in situations where different principles for the allocation of jurisdiction are in conflict. Hence, to the extent that BTA schemes form part of MEAs, they would be considered legal under the WTO.

TO BE REWRITEN: The current construction of the relevant WTO rules concerning BCAs/BTAs is, in our view, wanting in several respects. It is clear that compliance of such schemes with Art. III GATT must be ensured. But WTO case law has, nevertheless, almost completely ignored MEAs, which often discuss the modalities for permissible action through such schemes in sufficient detail; Moreover, case law has completely ignored the *default rules* in public international law regarding allocation of jurisdiction across states. We believe that, were WTO adjudicating bodies to control for these elements (MEAs, default rules), the outcomes of the adjudication process would become more predictable.

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7 Appendix: Derivations for Section 2.4

Let there be two countries, Home (H) and Foreign (F). There is one perfectly competitive sector. H and F produce respectively X and Y of the same homogenous product, and all consumption takes place in H.

The Market Equilibrium

Let Z denote H consumer consumption of the output of the sector under study, and Z_0 consumption of other goods. Consumer welfare is additively separable in the utility derived from Z , given by $U(Z) = \frac{1}{2}Z(2 - Z)$, and Z_0 . Consumer maximization will then give rise to linear demand $Z(P) = 1 - P$.

Firms in H produce the volume X and those in F the volume Y , using the identical cost functions $C(X) = \frac{1}{2}X^2$ and $C(Y) = \frac{1}{2}Y^2$.

H levies a carbon tax t_H and an import tariff τ , while F levies a carbon tax t_F . Consequently, H producers face the same price as H consumers, except for that they have to pay a carbon tax t_H per unit of output. They hence solve

$$\max_X (p - t_H)X - C(X)$$

yielding H supply $X(p - t_H) = p - t_H$. The price faced by F producers is the consumer price less the tariff and the F carbon tax, and consequently solve

$$\max_Y (p - \tau - t_F)Y - C(Y)$$

yielding the supply curve $Y(p - \tau - t_F) = p - \tau - t_F$.

The condition for global demand to equal global supply, or

$$D(p) = X(p - t_H) + Y(p - \tau - t_F)$$

determines the equilibrium price as a function of the policy variables,

$$P(t_H, t_F, \tau) = \frac{1}{3}(1 + \tau + t_F + t_H)$$

and production volumes

$$X(t_H, t_F, \tau) = \frac{1}{3}(1 - 2t_H + t_F + \tau)$$

$$Y(t_H, t_F, \tau) = \frac{1}{3}(1 + t_H - 2(t_F + \tau))$$

Welfare Expressions

H welfare is the sum of consumer surplus CS_H , H producer surplus PS_H and H government revenue GR_H , less the harm to the climate, as captured by the welfare cost K :

$$W_H = CS_H + PS_H + GR_H - K$$

where

$$\begin{aligned}
CS_H &= U(X + Y) - p(X + Y) \\
PS_H &= (p - t_H)X - C(X) \\
GR_H &= t_H X + \tau Y \\
K &= \frac{1}{2}(X + Y)^2
\end{aligned}$$

Similarly, F welfare is the sum of F producer surplus PS_F and F government revenue GR_F , less the harm to the climate K :

$$W_F = PS_F + GR_F - K$$

where

$$\begin{aligned}
PS_F &= (p - \tau - t_F)Y - C(Y) \\
GR_H &= t_F Y
\end{aligned}$$

Finally, global welfare is

$$W_G = W_H + W_F$$

Definitions for Computations

The results to be presented are derived using MuPAD/Scientific WorkPlace 5.50. The following definitions are made for this purpose:

$$\begin{aligned}
U &:= \frac{1}{2}(X + Y)(2 - X - Y) \\
D &:= 1 - p \\
C &:= \frac{1}{2}X^2 \\
G &:= \frac{1}{2}Y^2 \\
X &:= p - t_H \\
Y &:= p - \tau - t_F \\
p &:= \frac{1}{3}(1 + \tau + t_F + t_H) \\
K &:= \frac{(X+Y)^2}{2} \\
S_H &:= U - p(X + Y) \\
A &:= (p - t_H)X - C \\
R &:= t_H X + \tau Y \\
W_H &:= S_H + A + R - K \\
W_F &:= (p - \tau)Y - G - K
\end{aligned}$$

$$W_G := S_H + A + R - K + (p - \tau)Y - G - K$$

The Basic Impact of a Tariff on Global Welfare

For constant t_H and t_F :

$$\frac{dW_G}{d\tau} = \frac{1}{9}(4 - 8\tau + t_H - 8t_F)$$

Hence, to evaluate the impact of a small tariff, with no carbon taxation, insert $\tau = t_H = t_F = 0$ into this expression to get:

$$\frac{dW_G}{d\tau} = \frac{4}{9} > 0$$

Carbon Taxes are Unilaterally Determined

Now compute the Nash equilibrium in (t_H, t_F) . The best reply functions are

$$\begin{aligned} \frac{dW_H}{dt_H} &= \frac{1}{9}(1 + 4\tau - 8t_H + t_F) = 0 \\ \frac{dW_F}{dt_F} &= \frac{1}{3}(1 - 3t_F - \tau) = 0 \end{aligned}$$

where it is readily shown that second-order conditions are fulfilled. Solving the two first-order conditions for (t_H, t_F) yields:

$$\begin{aligned} t_H &= \frac{1}{6} + \frac{11}{24}\tau \\ t_F &= \frac{1}{3} - \frac{1}{3}\tau \end{aligned}$$

Now evaluate the global welfare impact of the introduction of a small tariff. At $\tau = 0$, the taxes are $t_H = \frac{1}{6}$ and $t_F = \frac{1}{3}$. Evaluating the global welfare impact of the introduction of a small tariff, taking these taxes as given:

$$\begin{aligned} \frac{dW_G}{d\tau} &= \frac{1}{9}(4 - 8\tau + t_H - 8t_F) \\ &= \frac{1}{9}(4 + \frac{1}{6} - 8(\frac{1}{3})) \\ &= \frac{1}{6} > 0 \end{aligned}$$

Carbon Taxes and the Tariff are Unilaterally Determined

H optimizes over (τ, t_H) . The objective function is strictly concave since

$$\begin{aligned}\frac{d^2W_H}{d\tau^2} &= -\frac{11}{81} < 0; & \frac{d^2W_H}{dt_H^2} &= -\frac{8}{81} < 0 \\ \frac{d^2W_H}{d\tau^2} \frac{d^2W_H}{dt_H^2} - \left(\frac{d^2W_H}{d\tau dt_H}\right)^2 &= \frac{1}{81}[(-11)(-8) - (4)^2] > 0\end{aligned}$$

The first-order conditions for a Nash equilibrium in (τ, t_H, t_F) :

$$\begin{aligned}4 - 11\tau + 4t_H - 5t_F &= 0 \\ 1 + 4\tau - 8t_H + t_F &= 0 \\ 1 - 3t_F - \tau &= 0\end{aligned}$$

Solution is:

$$\tau^A = \frac{2}{5}, \quad t_H^A = \frac{7}{20}, \quad t_F^A = \frac{1}{5}$$

Quantities are positive, and the implied welfare is $W_G^A = \frac{3}{25}$.

The global welfare impact of increase in τ at this NE:

$$\begin{aligned}\frac{dW_G}{d\tau} &= \frac{1}{9}(4 - 8\tau^A + t_H^A - 8t_F^A) \\ &= \frac{1}{9}\left(4 - 8\left(\frac{2}{5}\right) + \frac{7}{20} - 8\left(\frac{1}{5}\right)\right) \\ &= -\frac{1}{20} < 0\end{aligned}$$

The global welfare impact of increase in τ at this NE:

$$\begin{aligned}\frac{dW_G}{d\tau} &= \frac{1}{9}\left(4 + \frac{7}{20} - 8\left(\frac{1}{5}\right)\right) \\ &= \frac{11}{36} > 0\end{aligned}$$

Hence, given t_H^A and t_F^A , global welfare maximization calls for a positive tariff, but H's unilaterally determined tariff is too high.

A Trade Agreement with Myopic Negotiators

In this scenario trade negotiators the taxes are unilaterally set, and the tariff is negotiated, but without consideration of the impact of the tariff on the unilateral tax setting. Since the tariff negotiation is assumed to be efficient, it effectively maximizes global wel-

fare, for constant taxes. The outcome will thus be determined by

$$\frac{dW_H}{dt_H} = 0, \quad \frac{dW_F}{dt_F} = 0, \quad \frac{dW_G}{d\tau} = 0$$

or

$$\begin{aligned} 4 - 8\tau + t_H - 8t_F &= 0 \\ 1 + 4\tau - 8t_H + t_F &= 0 \\ 1 - \tau - 3t_F &= 0 \end{aligned}$$

with the solution

$$\tau^B = \frac{4}{13}, \quad t_H^B = \frac{4}{13}, \quad t_F^B = \frac{3}{13}$$

The resulting quantities are positive,

$$X^B = \frac{4}{13}, \quad Y^B = \frac{1}{13}$$

and the global welfare level is $W_G^B = \frac{19}{169}$.

$\tau^A > \tau^B$ since $\frac{2}{5} > \frac{4}{13}$, $t_H^A > t_H^B$ since $\frac{7}{20} > \frac{4}{13}$, and $t_F^A < t_F^B$ since $\frac{1}{5} < \frac{3}{13}$. Furthermore, $t_H^B > t_F^B$, but $t_H^B < \tau + t_F^B$. Home would prefer a higher τ :

$$\begin{aligned} \frac{dW_H}{d\tau} &= \frac{4}{9}\left(\frac{4}{13}\right) - \frac{5}{9}\left(\frac{3}{13}\right) - \frac{11}{9}\left(\frac{4}{13}\right) + \frac{4}{9} \\ &= \frac{1}{13} > 0 \end{aligned}$$

Taking into account the dependence of taxes on the tariff,

$$\begin{aligned} t_F &= \frac{1}{3}(1 - \tau) \\ t_H &= \frac{1}{24}(4 + 11\tau) \end{aligned}$$

an increase in τ would also increase global welfare:

$$\begin{aligned} \frac{dW_G}{d\tau} &= \frac{19}{72} - \frac{37}{72}\tau^B \\ &= \frac{11}{104} > 0 \end{aligned}$$

A Trade Agreement with Forward-Looking Negotiators

With τ negotiated before countries unilaterally sets t_H and t_F , the optimal tariff will

be given by

$$\frac{dW_G}{d\tau} = \frac{19}{72} - \frac{37}{72}\tau = 0$$

yielding the solution

$$\tau^C = \frac{19}{37}, t_H^C = \frac{119}{296}, t_F^C = \frac{6}{37}$$

Quantities are positive:

$$\begin{aligned} X^C &= \frac{43}{148} \\ Y^C &= \frac{5}{296} \end{aligned}$$

and the global welfare level is $W_G^C = \frac{73}{592}$.

$\tau^C > \tau^A > \tau^B$ since $\frac{19}{37} > \frac{2}{5} > \frac{4}{13}$. Furthermore, $X^C + Y^C < X^B + Y^B$, since

$$\frac{43}{148} + \frac{5}{296} < \frac{4}{13} + \frac{1}{13}$$

Furthermore, $W_G^C > W_G^B$ since $\frac{73}{592} > \frac{19}{169}$. $t_H^C > t_H^B$ since $\frac{119}{296} > \frac{6}{37}$.

Evaluating the impact of a small change in τ from this equilibrium for given taxes:

$$\frac{dW_H}{d\tau} = -\frac{7}{74} < 0$$

and if taking the induces changes in taxes into account

$$\frac{dW_H}{d\tau} = -\frac{17}{296} < 0$$

A Trade Agreement with Commerically-Minded, and Myopic Negotiators

If trade negotiators disregard the climate impact of their agreement, they effectively maximize $W_G + 2K$. Assuming that negotiators also disregard the impact on carbon taxes, the outcome would be given by

$$\begin{aligned} \frac{d}{d\tau}(W_G + 2K) &= 0 \\ \frac{dW_H}{dt_H} &= 0 \\ \frac{dW_F}{dt_F} &= 0 \end{aligned}$$

with the solution

$$\tau = -\frac{4}{7}, t_F = \frac{11}{21}, t_H = -\frac{2}{21}$$

with positive quantities

$$X = \frac{8}{21}, Y = \frac{1}{3}$$

However, assuming that a negative tariff (and export subsidy) is not permitted, the solution will be

$$\tau^D = 0, t_H^D = \frac{1}{6}, t_F^D = \frac{1}{3}$$

taking into account the dependency of the optimal carbon taxes on the tariff. The resulting quantities are positive

$$X^D = \frac{1}{3}, Y^D = \frac{1}{6}$$

and the welfare level is $W_G^D = \frac{1}{18}$. The global welfare level will be the lowest among the four scenarios:

$$W_G^C > W_G^A > W_G^B > W_G^D$$

since

$$\frac{73}{592} > \frac{3}{25} > \frac{19}{169} > \frac{1}{18}$$

Production will be the largest among the four scenarios:

$$X^D + Y^D > X^B + Y^B > X^A + Y^A > X^C + Y^C$$

since

$$\frac{8}{21} + \frac{1}{3} > \frac{4}{13} + \frac{1}{13} > \frac{3}{10} + \frac{1}{20} > \frac{43}{148} + \frac{5}{296}$$

Finally, $t_H^D < t_F^D$.