

Will International Rules on Subsidies Disrupt the World Trading System?

by

Kyle Bagwell and Robert W. Staiger*

First Draft: January 2004

Revised: January, 2005

Abstract

We provide a first formal analysis of the international rules that govern the use of subsidies to domestic production. Our analysis highlights the impact of the new disciplines on subsidies that were added to GATT rules with the creation of the WTO. Our results suggest that, although GATT subsidy rules were typically viewed as weak and inadequate while the WTO subsidy rules are seen as representing a significant strengthening of multilateral disciplines on subsidies, the key changes introduced by the WTO subsidy rules may ultimately do more harm than good to the multilateral trading system, by undermining the ability of tariff negotiations to serve as the mechanism for expanding market access to more efficient levels.

*Bagwell: Columbia University and NBER; Staiger: University of Wisconsin and NBER. We thank seminar participants at the IIES in Stockholm, the NBER Summer Institute, Syracuse University, the University of Maryland and the University of Pennsylvania and especially Bill Ethier for helpful comments. We thank the National Science Foundation for support. Comments from a referee and the Co-Editor greatly improved the paper. An earlier draft of this paper, titled "Subsidy Agreements," was circulated as NBER Working Paper No. 10292. Remaining errors are ours.

I. Introduction

International disputes over subsidies are becoming an increasingly prominent feature of the world trading system. The creation of the World Trade Organization (WTO) as a successor to GATT was nearly prevented by disputes in the Uruguay Round of GATT negotiations over the issue of negotiating disciplines on agricultural subsidies, an issue which continues to plague the ongoing Doha Round of WTO negotiations. And ongoing disputes over subsidies that violate existing WTO rules have led to the largest amount of authorized retaliation in GATT/WTO history. Yet despite their evident importance, the international rules that govern subsidies have received little attention in the form of systematic economic analysis.

Perhaps surprisingly, when viewed in the light shed by the existing theoretical literature on domestic subsidies in trading economies, the notion of international agreements that seek to limit the use of subsidies to domestic production looks immediately suspect. After all, a central message of the theory of distortions and welfare is the *targeting principle* (see Bhagwati and Ramaswami, 1963, and Johnson, 1965), under which the optimal intervention targets the affected margin directly. According to this principle, production subsidies are almost always a preferred policy instrument to tariffs. This is because a production subsidy distorts only one margin (i.e., producer decisions), and can therefore constitute a “first-best” instrument of intervention in the presence of production distortions, whereas it is well-understood that a tariff distorts *two* margins (i.e., producer *and* consumer decisions) and therefore almost never corresponds to first-best intervention. In this light, attempts to discipline the use of production subsidies appear misguided, if they simply redirect government interventions toward the use of “second-best” instruments of intervention such as tariffs.

Of course, tariffs themselves have long been the subject of international agreements, with tariff commitments comprising the traditional focus of GATT negotiations. And the concern that, if left unrestrained, the use of subsidies could thwart the impacts of negotiated tariff liberalization has been a long-standing motivation for the continuing attempts by GATT/WTO member governments to introduce “discipline” into the use of subsidies. But the subsidy disciplines that are increasingly leading to disputes are in many ways more constraining of governments than the tariff commitments they negotiate within the GATT/WTO. At a basic level, this feature raises the concern

that the search for effective subsidy disciplines may have gotten off track, since it is a feature that runs counter to what simple reliance on the targeting principle would suggest is warranted. In any event, to sort out these various concerns, what is needed is an analysis of the impacts of subsidy disciplines of various designs in a setting where governments may also negotiate over tariffs.

We provide a first formal analysis of the international rules that govern the use of subsidies to domestic production.¹ Our analysis highlights the impact of the new disciplines on subsidies that were added to GATT rules with the creation of the WTO. We work within a standard 2-country 2-good competitive general equilibrium trade model, augmented to include government choices of domestic production subsidies and also possibly domestic consumption taxes, in addition to tariffs. Our modeling of government objectives extends Bagwell and Staiger (1999) to allow for domestic production subsidies/consumption taxes, and is consistent with many possible underlying motives for the imposition of a production subsidy, including the pursuit of distributive goals in the presence of political economy motivations and the pursuit of allocative efficiency goals in the presence of local (i.e., not trans-border) non-pecuniary externalities. This is an important feature of the model, as the long history of GATT/WTO attempts to discipline domestic subsidies has taken place against the backdrop of explicit acknowledgment by member governments of the legitimate role of domestic subsidies in government policy programs.²

Within this economic environment, we consider the possibility that governments might implement internationally efficient policy choices (defined according to the objectives of each government) with negotiations over tariffs alone, when they face either of two distinct sets of

¹Elsewhere (Bagwell and Staiger, 2001a), we examine the logic of GATT/WTO rules regarding *export* subsidies. At a casual level, it might be thought that our export subsidy results carry over to the case of production subsidies, and therefore that an independent analysis of the international rules governing production subsidies is not warranted. Export subsidies, however, are distinct from production subsidies, and it is well-known that the economic effects of the two forms of intervention are fundamentally different (export subsidies, like tariffs, distort producer *and* consumer decisions). Hence, there is good reason to expect (as we confirm below) that our analysis of export subsidies bears little formal relation to an analysis of the international rules regarding subsidies to domestic production.

²For example, as Jackson (1989, p. 259) points out, the 1979 GATT Subsidies Code observes that domestic subsidies “...are widely used for the promotion of social and economic policy objectives,” and states that it is not the intent of the Code “...to restrict the right of signatories to use such subsidies to achieve these and other important policy objectives which they consider desirable.”

“disciplines” on their unilateral choices of domestic subsidy/tax levels, one set corresponding to GATT subsidy rules and the other corresponding to WTO subsidy rules. In this way, we seek first to identify “weaknesses” in GATT subsidy disciplines that might prevent governments from reaching the international efficiency frontier under GATT tariff negotiations, and then to gauge the degree to which WTO subsidy rules might be seen as marking an improvement.

To represent the key features of GATT subsidy rules, we highlight the two central mechanisms by which a government could respond to the subsidies of a trading partner prior to the creation of the WTO: “countervailing duty” (CVD) measures, and “non-violation” (NV) nullification-or-impairment complaints. More specifically, if the subsidy was offered to exporting producers, then a government whose import-competing producers experienced material injury on account of the subsidy (and whose import tariff on that product was legally bound in a GATT agreement) could unilaterally impose a CVD against the subsidized imports. If the subsidy was instead offered to import-competing producers, then a government that had previously negotiated a tariff binding on that product with the subsidizing government would have a legitimate basis for making an NV claim concerning its market access rights, under which the subsidizing government would then be expected to make a policy adjustment that returned market access to its original level (though the government would be under no obligation to remove the subsidy).

A central question is whether governments have available a sufficiently rich set of domestic instruments that they enjoy a degree of *policy redundancy* which can be exploited under tariff negotiations. In particular, as is well known, the effects of a tariff can be duplicated by a combination production subsidy/consumption tax, and so a government that has access to tariffs as well as a full set of production subsidies and consumption taxes enjoys a degree of policy redundancy. Assuming that this rich set of domestic instruments is available, we show that GATT subsidy rules are sufficient to ensure that an internationally efficient policy combination will be implemented under GATT tariff negotiations. Moreover, we find that efficiency under GATT tariff negotiations is attained even when responding to subsidies under GATT rules is allowed to be quite costly. Intuitively, governments can position tariffs in their negotiations so as to imply a level of market access which yields an NV “trigger point” – a point beyond which further erosion of one

country's market access level would warrant initiation of a costly NV claim by its trading partner in order to reinstate the negotiated market access level – set equal to the efficient level of market access. Subsequent to these negotiations, the level of market access is then allowed to “slip” back to this trigger point through the unilateral choice of domestic subsidy and tax policies – and the redundancy of policy instruments ensures that the conditions for domestic efficiency are not disrupted in the process – but the threat of an NV claim beyond this point keeps market access levels from falling below their efficient levels.

We turn next to the WTO subsidy rules, the main features of which are reflected in the Agreement on Subsidies and Countervailing Measures (SCM). When applied within the context of our model, we argue that the key innovation of the SCM Agreement relative to GATT subsidy rules is that, in addition to its rights under the GATT subsidy rules, any government now has the added right to challenge – and, in principle, force the removal of – virtually any positive subsidy. Maintaining our assumption that governments have sufficient instruments to enjoy a degree of policy redundancy, an implication of our finding regarding the efficiency of GATT subsidy rules is of course that the subsidy rules of the WTO cannot possibly mark an improvement in this setting. Still, it might be conjectured that the WTO subsidy rules, in providing governments with the ability to challenge and remove a domestic instrument (subsidy) which is in any event redundant, will at least do no harm. We show, however, that this conjecture is incorrect: a range of efficient outcomes that were attainable under GATT subsidy rules are unattainable under the subsidy rules of the WTO. Intuitively, the redundancy of policy instruments is *utilized* to achieve efficient outcomes through tariff negotiations under the institutional constraints of the GATT subsidy rules, and by introducing the potential that this redundancy will be removed, the WTO subsidy rules interfere with the ability of governments to structure their tariff negotiations so as to achieve efficient policy combinations.

Finally, we consider a world in which the only domestic instrument is a production subsidy, and so the policy redundancy featured above does not arise. Because it simply eliminates redundancy, this instrument restriction does not alter the welfare combinations that correspond to the efficiency frontier. But as we demonstrate, the elimination of policy redundancy has important implications for negotiated tariff outcomes under GATT and WTO subsidy rules.

First, as can be anticipated from our description just above, in this limited-instrument world, the lack of policy redundancy interferes with the ability of governments to attain the efficiency frontier under GATT subsidy rules. In fact, if NV claims are costly, the lack of policy redundancy in this limited-instrument world prevents governments from attaining *any* point on the efficiency frontier under GATT subsidy rules, so that tariff negotiations under GATT subsidy rules are sure to lead to policy outcomes that are internationally inefficient. Second, the inefficiency under GATT subsidy rules raises at least the possibility that WTO subsidy rules could then mark an improvement, and we show that this is indeed possible provided that the use of subsidies is of sufficiently minor importance on the efficiency frontier. And third, we show that if the importance of domestic subsidies is instead sufficiently pronounced on the efficiency frontier, then WTO subsidy rules can be seen to mark a “step backward” relative to GATT subsidy rules in a limited-instrument costly-NV world. In fact, we describe circumstances in which the WTO subsidy rules will *completely undermine* the ability of tariff negotiations to provide governments with an avenue of escape from the non-cooperative (Nash) equilibrium, and in these circumstances GATT subsidy rules must surely lead to more efficient outcomes than WTO subsidy rules.

When taken together, our results signal a note of caution about the direction in which the WTO is moving on the issue of domestic subsidies. GATT subsidy rules were typically viewed as weak and inadequate, while the WTO subsidy rules are seen as representing a significant strengthening of multilateral disciplines on subsidies. However, our results indicate that the key changes introduced by the WTO subsidy rules may ultimately do more harm than good to the multilateral trading system, by undermining the ability of tariff negotiations to serve as the mechanism for expanding market access to more efficient levels.

The rest of the paper proceeds as follows. Section II develops the model, and characterizes the GATT/WTO bargaining frontier. Section III evaluates the efficiency properties of the GATT subsidy rules, while section IV considers the WTO subsidy rules. Section V turns to a world of limited instruments, and re-evaluates the performance of GATT and WTO subsidy rules in this environment. Section VI offers a brief conclusion.

II. The Model

Our starting point is the 2-country 2-good competitive general equilibrium trade model adapted to allow for the possibility of both tariff and production subsidy/consumption tax choices. To establish our main points simply, we introduce non-trade policies into the home country only, so that the home government may choose both a tariff level and a level for its production subsidy and its consumption tax, while the foreign government has only a tariff choice to make.

II.1: The Basic Trade Model

We assume that the home country exports good y to the foreign country in exchange for imports of good x . Beginning with home country magnitudes, let s denote one plus the ad valorem production subsidy offered to producers of good x in the home country (so that $s > 1$ ($s < 1$) reflects a production subsidy (tax)), and similarly let t denote one plus the ad valorem consumption tax imposed on consumption of good x in the home country (so that $t > 1$ ($t < 1$) reflects a consumption tax (subsidy)).³ We denote the domestic producer price of good x (inclusive of the producer tax/subsidy) by q_x and the domestic consumer price of good x (inclusive of the consumer tax/subsidy) by p_x . The domestic (producer and consumer) price of good y is denoted by p_y , with the ratio of domestic producer and consumer prices then given by $q = q_x/p_y$ and $p = p_x/p_y$, respectively. Finally, let τ denote one plus the ad valorem tariff imposed on imports of good x into the home country (so that $\tau > 1$ ($\tau < 1$) reflects an import tax (subsidy)). All net (positive or negative) revenues generated by these instruments are distributed lump sum across domestic consumers.

Turning to the foreign country, our assumption that the foreign government has only a tariff at its disposal simplifies the description of the foreign economy. Let τ^* denote one plus the ad valorem tariff imposed on foreign imports of good y (so that $\tau^* > 1$ ($\tau^* < 1$) reflects an import tax (subsidy)), where here and throughout “*” is used to denote foreign variables. We denote the local (consumer and producer) price of good x relative to good y in the foreign country by p^* . All net

³As only the price of x relative to the price of y matters in our general equilibrium setting, it is immaterial whether these policy interventions take place in the import-competing sector or the export sector, and we concentrate all interventions in the import-competing sector.

tax revenues from the use of the foreign tariff are distributed lump sum across foreign consumers.

The relative “world price” (i.e., the relative exporter price p_x^*/p_y , or terms of trade) is denoted by p^w . Under the maintained assumption that tariffs are non-prohibitive, international arbitrage links each country’s local prices to the world price in light of its tariff according to $q = s\tau p^w \equiv q(s, \tau, p^w)$, $p = t\tau p^w \equiv p(t, \tau, p^w)$ and $p^* = p^w/\tau^* \equiv p^*(\tau^*, p^w)$.⁴

The foreign import demand and export supply functions may be written as functions of the local relative price in the foreign country and the world price, and we denote these functions by $M^*(p^*, p^w)$ and $E^*(p^*, p^w)$, respectively. In an analogous fashion, the home-country import demand and export supply functions may be written as functions of the local relative producer price q and consumer price p in the home country and the world price p^w . We denote these functions as $M(q, p, p^w)$ and $E(q, p, p^w)$, respectively. With the relevant functions defined, the home and foreign budget constraints may then be written as

$$(1) \quad p^w M(q, p, p^w) = E(q, p, p^w),$$

$$(2) \quad M^*(p^*, p^w) = p^w E^*(p^*, p^w).$$

The equilibrium world price, $\tilde{p}^w(s, t, \tau, \tau^*)$, is determined by market clearing for good x ,

$$(3) \quad M(q(s, \tau, \tilde{p}^w), p(t, \tau, \tilde{p}^w), \tilde{p}^w) = E^*(p^*(\tau^*, \tilde{p}^w), \tilde{p}^w),$$

where we have made explicit the dependence of the local producer prices (consumer prices) on the producer subsidy (consumption tax) and tariffs and the world price. Market clearing for good y is then implied by (1), (2) and (3).

Using the market-clearing condition (3), it may be confirmed that an increase in the tariff has the same impact on the market-clearing world price as does a combined increase in both the

⁴In the domestic country, for example, international arbitrage implies that the before-tax price of good x faced by domestic consumers, p_x/t , is equal to τp_x^* , the before-tax price of an imported unit of good x . This implies that $p = t\tau p^w$ as stated in the text. Domestic producers of good x must meet the competition for domestic consumers from foreign suppliers, and so the before-subsidy price collected by domestic producers of good x , q_x/s , must by international arbitrage be equal to τp_x^* , which implies $q = s\tau p^w$ as stated in the text.

production subsidy and consumption tax by the same percentage. This, of course, reflects the equivalence between a tariff and a combination production subsidy/consumption tax. As we will see, the implied *policy redundancy* for the home government – that any one of its three policy instruments is redundant in light of the other two – plays an important role in what follows.

We assume that the Marshall-Lerner stability conditions are met, so that an inward shift of the home (foreign) import demand curve results in a lower (higher) equilibrium world price. We also assume that Metzler/Lerner-type Paradoxes are ruled out, so that $dq/d\tau = [s/t]dp/d\tau > 0 > dp^*/d\tau^*$, $\partial\tilde{p}^w/\partial\tau < 0 < \partial\tilde{p}^w/\partial\tau^*$, $\partial\tilde{p}^w/\partial s < 0$ and $\partial\tilde{p}^w/\partial t < 0$.

Finally, we represent the objectives of the home and foreign governments with the general functions $W(q, p, \tilde{p}^w)$ and $W^*(p^*, \tilde{p}^w)$, respectively. We assume that, holding its local prices fixed, each government would prefer an improvement in its terms of trade:

$$(4) \quad W_{\tilde{p}^w}(q, p, \tilde{p}^w) < 0 \text{ and } W_{\tilde{p}^w}^*(p^*, \tilde{p}^w) > 0 .$$

According to (4), governments like transfers of revenue from their trading partners. We place no other restrictions on the objectives of each government, although implicitly our representation of government objectives rules out non-pecuniary trans-border externalities that could interact with the choice of tariffs or production subsidies/consumption taxes.⁵

As we do not place restrictions on how a government feels about changes in its local prices, our representation of government preferences is very general, and is consistent with formal models of government policy determination in a wide variety of settings (see Bagwell and Staiger, 1999, for a discussion of this in the context of tariff determination). Of particular relevance for the present discussion is the fact that our model is consistent with many possible underlying motives for the imposition of a production subsidy in the home country, including the pursuit of distributive goals in the presence of political economy motivations and the pursuit of allocative efficiency goals in the presence of local (i.e., not trans-border) non-pecuniary externalities. As we observed in the

⁵We also assume throughout that these objective functions are everywhere differentiable and globally concave in the policy variables.

Introduction, this is an important feature of the model, as the long history of GATT/WTO attempts to discipline domestic subsidies has taken place against the backdrop of explicit acknowledgment by member governments of the legitimate role of domestic subsidies in government policy programs.

II.2: The GATT/WTO Contracting Frontier

We next define the international efficiency frontier. To this end, let \hat{W}^* denote any feasible level of foreign welfare, i.e, any level of \hat{W}^* for which there exists some (s, t, τ, τ^*) such that $W^*(p^*(\tau^*, \tilde{p}^w(s, t, \tau, \tau^*)), \tilde{p}^w(s, t, \tau, \tau^*)) = \hat{W}^*$. We define the international efficiency frontier by the combinations of (s, t, τ, τ^*) which, for each \hat{W}^* , solve:

$$\begin{aligned} \text{Max}_{s, t, \tau, \tau^*} \quad & W(q(s, \tau, \tilde{p}^w(s, t, \tau, \tau^*)), p(t, \tau, \tilde{p}^w(s, t, \tau, \tau^*)), \tilde{p}^w(s, t, \tau, \tau^*)) \\ \text{s.t.} \quad & W^*(p^*(\tau^*, \tilde{p}^w(s, t, \tau, \tau^*)), \tilde{p}^w(s, t, \tau, \tau^*)) \geq \hat{W}^* . \end{aligned}$$

Notice that the international efficiency frontier is defined with respect to the governments' own objective functions which, as we have observed above, may include political economy considerations. In what follows we evaluate various approaches to the treatment of subsidies in international trade agreements on the basis of whether these approaches allow governments to achieve a position on the international efficiency frontier so defined. As we discuss more broadly in Bagwell and Staiger (2002), this seems an appropriate criterion in the context of the GATT/WTO, as the GATT/WTO is an organization that facilitates the negotiation of trading arrangements that are mutually beneficial to its members (i.e., the member governments).⁶

It is straightforward to show that the non-cooperative (Nash) policy choices of the two governments do not achieve a point on the international efficiency frontier. Hence, there are potential gains to the home and foreign government from international negotiations. In what follows we restrict attention to points on the international efficiency frontier at which, with its trading partner's policies fixed, each government would like to raise its own tariff. This restricted attention seems appropriate given our focus on the GATT/WTO, where governments evidently view their own

⁶This is not to say that international subsidy agreements could not be evaluated on the basis of some alternative criterion. For example, international subsidy agreements might be valuable to governments as a way of altering their interactions with their own citizens, rather than as a way of altering their interactions with other governments as is the case in our analysis here. For a broader discussion of these two approaches to understanding the role of international trade agreements more generally, see Bagwell and Staiger (2002).

tariff reductions as “concessions” to be offered only in exchange for something of value (such as concessions of a reciprocal nature) from their trading partners. Formally, we state this condition as:

$$(C1) \quad dW/d\tau > 0; \quad dW^*/d\tau^* > 0.$$

In subsequent sections, when we ask whether various negotiating games can deliver efficient outcomes, we will restrict attention to efficient outcomes which satisfy (C1). We refer to this restricted portion of the international efficiency frontier as the *Contracting Frontier*.

Points on the Contracting Frontier exhibit two important properties that prove useful for our analysis, and so we record these properties in a pair of lemmas, which we prove in the Appendix:

Lemma 1: Let $(s^E, t^E, \tau^E, \tau^{*E})$ denote a point on the Contracting Frontier, and let $\tilde{p}^{wE} \equiv \tilde{p}^w(s^E, t^E, \tau^E, \tau^{*E})$. Then for any $\tilde{p}^{w'} < \tilde{p}^{wE}$, $W^*(p^*(\tau^{*E}, \tilde{p}^{w'}), \tilde{p}^{w'}) < W^*(p^*(\tau^{*E}, \tilde{p}^{wE}), \tilde{p}^{wE})$.

Lemma 2: Let $(s^E, t^E, \tau^E, \tau^{*E})$ denote a point on the Contracting Frontier, and let $\tilde{p}^{wE} \equiv \tilde{p}^w(s^E, t^E, \tau^E, \tau^{*E})$ and $\tilde{p}^{w'} \equiv \tilde{p}^w(s', t', \tau^E, \tau^{*'})$ for any s', t' and $\tau^{*'}$. Then for any s', t' and $\tau^{*'}/\geq \tau^{*E}$ implying $\tilde{p}^{w'} > \tilde{p}^{wE}$, $W(q(s', \tau^E, \tilde{p}^{w'}), p(t', \tau^E, \tilde{p}^{w'}), \tilde{p}^{w'}) < W(q(s^E, \tau^E, \tilde{p}^{wE}), p(t^E, \tau^E, \tilde{p}^{wE}), \tilde{p}^{wE})$.

Together, Lemmas 1 and 2 indicate that, beginning from a point on the Contracting Frontier: (i) the foreign government dislikes any changes in the trade and/or domestic policies of the home government that reduce \tilde{p}^w ; while (ii) the home government dislikes any changes in its own domestic policies combined with a weakly higher foreign tariff that together increase \tilde{p}^w . We emphasize that these predictions do not follow directly from the structure we have placed on government objectives in (4), which refers only to the *partial* effect of how governments feel about \tilde{p}^w -movements (when their local prices are held fixed). That from a position on the Contracting Frontier the direction of \tilde{p}^w -movements implied by various combinations of policy changes is predictive of how governments feel about these policy changes in *total* is a feature that will turn out to be useful in our analysis of subsidy agreements. We begin that analysis in the next section.

III. The GATT Subsidy Rules

III.1 Institutional Background

Throughout GATT’s history, subsidies have posed perplexing and difficult issues for

international trade agreements. Jackson (1989, p. 269) describes the issues this way:

“...the whole area of subsidy activity in international law, including the rules designed to constrain the use of subsidies and the other rules designed to allow national governments the unilateral privilege of responding to subsidies with countervailing duties, is not only extremely complex but holds the potential, if misapplied, of undermining the basic policy goals of the post- World War II liberal trade system. On the one hand, governments can use subsidies to evade a liberal trade system by subsidizing so as to inhibit imports, or by subsidizing so as to enhance exports. On the other hand, responses to subsidies, particularly the unilateral national government response of countervailing duties, can be implemented in such a way as to undermine liberal trade policies...”

As Sykes (forthcoming) describes, there were several attempts made to strengthen GATT subsidy rules prior to the advent of the WTO, but in effect governments remained essentially free under GATT to offer production subsidies to their producers as they wished (possibly subject to some reporting requirements). The allowable responses to these production subsidies from other governments under GATT rules were more restricted, and could in effect take one of two forms, depending on whether the production subsidy was offered to *exporting producers* – and so enhanced exports – or instead to *import-competing producers* – and so inhibited imports.

If the subsidy was offered to exporting producers, then as Sykes (forthcoming) describes a government whose import-competing producers experienced “material injury” on account of the subsidy (and whose import tariff on that product was legally bound in a GATT agreement) could unilaterally impose an additional “countervailing duty” (CVD) against the subsidized imports. The magnitude of the CVD response was limited to be no larger than the amount of the subsidy.⁷

If the subsidy was instead offered to import-competing producers, then as Sykes (forthcoming) explains a government that had previously negotiated a tariff binding on that product with the subsidizing government would have a legitimate basis for making a “non-violation” (NV) nullification-or-impairment claim concerning its market access rights (provided that it could claim

⁷If the importing country’s tariff on that product were unbound, then it could respond to the subsidy with any tariff level it wished., though in contrast to a countervailing duty (which would also be available to it) this tariff response could not discriminate against imports of the product coming from the subsidizing country.

that its market access expectations had been upset by the new subsidy).⁸ In response to such a claim, the subsidizing government would then be expected to make a policy adjustment that returned market access to its original level (though the government would be under no obligation to remove the subsidy). More generally, as Petersmann (1997, pp. 142-170) explains, in principle NV claims can be associated with any governmental measure (e.g., consumption taxes), not just the introduction of new production subsidies, though as Petersmann describes the role of NV claims has been most clearly established in GATT case law as these claims relate to production subsidies. Nevertheless, even when applied to subsidies, the legal ambiguities associated with the notion of “non-violation” complaints are considerable, and have made reliance on NV claims as a subsidy disciplining device controversial from the beginning. The resulting frustration has helped to fuel the long-standing attempts to reform subsidy disciplines in the GATT/WTO.⁹

Against this institutional background, we now pose the following question: Could governments who negotiate tariff commitments and are then free to set their domestic subsidy/tax instruments as they wish be expected to achieve internationally efficient policy outcomes, when they are permitted to respond to production subsidies (and in the case of NV claims, consumption taxes as well) as we have described these allowable responses just above? To answer this question, we next define a negotiation game that captures the features described above. The general features of the *GATT Subsidy Game* are as follows:¹⁰

Stage 1: The home and foreign governments negotiate tariff levels $(\hat{\tau}, \hat{\tau}^*)$, and a stage-1 market-clearing world price $\tilde{p}_1^w \equiv \tilde{p}^w(s_0, t_0, \hat{\tau}, \hat{\tau}^*)$ is implied by $(\hat{\tau}, \hat{\tau}^*)$ and the existing domestic subsidy and tax policies (s_0, t_0) .

⁸The conditions under which a subsidy could be said to upset market access expectations were clarified in several early GATT Working Party and Panel reports, and effectively cover the introduction of any new or increased subsidy that diminishes access and was not previously included in a GATT schedule (Petersmann, 1997, pp. 151-154).

⁹An additional limitation of GATT subsidy disciplines which is emphasized by Sykes (forthcoming) was their inability to address third-country issues. These issues do not arise in our 2-country model, but we return to consider them further in the concluding section.

¹⁰Implicitly, we are assuming that GATT commitments are enforced. In fact, GATT enforcement mechanisms were notoriously weak, and the WTO took important steps to rectify this weakness. We abstract from issues of enforcement in our formal analysis, to focus on differences in subsidy disciplines across the GATT and the WTO.

Stage 2: The home government chooses domestic policies (\hat{s}, \hat{t}) , and a stage-2 market-clearing world price $\tilde{p}_2^w \equiv \tilde{p}^w(\hat{s}, \hat{t}, \hat{\tau}, \hat{\tau}^*)$ is implied.

Stage 3: If the conditions for a successful NV claim are met, then the foreign government chooses whether or not to make an NV claim; if the conditions for a CVD response are met, then the foreign government chooses whether or not to impose a CVD.

In effect, the GATT Subsidy Game has the two governments negotiating over tariffs, with the home government then free to set unilaterally its domestic production subsidy and consumption tax levels, and the foreign government free to respond to the domestic policy choices within the limits established by GATT rules.¹¹ In the next subsection, we further develop the specific features of the GATT Subsidy Game, and derive a benchmark result.

III.2 The Efficiency of Outcomes under GATT Subsidy Rules

We begin our analysis of the GATT Subsidy Game by considering in more detail the implications of GATT rules for the allowable responses of the foreign government in stage 3. Consider first the condition for a successful NV claim. As described above, a legitimate basis for an NV claim by the foreign government arises whenever the home government has bound a tariff in a GATT negotiation with the foreign government, and then subsequently alters its domestic policies in a way that diminishes the market access implied by that original tariff negotiation.

To formalize this condition, we follow Bagwell and Staiger (2001b) and define the *market access* that a country provides to its trading partner by the volume of imports it would accept at a particular world price.¹² In particular, let us define the *domestic market access implied by the stage-*

¹¹Governments negotiate *bindings* on their tariffs in the GATT/WTO, and these bindings represent maximum levels beyond which a government's applied tariffs cannot legally rise. For simplicity, and to focus on the main points, we make no distinction between the applied tariffs and the bindings negotiated in stage 1 of the GATT Subsidy Game, but this distinction can be introduced without altering our results. We observe as well that, owing to the policy redundancy noted above, if the foreign government had *no* ability to respond to the stage-2 domestic policy choices of the home government (i.e., if there were no stage 3), then the home government would attain a point on its best-response function with its stage-2 choices, and an efficient combination of policies satisfying (C1) cannot be achieved.

¹²This definition conforms to the notion of market access in the GATT/WTO (see WTO, 2004, for a recent and illuminating discussion of the concept of market access). GATT Panels have made a clear distinction between market access and export volume (Petersmann, 1997, p. 141), noting that market access refers to the "conditions of competition" between imported and domestic products. This is reflected in our formal definition of market access above by evaluating

I tariff negotiation as the domestic import volume implied by the stage-1 tariff choice and the existing domestic subsidy and tax policies, evaluated at the market-clearing world price implied in stage 1, or $M(q(s_0, \hat{t}, \tilde{p}_1^w)), p(t_0, \hat{t}, \tilde{p}_1^w), \tilde{p}_1^w$. Next, we define the *domestic market access implied by the stage-2 policy choices* as the domestic import volume implied by the stage-1 tariff choice and the stage-2 domestic subsidy and tax policy choices, evaluated again at the market-clearing world price implied in stage 1, or $M(q(\hat{s}, \hat{t}, \tilde{p}_1^w)), p(\hat{t}, \hat{t}, \tilde{p}_1^w), \tilde{p}_1^w$. With these definitions, it may then be said that the condition for a successful NV claim by the foreign government is met if and only if $M(q(\hat{s}, \hat{t}, \tilde{p}_1^w)), p(\hat{t}, \hat{t}, \tilde{p}_1^w), \tilde{p}_1^w < M(q(s_0, \hat{t}, \tilde{p}_1^w)), p(t_0, \hat{t}, \tilde{p}_1^w), \tilde{p}_1^w$. But using the market-clearing condition (3) and the Marshall-Lerner stability condition, this condition is equivalent to $\tilde{p}_2^w < \tilde{p}_1^w$.

Having formalized the condition for a successful NV claim, we next ask when the foreign government would choose to make an NV claim, if the condition for success were in place. To answer this question, we first observe that the home government is obliged under a successful NV claim to make a policy adjustment that returns market access to its original level. Following a successful NV claim, then, we allow the home government to select its preferred (\hat{s}, \hat{t}) consistent with the original market access level.¹³ But by (3), it may now also be observed that the effect of a successful NV claim is to return the market-clearing world price to its implied stage-1 level \tilde{p}_1^w .

Figure 1 illustrates. With the world price measured on the vertical axis and the quantity of good x measured on the horizontal axis, the home-country import demand curve and the foreign-country export supply curve associated with the stage-1 tariff negotiations are labeled M_1 and E^* , respectively. The domestic market access implied by the stage-1 tariff negotiation is labeled $M_1(\tilde{p}_1^w)$. A reduction in the domestic market access implied by the stage-2 policy choices to the

import volume at a particular world (i.e., exporter) price. We may think of the conditions of competition between imported and domestic products as remaining stable as long as a particular exporter price would continue to bring forth the same volume of import demand.

¹³In response to an NV claim, the home government could also adjust (reduce) its tariff, but the policy redundancy for the home government allows us to focus on adjustments to (\hat{s}, \hat{t}) with no loss of generality. We model NV claims here as preserving the *level* of market access commitments implied by tariff negotiations. More accurately, in combination with renegotiation rights the NV claims operate to preserve the *balance* of market access commitments implied by tariff negotiations. We discuss the extension of our results to this setting in the concluding section.

level labeled $M_2(\tilde{p}_1^w)$ would be associated with an inward-shift of the home-country import demand curve to that labeled M_2 . The associated stage-2 market clearing world price is labeled \tilde{p}_2^w and, as Figure 1 depicts, $M_2(\tilde{p}_1^w) < M_1(\tilde{p}_1^w)$ implies $\tilde{p}_2^w < \tilde{p}_1^w$. By inducing the home government to select a (\hat{s}, \hat{t}) consistent with the original market access level $M_1(\tilde{p}_1^w)$, a successful NV claim shifts the home-country import demand curve back out through the point $(\tilde{p}_1^w, M_1(\tilde{p}_1^w))$ in Figure 1, and returns the market-clearing world price to its implied stage-1 level \tilde{p}_1^w .

As a consequence of these observations, we may conclude that the foreign government gains from exercising a right to make an NV claim if and only if $W^*(p^*(\hat{t}^*, \tilde{p}_1^w), \tilde{p}_1^w) > W^*(p^*(\hat{t}^*, \tilde{p}_2^w), \tilde{p}_2^w)$. We may therefore state:

Lemma 3: The foreign government makes an NV claim in stage 3 of the GATT Subsidy Game if and only if (i) $\tilde{p}_2^w < \tilde{p}_1^w$, and (ii) $W^*(p^*(\hat{t}^*, \tilde{p}_2^w), \tilde{p}_2^w) < W^*(p^*(\hat{t}^*, \tilde{p}_1^w), \tilde{p}_1^w)$.

Consider next the condition for a CVD response. As described in the previous subsection, under GATT rules the foreign government can unilaterally impose a CVD on imports from the home country whenever it can establish that its import-competing industry suffers material injury as a result of a subsidy offered by the domestic government to domestic exporting firms. We formalize this by requiring that, for a foreign CVD response to be permissible, the home government must have with its stage-2 choice increased the production subsidy it offers to its exporting firms relative to the stage-1 level, and the implied output in the foreign import-competing sector must contract between stages 1 and 2 as a result. In our general equilibrium setting, a production subsidy offered to domestic exporting firms implies $\hat{s} < 1$, and a rise in the production subsidy offered to the domestic exporting firms implies $\hat{s} < s_0$, while the output of the foreign import-competing sector contracts between stages 1 and 2 if and only if $p^*(\hat{t}^*, \tilde{p}_2^w) > p^*(\hat{t}^*, \tilde{p}_1^w)$, which is equivalent to $\tilde{p}_2^w > \tilde{p}_1^w$.

Observing that the foreign government will exercise an opportunity to impose a CVD if and only if its tariff is bound below its best-response level, or $\hat{t}^* < \tau^{*R}(\hat{s}, \hat{t}, \hat{t})$, we may therefore state:

Lemma 4: The foreign government chooses to impose a CVD in stage 3 of the GATT Subsidy Game if and only if (i) $\hat{s} < \min[1, s_0]$, (ii) $\tilde{p}_2^w > \tilde{p}_1^w$, and (iii) $\hat{t}^* < \tau^{*R}(\hat{s}, \hat{t}, \hat{t})$.

With the foreign government's stage-3 responses in the GATT Subsidy Game characterized by Lemmas 3 and 4, we now ask whether the GATT Subsidy Game can deliver internationally efficient outcomes. To explore this possibility, we follow Bagwell and Staiger (2001b) and ask whether points on the efficiency frontier can be reached with appropriate stage-1 outcomes, in light of the subsequent (stage-2 and stage-3) outcomes that may be anticipated. Given the existing production and consumption policies of the home government, we say that a particular pair of payoffs for the home and foreign governments can be *implemented under GATT tariff negotiations* if there exists a pair of negotiated tariff levels $(\hat{\tau}, \hat{\tau}^*)$ such that this payoff pair corresponds to a Subgame Perfect Nash Equilibrium (SGPE) of stages 2 and 3 of the GATT Subsidy Game.

Consider, then, any policy combination $(s^E, t^E, \tau^E, \tau^{*E})$ on the Contracting Frontier. As we observed in section II.1, there is a degree of policy redundancy for the home government, in the sense that any one of its three policy instruments is redundant in light of the other two. We now exploit this policy redundancy and observe that the efficient payoffs associated with $(s^E, t^E, \tau^E, \tau^{*E})$ can be equivalently delivered with the alternative (efficient) policy combination $(s^E/\alpha, t^E/\alpha, \alpha\tau^E, \tau^{*E})$ for any $\alpha > 0$. Define $\tilde{p}^{wE} \equiv \tilde{p}^w(s^E, t^E, \tau^E, \tau^{*E})$, and define $\hat{\tau}^E$ implicitly by $\tilde{p}^w(s_0, t_0, \hat{\tau}^E, \tau^{*E}) = \tilde{p}^{wE}$. In words, $\hat{\tau}^E$ is the domestic tariff level that, in combination with the foreign tariff τ^{*E} and the *existing* domestic subsidy and tax policies (s_0, t_0) , implies the market-clearing world price \tilde{p}^{wE} (and the efficient domestic market access level). Finally, let $\hat{\alpha} \equiv \hat{\tau}^E/\tau^E$. Then the efficient policy combination $(s^E, t^E, \tau^E, \tau^{*E})$ is equivalent to the alternative (efficient) policy combination $(s^E/\hat{\alpha}, t^E/\hat{\alpha}, \hat{\tau}^E, \tau^{*E})$.

We now claim that the pair of payoffs for the home and foreign governments associated with the policy combination $(s^E, t^E, \tau^E, \tau^{*E})$ can be implemented under GATT tariff negotiations. To establish this claim, we suppose that stage-1 negotiations result in the tariff pair $(\hat{\tau} = \hat{\tau}^E, \hat{\tau}^* = \tau^{*E})$, so that the market access levels implied by these initial choices are efficient and the implied stage-1 market-clearing world price is $\tilde{p}_1^w = \tilde{p}^{wE}$. We then show that this payoff pair corresponds to a SGPE of stages 2 and 3 of the GATT Subsidy Game. The candidate equilibrium entails home government stage-2 choices of $(\hat{s} = s^E/\hat{\alpha}, \hat{t} = t^E/\hat{\alpha})$, and no stage-3 claims/responses by the foreign government.

To establish that this candidate equilibrium is indeed a SGPE of stages 2 and 3 of the GATT Subsidy Game when stage-1 negotiations result in the tariff pair $(\hat{\tau}=\hat{\tau}^E, \hat{\tau}^*=\tau^{*E})$, consider the home government's stage-2 problem. If it selects $(\hat{s}=s^E/\hat{\alpha}, \hat{t}=t^E/\hat{\alpha})$, then it has selected an efficient mix of policies to deliver its efficient market access level, the implied stage-2 market-clearing world price is $\tilde{p}_2^w = \tilde{p}^{wE} = \tilde{p}_1^w$, and by Lemmas 3 and 4 there can be no stage-3 response from the foreign government. Hence, if the home government's stage-2 choice is $(\hat{s}=s^E/\hat{\alpha}, \hat{t}=t^E/\hat{\alpha})$, then the welfare levels associated with the efficient policy combination $(s^E, t^E, \tau^E, \tau^{*E})$ will be implemented.

Suppose, then, that the home government's stage-2 choice deviates from this candidate equilibrium and instead is $(\hat{s}, \hat{t}) = (s', t') \neq (s^E/\hat{\alpha}, t^E/\hat{\alpha})$. Then there are three possibilities. A first possibility is that, under the alternative stage-2 choice, the domestic market access level remains unchanged so that it is still true that $\tilde{p}_2^w = \tilde{p}^{wE} = \tilde{p}_1^w$, and therefore by Lemmas 3 and 4 it is still the case that there can be no stage-3 response from the foreign government. But then the foreign government is indifferent between $(\hat{s}=s^E/\hat{\alpha}, \hat{t}=t^E/\hat{\alpha})$ and $(\hat{s}=s', \hat{t}=t')$, so that a strict preference for $(\hat{s}=s', \hat{t}=t')$ by the home government would be inconsistent with the efficiency of $(s^E, t^E, \tau^E, \tau^{*E})$. A second possibility is that, under the alternative stage-2 choice, the domestic market access level is reduced, so that $\tilde{p}_2^w < \tilde{p}^{wE} = \tilde{p}_1^w$. But then by Lemmas 1 and 3, the foreign government will choose in stage 3 to make an NV claim, and the home government must then select its preferred (\hat{s}, \hat{t}) consistent with $\tilde{p}^w(\hat{s}, \hat{t}, \hat{\tau}^E, \tau^{*E}) = \tilde{p}_1^w = \tilde{p}^{wE}$, and can do no better than to select the (efficient) combination $(\hat{s}=s^E/\hat{\alpha}, \hat{t}=t^E/\hat{\alpha})$. The third and final possibility is that, under the alternative stage-2 choice, the domestic market access level is increased, so that $\tilde{p}_2^w > \tilde{p}^{wE} = \tilde{p}_1^w$. Under this possibility, there can be no stage-3 NV claim by Lemma 3. By Lemma 4 there might be a stage-3 CVD imposed by the foreign government, and with $\partial \tilde{p}^w / \partial \tau^* > 0$ this would have the effect of increasing \tilde{p}^w further above \tilde{p}^{wE} . But in any event, by Lemma 2 the home government cannot achieve higher welfare under this (higher \tilde{p}^w) possibility. Hence we may state:

Proposition 1: Any point on the Contracting Frontier can be implemented under GATT tariff negotiations.

Proposition 1 asserts that the GATT-permissible responses to production subsidies (and

consumption taxes) are sufficient to allow internationally efficient outcomes to be achieved with negotiations over tariffs alone. Since, according to Proposition 1, any point on the Contracting Frontier can be implemented under GATT tariff negotiations, it follows that any (frictionless) stage-1 bargaining procedure over tariffs will achieve an internationally efficient policy outcome. Intuitively, the rules that delineate the permissible responses evidently strike the right balance between, on the one hand, providing governments with the responses necessary to prevent their trading partners from making domestic policy choices that would preclude attainment of the international efficiency frontier and, on the other hand, not being so permissive as to allow the responses themselves to become the impediment to efficient outcomes.¹⁴

Notice that, in establishing Proposition 1, we have said nothing about how the “existing” domestic subsidy and tax policies (s_0, t_0) are determined. This raises a potential concern that allowing (s_0, t_0) to be chosen by the home government before the initiation of the GATT Subsidy Game – in anticipation of the upcoming negotiations according to the GATT Subsidy Game – could undercut the ability of this game to deliver governments to the Contracting Frontier (and hence undercut our Proposition 1). However, Proposition 1 is proven for *any* initial subsidy and tax levels, and so allowing the home government to choose its subsidies and taxes prior to the initiation of the GATT Subsidy Game has no effect on our proposition; in particular the GATT Subsidy Game continues to deliver governments to the Contracting Frontier. The reason is that, whatever the initial subsidy and tax levels, the Stage-1 tariff negotiations secure tariff levels that, together with these initial subsidies and taxes, imply the desired equilibrium world price. And once Stage 1 negotiations have been completed and a world price is thereby implied, the initial subsidy and tax levels are irrelevant to the later stages of the game.¹⁵

¹⁴As our proof of Proposition 1 demonstrates, it is possible to implement any point on the Contracting Frontier without altering the implied domestic market access between stages 1 and 2 and thus without triggering an NV claim along the equilibrium path. Hence, while we have appealed to GATT rulings (see note 8) and treated as unexpected any $(\hat{s}, \hat{t}) \neq (s_0, t_0)$ that diminishes the implied domestic market access between stages 1 and 2, this treatment would also be consistent with a more game-theoretic approach of defining unexpected as “off-equilibrium.”

¹⁵Under the natural assumption that disagreement in the stage-1 tariff negotiations of the GATT Subsidy Game leads to non-cooperative (Nash) policy choices for both governments, there is no incentive for the home government to manipulate its initial subsidy and tax choices to position disagreement payoffs either.

Interestingly, as the arguments leading up to Proposition 1 reveal, there is an important role for the possibility of NV claims in supporting efficient negotiating outcomes, but there appears to be no need for the possibility of CVD responses to guide governments to the Contracting Frontier (that is, the possibility of a stage-3 CVD response could be made costly or even removed entirely from the GATT Subsidy Game without altering the validity of Proposition 1). But in light of the role played by NV claims in supporting efficient outcomes in the GATT Subsidy Game, it is important to ask whether this role would be diminished or even eliminated once the costs of bringing a successful NV claim are introduced. After all, as we observed in section III.1, the many attempts to impose further disciplines on the use of subsidies which culminated in the WTO SCM Agreement can be interpreted as reflecting in large part the frustration associated with the high costs of using the legally ambiguous NV claim for this purpose. We therefore turn in the next subsection to consider the implications for Proposition 1 of introducing a cost to the NV claim.

III.3 Costly NV Claims and the Efficiency of Outcomes under GATT Subsidy Rules

We maintain our focus on the GATT Subsidy Game, but now introduce a cost to making an NV claim. We assume that the cost is borne by the claimant (i.e., the foreign government), and depict the welfare level of the foreign government as $W^*(p^*, \tilde{p}^w; NV)$ when it makes an NV claim and faces local foreign prices p^* and market-clearing world price \tilde{p}^w . We will say that the NV claim is *costly* at prices p^* and \tilde{p}^w if and only if $W^*(p^*, \tilde{p}^w) > W^*(p^*, \tilde{p}^w; NV)$. An NV claim is *costless* at prices p^* and \tilde{p}^w if and only if $W^*(p^*, \tilde{p}^w) = W^*(p^*, \tilde{p}^w; NV)$.

The only limit we place on the magnitude of the NV cost is as follows. For any combination of policies $(s^E, t^E, \tau^E, \tau^{*E})$ on the Contracting Frontier, and with $\tilde{p}^{wE} \equiv \tilde{p}^w(s^E, t^E, \tau^E, \tau^{*E})$, we assume that there exists a \bar{p}_1^w satisfying $W^*(p^*(\tau^{*E}, \bar{p}_1^w), \bar{p}_1^w; NV) = W^*(p^*(\tau^{*E}, \tilde{p}^{wE}), \tilde{p}^{wE})$.¹⁶ Our assumption on the allowable magnitude of NV cost implies that the cost of NV cannot rise so high that there is no level of \bar{p}_1^w that would make the foreign government indifferent between, on the one hand, paying the NV cost and trading at the terms of trade $\tilde{p}^w = \bar{p}_1^w$, and on the other hand, not paying the NV cost

¹⁶If more than one value of \bar{p}_1^w exists, then we define \bar{p}_1^w to be the lowest such value. From the definition of \bar{p}_1^w , if NV is costless, then $\bar{p}_1^w = \tilde{p}^{wE}$. When NV is costly, we have that $\bar{p}_1^w > \tilde{p}^{wE}$ by the definition of \bar{p}_1^w and Lemma 1.

but trading at the terms of trade \tilde{p}^{wE} . Recalling now by Lemma 1 that, for any $\tilde{p}^{w/} < \tilde{p}^{wE}$, we also have $W^*(p^*(\tau^{*E}, \tilde{p}^{w/}), \tilde{p}^{w/}) < W^*(p^*(\tau^{*E}, \tilde{p}^{wE}), \tilde{p}^{wE})$, it follows that, whether or not NV is costly at prices $p^*(\tau^{*E}, \bar{p}_1^w)$ and \bar{p}_1^w , $W^*(p^*(\tau^{*E}, \tilde{p}^{w/}), \tilde{p}^{w/}) < W^*(p^*(\tau^{*E}, \tilde{p}^{wE}), \tilde{p}^{wE}) = W^*(p^*(\tau^{*E}, \bar{p}_1^w), \bar{p}_1^w; NV)$ for any $\tilde{p}^{w/} < \tilde{p}^{wE}$. We may therefore state the analogue of Lemma 1 when NV claims are costly:

Lemma 5: Let $(s^E, t^E, \tau^E, \tau^{*E})$ denote a point on the Contracting Frontier, let $\tilde{p}^{wE} \equiv \tilde{p}^w(s^E, t^E, \tau^E, \tau^{*E})$, and let \bar{p}_1^w be defined by $W^*(p^*(\tau^{*E}, \bar{p}_1^w), \bar{p}_1^w; NV) = W^*(p^*(\tau^{*E}, \tilde{p}^{wE}), \tilde{p}^{wE})$. Then for any $\tilde{p}^{w/} < \tilde{p}^{wE}$, $W^*(p^*(\tau^{*E}, \tilde{p}^{w/}), \tilde{p}^{w/}) < W^*(p^*(\tau^{*E}, \bar{p}_1^w), \bar{p}_1^w; NV)$.

Introducing a cost to making an NV claim alters our previous analysis of the GATT Subsidy Game in only one way: the condition under which the foreign government gains from exercising a right to make an NV claim must be reconsidered. As before, the home government is obliged under a successful NV claim to make a policy adjustment that returns market access to its original level. To simplify and focus on the main point, we assume as well that the foreign export supply function is invariant to the filing of an NV claim. (We thus rule out the possibility that the foreign export supply function is altered in the process of making an NV claim by, for example, diverting resources from production of the export good to developing the NV claim.) With this assumption, it again follows by (3) that the effect of a successful NV claim is to return the market-clearing world price to its implied stage-1 level \tilde{p}_1^w . Hence, the foreign government gains from making a successful NV claim if and only if $W^*(p^*(\hat{\tau}^*, \tilde{p}_2^w), \tilde{p}_2^w) < W^*(p^*(\hat{\tau}^*, \tilde{p}_1^w), \tilde{p}_1^w; NV)$. We may therefore state the analogue of Lemma 3 when NV claims are costly:

Lemma 6: The foreign government makes a costly NV claim in stage 3 of the GATT Subsidy Game if and only if (i) $\tilde{p}_2^w < \tilde{p}_1^w$, and (ii) $W^*(p^*(\hat{\tau}^*, \tilde{p}_2^w), \tilde{p}_2^w) < W^*(p^*(\hat{\tau}^*, \tilde{p}_1^w), \tilde{p}_1^w; NV)$.

As we continue to assume that a CVD response is costless, Lemma 4 continues to characterize the circumstances under which the foreign government chooses to impose a CVD in stage 3 of the GATT Subsidy Game. Armed with Lemmas 4, 5 and 6, we may now ask whether the GATT Subsidy Game can deliver efficient outcomes when the NV claim is costly.

Consider, then, any policy combination $(s^E, t^E, \tau^E, \tau^{*E})$ on the Contracting Frontier. Define $\bar{\tau}^E$

implicitly by $\tilde{p}^w(s_0, t_0, \bar{\tau}^E, \tau^{*E}) = \bar{p}_1^w$, and let $\bar{\alpha} \equiv \bar{\tau}^E / \tau^{*E}$. In words, $\bar{\tau}^E$ is the domestic tariff level that, in combination with the foreign tariff τ^{*E} and the *existing* domestic subsidy and tax policies (s_0, t_0) , implies the market-clearing world price \bar{p}_1^w . Then the efficient policy combination $(s^E, t^E, \tau^E, \tau^{*E})$ is equivalent to the alternative (efficient) policy combination $(s^E/\bar{\alpha}, t^E/\bar{\alpha}, \bar{\tau}^E, \tau^{*E})$.

Now suppose that stage-1 negotiations result in the tariff pair $(\hat{\tau} = \bar{\tau}^E, \hat{\tau}^* = \tau^{*E})$, so that the implied stage-1 market-clearing world price is then $\tilde{p}_1^w = \bar{p}_1^w$. Notice that when NV is costly, $\bar{p}_1^w > \tilde{p}^{wE}$ and so these stage-1 negotiations result in the home government offering to bind its tariff at a level that implies a *greater* level of market access at \tilde{p}^{wE} than is efficient. Consider the home government's stage-2 problem. If it selects $(\hat{s} = s^E/\bar{\alpha}, \hat{t} = t^E/\bar{\alpha})$, then its domestic policy choices have *reduced* its market access to the efficient level at \tilde{p}^{wE} , and the implied stage-2 market-clearing world price is $\tilde{p}_2^w = \tilde{p}^{wE}$, with $\bar{p}_1^w > \tilde{p}^{wE}$ and hence $\tilde{p}_2^w < \bar{p}_1^w$ when NV is costly. By Lemma 4, then, there can be no stage-3 CVD response from the foreign government. And by Lemma 6 and the definition of \bar{p}_1^w , there will be no NV claim against the home government. Hence, if the home government's stage-2 choice is $(\hat{s} = s^E/\bar{\alpha}, \hat{t} = t^E/\bar{\alpha})$, then the welfare levels associated with the efficient policy combination $(s^E, t^E, \tau^E, \tau^{*E})$ will be implemented.

To see that the home government cannot do better than this candidate equilibrium with an alternative stage-2 selection, suppose that its stage-2 choice is $(\hat{s}, \hat{t}) = (s', t') \neq (s^E/\bar{\alpha}, t^E/\bar{\alpha})$. Then there are three possibilities. A first possibility is that, under the alternative stage-2 choice, domestic market access remains at its efficient level, so that it is still true that $\tilde{p}_2^w = \tilde{p}^{wE}$. But then the foreign government is indifferent between $(\hat{s} = s^E/\bar{\alpha}, \hat{t} = t^E/\bar{\alpha})$ and $(\hat{s} = s', \hat{t} = t')$, so that a strict preference for $(\hat{s} = s', \hat{t} = t')$ by the home government would be inconsistent with the efficiency of $(s^E, t^E, \tau^E, \tau^{*E})$. A second possibility is that, under the alternative stage-2 choice, domestic market access is reduced below its efficient level, so that $\tilde{p}_2^w < \tilde{p}^{wE}$. But then by Lemmas 5 and 6, the foreign government will choose in stage 3 to make an NV claim, and the home government must then select its preferred (\hat{s}, \hat{t}) consistent with $\tilde{p}^w(\hat{s}, \hat{t}, \hat{\tau}^E, \tau^{*E}) = \tilde{p}_1^w > \tilde{p}^{wE}$, which by Lemma 2 implies that the home government then does strictly worse. The third and final possibility is that, under the alternative stage-2 choice, domestic market access is maintained above its efficient level, so that $\tilde{p}_2^w > \tilde{p}^{wE}$. But whether or not there is a (CVD) response from the foreign government, under this third possibility the home

government must face a market-clearing world price higher than \tilde{p}^{wE} , and by Lemma 2 therefore does strictly worse. Hence we may state:

Proposition 2: Whether or not NV claims are costly, any point on the Contracting Frontier can be implemented under GATT tariff negotiations.

According to Proposition 2, the costs of an NV claim can potentially be quite high without interfering with the ability of governments to implement efficient policy combinations under GATT tariff negotiations. Intuitively, the redundancy of policy instruments indicated by the possibility of using tariffs, production subsidies and consumption taxes allows governments to position tariffs in their negotiations so as to imply a level of market access which yields an NV “trigger point” at the efficient level of market access. Subsequent to these negotiations, the level of market access is then allowed along the equilibrium path to “slip” back to this trigger point through the unilateral choice of domestic subsidy and tax policies – and the redundancy of policy instruments ensures that the conditions for domestic efficiency are not disrupted in the process – but the threat of NV beyond this point keeps market access levels from falling below their internationally efficient levels.

An implication of Proposition 2's assertion that GATT subsidy rules can continue to deliver internationally efficient policy outcomes even when the (potentially very high) costs of NV claims are acknowledged is that the subsidy rules of the WTO cannot possibly mark an improvement in terms of international efficiency in this environment. Still, perhaps WTO subsidy rules “do no harm.” We assess this possibility in the next section.

IV. The WTO Subsidy Rules

IV.1 Institutional Background

As described in section II.1, from early in its history, governments were dissatisfied with the treatment of subsidies within GATT. This dissatisfaction led to the negotiation of increasingly stringent rules in an attempt to discipline the use of subsidies. The 1979 GATT Subsidies Code negotiated in the Tokyo Round was an attempt to strengthen GATT rules on subsidies, and the WTO SCM Agreement and the WTO Agreement on Agriculture represent attempts to bring further teeth

to subsidy disciplines within the WTO. In light of our above findings, the WTO attempts to discipline domestic subsidies which are embodied in the SCM and Agriculture Agreements are particularly noteworthy, because these agreements depart in several important ways from the basic features that are associated with reliance on NV claims as a way to discipline subsidies, features that receive formal support under Propositions 1 and 2.

Focusing on the SCM Agreement, we may identify three key differences in the way domestic subsidies are treated under this agreement relative to their treatment in non-violation complaints.¹⁷ First, a subsidy that is successfully challenged under the SCM Agreement must be removed to achieve compliance (i.e., subsidy complaints under the SCM Agreement are “violation” complaints), whereas under an NV claim the subsidizing government would simply be expected to make a policy adjustment that returned market access to its original level – it would be under no obligation to remove the subsidy.¹⁸ Second, there is no distinction in the SCM Agreement between “new” subsidies and subsidies that were known to exist at the time of market access negotiations. And third, there is no requirement that a government challenging a subsidy under the SCM Agreement had previously negotiated a tariff commitment. Together, these three differences sever the link between subsidies that may be challenged within the WTO and market access expectations that are upset, and imply that any government has the right to challenge – and, in principle, force the removal of – virtually any positive subsidy (see Sykes, forthcoming, for a similar assessment).¹⁹

To capture the additional features embodied in the WTO subsidy rules, we introduce into the GATT Subsidy Game the ability to challenge a subsidy afforded under the SCM Agreement. We accomplish this by inserting a new stage, between stages 2 and 3 of the GATT Subsidy Game, in

¹⁷These three new features are also present in the Agriculture Agreement.

¹⁸Lawrence (2003, pp. 54-60) emphasizes the new “compliance” orientation of the WTO subsidy rules as marking a fundamental shift from the traditional “concession rebalancing” orientation of the GATT.

¹⁹A fourth important difference is the “specificity” requirement that a subsidy must meet to be challenged under the SCM Agreement. As the *x*-sector production subsidy that we consider would satisfy this requirement automatically, we do not emphasize this difference here, though in practice the requirement of specificity is considered to be the critical “gateway” to the SCM provisions.

which the foreign government may choose to challenge a domestic subsidy under the SCM Agreement. The general features of this augmented game, which we refer to as the *WTO Subsidy Game*, are as follows:

Stage 1: The home and foreign governments negotiate tariff levels $(\hat{\tau}, \tau^*)$, and a stage-1 market-clearing world price $\tilde{p}_1^w \equiv \tilde{p}^w(s_0, t_0, \hat{\tau}, \tau^*)$ is implied by $(\hat{\tau}, \tau^*)$ and the existing domestic subsidy and tax policies (s_0, t_0) .

Stage 2: The home government chooses domestic policies (\hat{s}, \hat{t}) , and a stage-2 market-clearing world price $\tilde{p}_2^w \equiv \tilde{p}^w(\hat{s}, \hat{t}, \hat{\tau}, \tau^*)$ is implied.

Stage 3: If $\hat{s} \neq 1$, then the foreign government chooses whether or not to challenge the subsidy under the SCM Agreement. If the subsidy is challenged, then $s=1$, and the home government may choose again its domestic tax \hat{t} .

Stage 4: If the conditions for an NV claim are met, then the foreign government chooses whether or not to make an NV claim; if the conditions for a CVD response are met, then the foreign government chooses whether or not to impose a CVD.

In effect, as compared with the GATT Subsidy Game, the WTO Subsidy Game introduces an option for the foreign government to choose to have a positive domestic subsidy removed with an SCM challenge, rather than respond to the subsidy with an NV claim or a CVD. We now turn in the next subsection to consider the impact of the WTO Subsidy Rules on negotiating outcomes.

IV.2 The (In)Efficiency of Outcomes under WTO Subsidy Rules

We continue to allow that an NV claim is costly, but we carry out our analysis of the WTO Subsidy Game under the assumption that there is no cost to challenging a subsidy under the SCM Agreement. In analogy with our analysis of the GATT Subsidy Game, given the existing production and consumption policies of the home government, we will say that a particular pair of payoffs for the home and foreign governments can be *implemented under WTO tariff negotiations* if there exists a pair of negotiated tariff levels $(\hat{\tau}, \tau^*)$ such that this payoff pair corresponds to a SGPE of stages 2-4 of the WTO Subsidy Game.

We first consider whether the stage-1 negotiating outcome that implements an efficient

policy combination under GATT tariff negotiations can implement this efficient policy combination under WTO tariff negotiations as well. Consider, then, any policy combination $(s^E, t^E, \tau^E, \tau^{*E})$ on the Contracting Frontier. Defining $\bar{\tau}^E$ implicitly by $\tilde{p}^w(s_0, t_0, \bar{\tau}^E, \tau^{*E}) = \bar{p}_1^w$, recalling that \bar{p}_1^w satisfies $W^*(p^*(\tau^{*E}, \bar{p}_1^w), \bar{p}_1^w; NV) = W^*(p^*(\tau^{*E}, \tilde{p}^{wE}), \tilde{p}^{wE})$, and letting $\bar{\alpha} \equiv \bar{\tau}^E / \tau^E$, we observed previously that $(s^E, t^E, \tau^E, \tau^{*E})$ is equivalent to the alternative (efficient) policy combination $(s^E / \bar{\alpha}, t^E / \bar{\alpha}, \bar{\tau}^E, \tau^{*E})$, and that the stage-1 negotiating outcome of $(\hat{\tau} = \bar{\tau}^E, \hat{\tau}^* = \tau^{*E})$ would implement this efficient policy combination under GATT tariff negotiations (leading to Proposition 2).

Now suppose that stage-1 negotiations in the WTO Subsidy Game result in the tariff pair $(\hat{\tau} = \bar{\tau}^E, \hat{\tau}^* = \tau^{*E})$, so that the implied stage-1 market-clearing world price is then $\tilde{p}_1^w = \bar{p}_1^w$. Consider the home government's stage-2 problem. If it selects $(\hat{s} = s^E / \bar{\alpha}, \hat{t} = t^E / \bar{\alpha})$ and the foreign government chooses in stage 3 *not* to challenge the subsidy under the SCM Agreement, then as with the GATT Subsidy Game the welfare levels associated with the efficient policy combination $(s^E, t^E, \tau^E, \tau^{*E})$ will be implemented. Moreover, any alternative stage-2 choice that does not elicit a stage-3 challenge under the SCM Agreement cannot be preferred by the home government, by arguments exactly analogous to those made in the context of the GATT Subsidy Game. Finally, the home government cannot gain from an alternative stage-2 choice that does elicit a stage-3 challenge under the SCM Agreement, since doing so simply restricts the level of s to 1, from which arguments exactly analogous to those made in the context of the GATT Subsidy Game again apply.

Hence, the key question is whether or not a stage-1 negotiating outcome of $(\hat{\tau} = \bar{\tau}^E, \hat{\tau}^* = \tau^{*E})$, followed by a stage-2 selection of $(\hat{s} = s^E / \bar{\alpha}, \hat{t} = t^E / \bar{\alpha})$, will elicit a stage-3 challenge of the subsidy under the SCM Agreement. If the foreign government chooses not to bring an SCM challenge in stage 3, then its payoff is $W^*(p^*(\tau^{*E}, \tilde{p}^{wE}), \tilde{p}^{wE})$. If the foreign government chooses to bring an SCM challenge in stage 3, then its payoff can be greater than $W^*(p^*(\tau^{*E}, \tilde{p}^{wE}), \tilde{p}^{wE})$ only if the resulting market-clearing world price is greater than \tilde{p}^{wE} .²⁰ Fixing $(s^E, t^E, \tau^E, \tau^{*E})$ and noting that $\bar{\alpha}$ varies

²⁰This can be seen as follows: since the SCM challenge sets $s=1$, there can be no CVD response in stage 4; if the resulting market-clearing world price is equal to \tilde{p}^{wE} , then there is no stage-4 (NV or CVD) response and the foreign payoff is $W^*(p^*(\tau^{*E}, \tilde{p}^{wE}), \tilde{p}^{wE})$; if the resulting market-clearing world price is less than \tilde{p}^{wE} , then a stage-4 NV claim is triggered and foreign welfare is $W^*(p^*(\tau^{*E}, \bar{p}_1^w), \bar{p}_1^w; NV) = W^*(p^*(\tau^{*E}, \tilde{p}^{wE}), \tilde{p}^{wE})$.

with (s_0, t_0) , we observe that, for $\hat{s} = s^E/\bar{\alpha} > 1$ and sufficiently large, our global concavity assumption ensures that the restriction to $s=1$ implied by an SCM challenge will *not* be met by an increase in t from the home government that preserves the implied world price at \tilde{p}^{wE} , at least for $(s^E, t^E, \tau^E, \tau^{*E})$ where the home government is positioned near its best-response policies.²¹ For $\hat{s} = s^E/\bar{\alpha} > 1$ and sufficiently large, then, the market-clearing world price resulting from an SCM challenge is greater than \tilde{p}^{wE} , at least for efficient policies that position the home government near its best-response policies. Provided the increase in \tilde{p}^w is not too large, which is guaranteed provided that $\hat{s} = s^E/\bar{\alpha}$ is not too large, the foreign government must then gain from the SCM challenge (as implied by (C1)), and the efficient policies are not implemented with a stage-1 negotiating outcome of $(\hat{\tau} = \bar{\tau}^E, \hat{\tau}^* = \tau^{*E})$.

Finally, we observe that, when the stage-1 negotiating outcome of $(\hat{\tau} = \bar{\tau}^E, \hat{\tau}^* = \tau^{*E})$ fails to implement the efficient policy combination $(s^E, t^E, \tau^E, \tau^{*E})$ in the WTO Subsidy Game, there can be no other stage-1 negotiating outcome that will work. This is because $\hat{\tau}$ must be set so as to provide the appropriate NV trigger, tying down the unique combination of policies that yield the welfare levels implied by $(s^E, t^E, \tau^E, \tau^{*E})$, i.e., the requirements of NV imply that there is no policy redundancy that can be exploited to meet the demands for achieving efficiency. We therefore state:

Proposition 3: Whether or not NV claims are costly, there exists a range of outcomes on the Contracting Frontier that cannot be implemented under WTO tariff negotiations.

When viewed together, Propositions 2 and 3 suggest that the subsidy rules embodied in the WTO SCM Agreement represent a step backward relative to the GATT subsidy rules. In effect, the available policy instruments are just sufficient to allow governments to meet the demands for efficient outcomes in the GATT Subsidy Game. When the additional restrictions on the use of subsidies embodied in the SCM Agreement are introduced, the available instruments are insufficient

²¹This can be seen as follows: with \hat{s} sufficiently large, the increase in t required to preserve the implied market-clearing world price at \tilde{p}^{wE} when the restriction $s=1$ is imposed can be made arbitrarily large; and therefore under global concavity and with $(s^E, t^E, \tau^E, \tau^{*E})$ placing the home government close to its best-response policies, a sufficiently large \hat{s} ensures that, when $s=1$ is imposed and beginning from a level of t that implies a market-clearing world price slightly above \tilde{p}^{wE} , the cost of raising t to achieve \tilde{p}^{wE} is not worth incurring for the home government.

to meet the added demands for efficient outcomes – at least over a range of outcomes on the international efficiency frontier – in the resulting WTO Subsidy Game.

V. Limited Domestic Policy Instruments

Until now we have maintained the assumption that the domestic government possesses a set of policy instruments that is sufficiently rich to exhibit a degree of redundancy, and we have observed that this policy redundancy plays a potentially important role in facilitating internationally efficient outcomes under GATT subsidy rules. We now consider briefly a world in which the policy redundancy featured in the previous sections does not arise. Specifically, we assume in this section that the home government has a tariff and a domestic production subsidy at its disposal, but we now eliminate the domestic consumption tax (i.e., we set $\tau=1$). This restriction on policy instruments can be interpreted as representing a limitation that governments may face when they attempt to offset – with adjustments in their domestic policies – the effects of international constraints on policy instruments imposed as a result of GATT/WTO commitments. Owing to the initial policy redundancy, this restriction, of course, does not alter the welfare combinations that correspond to the efficiency frontier or the non-cooperative (Nash) equilibrium, though it does make the associated policy combinations unique. Moreover, it is straightforward to confirm that Lemmas 1-6 continue to hold when $\tau=1$. But as we next demonstrate, the elimination of policy redundancy has important implications for the efficiency properties of outcomes under GATT and WTO subsidy rules.

V.1 GATT Subsidy Rules in a Limited-Instrument Environment

We consider first the efficiency properties of the outcomes of the GATT Subsidy Game in the presence of limited domestic policy instruments, concentrating on the case where NV is costly. When NV is costly, the efficiency frontier cannot be attained if an NV claim is filed, and so we need only ask whether a point on the Contracting Frontier can be implemented under GATT tariff negotiations when an NV claim is not triggered.

Suppose, then, that a policy combination on the Contracting Frontier has been reached as the outcome of the GATT Subsidy Game. There are two possible paths to this outcome, corresponding to whether a CVD response is triggered or not. If a CVD response is triggered, then by Lemma 4

we have that $\tilde{p}_2^w > \tilde{p}_1^w$, and by Lemma 6 it then follows that a small increase in s above s^E would not trigger an NV response from the foreign government, and would lead to a reduction of τ^* below τ^{*E} under the permissible CVD response (i.e., letting τ^{*CVD} denote the CVD response, $d\tau^{*CVD}/ds < 0$). But then the home government gains from deviating to $s > s^E$, since at a point on the Contracting Frontier we have $[dW/d\tau^*][d\tau^{*CVD}/ds] > 0$ by the proof of Lemma 1 and $dW/ds > 0$ by the proof of Lemma 2 (see Appendix). The remaining possibility is that a CVD response is not triggered. In this case, the efficient tariffs τ^E and τ^{*E} must be chosen in stage 1. Moreover, owing to the lack of policy redundancy, as we observed above there is now a *unique* combination of policies associated with any point on the efficiency frontier. Hence, in light of the domestic production subsidy s_0 that exists at the time of the stage-1 choices, a unique stage-1 market clearing price of $\tilde{p}_1^w = \tilde{p}^w(s_0, \tau^E, \tau^{*E})$ is implied, with the unique stage-2 market clearing price then given by $\tilde{p}_2^w = \tilde{p}^w(s^E, \tau^E, \tau^{*E})$. Finally, recalling the definition of \bar{p}_1^w and observing that it is a function of s^E , τ^E and τ^{*E} , it follows (generically) that the implied $\tilde{p}_1^w \neq \bar{p}_1^w$. But using Lemmas 5 and 6, we then have that either a (costly) NV claim would be triggered along this path to the efficient policy combination, thereby precluding efficiency, or that the home government could deviate from the efficient policy combination to $s > s^E$ without triggering an NV claim from the foreign government and thereby gain.

As a consequence of these arguments, we may state:

Proposition 4: In the presence of limited domestic policy instruments and costly NV claims, there does not exist (generically) a point on the Contracting Frontier that can be implemented under GATT tariff negotiations.

In effect, as a comparison of Propositions 2 and 4 makes clear, a level of policy redundancy is required to achieve efficient outcomes under GATT tariff negotiations when NV is costly: when the set of domestic policy instruments is limited and this redundancy is not present, there are too few instruments for governments to orchestrate a movement from inefficient non-cooperative (Nash) policies to a place on the efficiency frontier under GATT subsidy rules. Notice, too, that the inability to reach efficient outcomes stems from the ineffectiveness of the “disciplines” placed on the use of subsidies by costly NV claims in the presence of limited domestic policy instruments. This gives rise to the possibility that alternative disciplines on subsidies, such as those embodied in

the SCM Agreement, could be “more effective,” and as such facilitate more efficient outcomes.

V.2 WTO Subsidy Rules in a Limited Instrument Environment

In light of Proposition 4, it is now fairly direct to identify a set of circumstances in which WTO subsidy rules mark an improvement over GATT subsidy rules in a limited-instrument environment, namely, when subsidies are of sufficiently minor importance on the efficiency frontier. To see that WTO subsidy rules must lead to more efficient outcomes than GATT subsidy rules in these circumstances, consider the extreme case in which there is *no* role for a domestic production subsidy at any point on the international efficiency frontier. This would be true, for example, if the home government’s objective were simply to maximize the real value of national income, and there were no distortions in the domestic economy. In this case, any point on the Contracting Frontier can be implemented under WTO tariff negotiations, by simply negotiating in stage 1 to the efficient tariffs τ^E and τ^{*E} associated with the desired point on the efficiency frontier: by challenging any $s \neq 1$ under the SCM Agreement, the foreign government can guarantee that the efficient point will be implemented; and by the efficiency of $s=1$, the home government cannot find a $s \neq 1$ that is preferred by it and the foreign government (and therefore not challenged under the SCM Agreement). Since (generically) no point on the Contracting Frontier can be implemented under GATT tariff negotiations in these circumstances according to Proposition 4, it follows that WTO subsidy rules must lead to more efficient outcomes than GATT subsidy rules in these circumstances.

At the other extreme, as we show in our working paper (Bagwell and Staiger, 2004), if the role of production subsidies in an internationally efficient policy environment is sufficiently important, then the WTO subsidy rules can *completely undermine* the ability of tariff negotiations to provide governments with an avenue of escape from the non-cooperative (Nash) equilibrium, and in these circumstances GATT subsidy rules must surely lead to more efficient outcomes than WTO subsidy rules. In effect, if governments consider domestic subsidies to be a sufficiently vital policy instrument, they may be less inclined to negotiate tariff commitments under the subsidy rules of the WTO, since such commitments may increase the likelihood that their subsidies will be challenged under the SCM Agreement. In this way, the SCM Agreement may have a “chilling” effect on the desire of governments to take on market access commitments through WTO negotiations.

To understand this chilling effect, observe that the foreign government gets more from an SCM challenge of the home government's subsidy when the home government has bound its tariff in a stage-1 tariff negotiation, because the home government is then unable to adjust its tariff to compensate for the loss of its subsidy instrument (and in this limited instrument environment it has no other instruments to adjust either). But this raises the possibility that the home government may be able to avoid a subsequent SCM challenge of its subsidy if it refuses to bind its tariff in stage 1 negotiations. When this is the case, the home government then confronts a choice between securing its non-cooperative (Nash) welfare – which it receives if it refuses to negotiate in stage 1 and thereby avoids an SCM challenge to its subsidy – and receiving the welfare it can secure from negotiated tariff levels but without the use of its subsidy instrument. If preserving the use of the domestic production subsidy is sufficiently valuable from the perspective of international efficiency, then elimination of this instrument results in a “tariffs-only” international efficiency frontier that lies *below* the non-cooperative (Nash) point that arises when the subsidy instrument is available to the home government. And in this case, no stage-1 tariff agreement is possible.

An example can help illustrate this last point. Consider a 2-good endowment world economy similar to that of Kennan and Riezman (1988), extended to allow for the use of production subsidies as well as tariffs. The foreign country is endowed with γ units of good x and $(1-\gamma)$ units of good y . If the representative agent in the foreign country consumes X^* units of x and Y^* units of y , its utility is $U^*=X^*Y^*$. With $p^*\equiv p_x^*/p_y^*$ denoting the relative foreign price, it is direct to show that the foreign price in autarky is given by $p^{*a}\equiv(1-\gamma)/\gamma$. The home region is composed of a continuum of small identical countries indexed by $h\in[0,1]$. The endowment of x in the range of home countries dh is $(1-\gamma)dh$, and this endowment is owned by the type-1 agents of these countries, while the endowment of y in the range of home countries dh is γdh , and this endowment is owned by the type-2 agents of these countries. If a type-1 agent consumes X_1 units of x and Y_1 units of y , its utility is $U_1=X_1Y_1$. Type-2 agents, by contrast, consume only good x , and if a type-2 agent consumes X_2 units of x , its utility is $U_2=X_2$. With $p\equiv p_x/p_y$ denoting the relative home price, it is direct to show that the price in autarky in a representative home country is given by $p^a\equiv 2\gamma/(1-\gamma)$. We impose the parameter restriction $\gamma\in(\sqrt{2}-1,1)$, which implies $p^a>p^{*a}$ and therefore ensures that, if trade is allowed and conforms with comparative advantage, the representative home country will

be an importer of x and the foreign country will be an importer of y .²²

We next describe the trading equilibrium between the home and foreign countries. The foreign government has at its disposal an import tariff τ^* . With $p^w \equiv p_x^*/p_y$, we then have $p^* = p^w/\tau^*$ for any non-prohibitive τ^* . The foreign government selects τ^* to maximize the utility of its representative agent, U^* , which can be expressed as

$$(5) \quad U^* = \frac{1}{p^*} \frac{(\gamma + [1 - \gamma]/\tilde{p}^w)^2}{\left(\frac{1}{p^*} + \frac{1}{\tilde{p}^w}\right)^2} \equiv W^*(p^*, \tilde{p}^w),$$

with \tilde{p}^w the market clearing world price. The government of a representative home country has at its disposal both a tariff τ and a production subsidy s . Its corresponding price relationships for non-prohibitive choices of τ and s are given by $p = \tau p^w$ and $q = s \tau p^w$. We assume that revenue from intervention in a representative home country is redistributed across its type-1 and type-2 agents as in Mayer (1984), so that the i^{th} agent's share of revenue is its share of factor income. We assume further that the government of a representative home country operates under a *rigid political constraint*, according to which it cannot allow international trade to alter the relative incomes of its type-1 and type-2 agents from their relation in autarky. This constraint amounts to the requirement that $q = p^a$. Subject to this constraint, the representative home government is assumed to select its instruments to maximize $U \equiv U_1 U_2$, which after substituting the constraint can be expressed as

$$(6) \quad U = p \frac{(\gamma + [1 - \gamma]\tilde{p}^w)^3}{(p + 2\tilde{p}^w)^3} \equiv W(q = p^a, p, \tilde{p}^w).$$

Exploiting the fact that the representative home country is small and therefore takes \tilde{p}^w as fixed when selecting its tariff and production subsidy, it is direct to calculate that the unique interior Nash equilibrium between the home and foreign countries is characterized by

$$(7) \quad \tau^{*N} = \sqrt{\frac{\gamma(4\gamma + 2)}{(3 - \gamma)(1 - \gamma)}}; \quad \tau^N = 1; \quad s^N = \frac{2\gamma}{(1 - \gamma)\tilde{p}^{wN}}; \quad \tilde{p}^{wN} = \frac{2\gamma + (3 - \gamma)\tau^{*N}}{3\gamma + (1 - \gamma)(1 + \tau^{*N})}.$$

²²As can be confirmed from (7) below, $\gamma < 1$ ensures that the Nash foreign tariff is finite.

Consider next the Nash equilibrium in home and foreign tariffs that would arise if $s=1$, so that no home country were permitted to utilize its production subsidy. In this case, we may observe that the representative home country must then have $p=q$, and so the constraint $q=p^a$ demands $p=p^a$ and hence no trade. That is, the unique Nash tariff equilibrium when $s=1$ entails autarky, and we observe as well that this corresponds to a point on the tariffs-only efficiency frontier. Since the foreign government achieves greater welfare in the interior Nash equilibrium than under autarky, we may also observe that, if the representative home government refuses to bind its tariff in stage 1 of the WTO Subsidy Game, it avoids an SCM challenge to its subsidy and thereby secures its interior Nash payoff. That is, the foreign government will not bring an SCM challenge against home subsidies in stage 3 if the home tariff is not bound in stage 1, and so the disagreement payoff for a representative home government in the WTO Subsidy game is its interior Nash payoff.

As a consequence of these observations, we may conclude that the representative home government will not accept any stage-1 tariff agreement in the WTO Subsidy Game under which a stage-3 SCM challenge is anticipated. It is also direct to show using (5) and (7) that the home tariff must be bound below 1 if the foreign government is to gain from any stage-1 tariff agreement that does not lead to a stage-3 SCM challenge. A remaining question is then whether there exists a stage-1 tariff agreement with τ bound below 1 that does not lead to a stage-3 SCM challenge. This question may be answered in two steps. First, since the subsidy is used in a representative home country to redistribute income from type-2 agents (who consume only the import good x) to type-1 agents (who consume both x and y), the subsidy serves to reduce the aggregate demand for the imported good x in the representative home country, and hence a stage-3 SCM challenge that removes these subsidies serves to increase home-country demand for the imported good x and thereby raise \tilde{p}^w . And second, using (5) it may be confirmed that the foreign government gains from any such rise in \tilde{p}^w .²³ Therefore, there does not exist a stage-1 tariff agreement with τ bound below 1 in which a stage-3 SCM challenge is not brought, and hence we may conclude that no stage-1 tariff agreement is possible in the WTO Subsidy Game in this example.

²³This statement and the statement immediately preceding it assume that the tariff agreement preserves the pattern of trade according to comparative advantage. But the conclusion remains valid as well for agreements that flip the pattern of trade between home and foreign countries, with the roles of goods x and y then simply reversed.

Figure 2 illustrates. With the utility of a representative home government on the vertical axis and the utility of the foreign government on the horizontal axis, the interior Nash utilities are depicted by the point labeled N , while the (full-instrument) efficiency frontier is labeled EF . The autarky utility levels associated with the Nash tariff equilibrium when $s=1$ are depicted by the point labeled $N(s=1)$, and as we note above this is also a point on the tariffs-only efficiency frontier. As we have explained: N is the disagreement point for stage-1 tariff negotiations in the WTO Subsidy Game; therefore, any stage-1 agreement under which a stage-3 SCM challenge can be anticipated is infeasible, since such an agreement could only rest on the tariffs-only efficiency frontier at point $N(s=1)$, which lies below point N ; but τ must be bound below 1 if the foreign government is to gain from a stage-1 agreement that does not trigger a stage-3 SCM challenge; and under any stage-1 agreement that binds τ below 1, a stage-3 SCM challenge may be anticipated. Hence, the Nash point N depicts the unique equilibrium of the WTO Subsidy Game in this example.

Returning now to our more general treatment, our discussion of the limited-instrument costly NV environment may be summarized as follows. If domestic subsidies have no reason to exist in an internationally efficient policy setting, then, by allowing these subsidies to be challenged and removed, the “more effective” discipline introduced under the WTO SCM Agreement is sure to be efficiency enhancing relative to the weaker subsidy disciplines embodied in GATT rules. It is notable, however, that these circumstances are strikingly at odds with the views expressed by GATT/WTO member governments concerning the legitimate role of subsidies in the pursuit of important public policy objectives (see note 2). Whether WTO subsidy rules can be said to mark an improvement over GATT subsidy rules in this environment when subsidies are instead seen as legitimate instruments of public policy is more difficult to establish, and presumably depends on circumstances. On the one hand, the heightened ability to challenge and remove subsidies that erode market access commitments can work to enhance international efficiency. On the other hand, the ability to challenge and remove subsidies that have a legitimate purpose in an internationally efficient policy environment can work against international efficiency. At a general level, then, whether or not the WTO subsidy rules mark an improvement over GATT subsidy rules in this limited-instrument costly-NV environment depends on the relative importance of these two forces.

VI. Conclusion

International disputes over subsidies are becoming increasingly prominent in the world trading system. Yet the international rules that govern subsidies have received little attention in the form of systematic economic analysis. In this paper we have provided a first formal analysis of the international rules that govern the use of subsidies to domestic production. Our analysis highlights the impact of the new disciplines on subsidies that were added to GATT rules with the creation of the WTO. Though GATT subsidy rules were seen as weak and inadequate while the WTO subsidy rules are viewed as a significant strengthening of multilateral disciplines on subsidies, we find that the key changes introduced by the WTO subsidy rules may ultimately do more harm than good to the multilateral trading system, by undermining the ability of tariff negotiations to serve as the mechanism for expanding market access to more efficient levels.

The possibility that WTO subsidy rules could have a “chilling” effect on the desire of governments to make further market access commitments through WTO negotiations reflects a possible resolution of the tension between a system of rules that now places more stringent limits on subsidies than on tariffs and the basic message of the Bhagwati-Johnson-Ramaswami targeting principle. This tension arises because, according to the targeting principle, production subsidies are typically a better policy instrument for achieving production goals than are tariffs, but according to WTO rules, tariffs rather than production subsidies may be the only permissible instrument available to WTO-member governments. As we have observed above, one possible resolution of this tension is that governments may refrain from accepting negotiated limits on their use of tariffs, if their ability to utilize production subsidies without challenge under WTO subsidy rules is thereby enhanced.

This paper raises at least as many questions as it answers. Among the most important questions are: (i) A central efficiency-enhancing role is suggested for the right to bring NV claims, but we have modeled these claims stylistically. Does this central role survive when the nature of NV claims is modeled more precisely?; (ii) Our results do not indicate that any efficiency-enhancing role is played by the right to impose CVDs. What role, if any, do CVDs play in facilitating efficient policy outcomes in a richer setting?; (iii) Our results indicate that a crucial feature upon which the

impacts of GATT and WTO subsidy rules hinges is the richness of the set of available domestic policy instruments. Are governments in fact better characterized as possessing redundant sets of policy instruments or facing more limited policy options?; and finally, (iv) Our results suggest that the WTO Subsidy rules may mark a step backward, in the sense that they may lead to less efficient outcomes than were possible under the GATT subsidy rules. If one accepts this suggestion, then a natural question is, How could this (inferior) change have been agreed to by GATT/WTO members?

These are important questions for future work. Here we comment briefly on two of them. First, regarding a more precise modeling of NV claims, we have modeled NV claims here as preserving the *level* of market access commitments implied by tariff negotiations. More accurately, as Petersmann (1977, p. 172) explains, in combination with renegotiation rights the NV claims operate to preserve the *balance* of market access commitments implied by tariff negotiations. This suggests that a more precise modeling of NV claims requires as well the introduction of renegotiation opportunities, along the lines pursued in Bagwell and Staiger (2001b) in the context of domestic standards. A similar analysis in the context of subsidies could be illuminating. Second, regarding the possibility that an inferior change in subsidy rules could have been agreed to by the GATT/WTO members, one explanation builds from the observation by Sykes (forthcoming), that a major limitation of GATT subsidy disciplines as perceived by member governments was their inability to address third-country issues. These issues do not arise in our 2-country model, but in a 3-country environment it can be seen that GATT's reliance on NV claims to discipline subsidies that upset market access expectations would be effective only if these claims extended to third parties, so that for example country A could file an NV claim against country B's subsidy if B's subsidy upset A's expected access to country C's market. Under GATT, NV claims were not interpreted to extend to third parties in this way, and as Sykes explains the WTO subsidy disciplines were introduced in large part to achieve this third-party reach. Under this explanation, our results indicate that a more appropriate fix would have been to simply extend the reach of NV claims to third parties.

References

- Bagwell, Kyle, and Robert W. Staiger, "An Economic Theory of GATT," *American Economic Review*, March 1999, pp. 215-248.
- Bagwell, Kyle, and Robert W. Staiger, "Strategic Trade, Competitive Industries and Agricultural Trade Disputes," *Economics and Politics*, July 2001a, pp. 113-128.
- Bagwell, Kyle, and Robert W. Staiger, "Domestic Policies, National Sovereignty and International Economic Institutions," *Quarterly Journal of Economics*, May 2001b, pp. 519-562.
- Bagwell, Kyle and Robert W. Staiger, **The Economics of The World Trading System**, MIT Press, 2002.
- Bagwell, Kyle and Robert W. Staiger, "Subsidy Agreements," NBER WP No. 10292, February 2004.
- Bhagwati, Jagdish and V.K. Ramaswami, "Domestic Distortions, Tariffs and the Theory of Optimum Subsidy," *Journal of Political Economy* 71 (1), February 1963, pp. 44-50.
- Jackson, John H., **The World Trading System**, MIT Press, 1989.
- Johnson, Harry G., "Optimal Trade Intervention in the Presence of Domestic Distortions," in R.E. Caves, H.G. Johnson and P.B. Kenen (eds.), **Trade, Growth and the Balance of Payments**, Amsterdam: North-Holland Publishing Company, 1965.
- Kennan, John and Raymond Riezman, "Do Big Countries Win Tariff Wars?" *International Economic Review* 29, 1988, 81-85.
- Lawrence, Robert Z., **Crimes & Punishments? Retaliation under the WTO**, Institute for International Economics, Washington D.C., October 2003.
- Mayer, Wolfgang, "Endogenous Tariff Formation," *American Economic Review* 74, 1984, 970-85.
- Petersmann, Ernst-Ulrich, **The GATT/WTO Dispute Settlement System**. London: Kluwer Law International, 1997.
- Sykes, Alan O., "The Economics of WTO Rules on Subsidies and Countervailing Measures," in **A Comprehensive Guide to the World Trade Organization** (Springer Verlag), forthcoming.
- WTO, "Decision by the Arbitrators in United States-Anti-Dumping Act of 1916: Recourse to Arbitration by the United States under Article 22.6 of the DSU," WT/DS136/ARB, February 24, 2004, Geneva.

Appendix

Lemma 1: Let $(s^E, t^E, \tau^E, \tau^{*E})$ denote a point on the Contracting Frontier, and let $\tilde{p}^{wE} \equiv \tilde{p}^w(s^E, t^E, \tau^E, \tau^{*E})$. Then for any $\tilde{p}^{w'} < \tilde{p}^{wE}$, $W^*(p^*(\tau^{*E}, \tilde{p}^{w'}), \tilde{p}^{w'}) < W^*(p^*(\tau^{*E}, \tilde{p}^{wE}), \tilde{p}^{wE})$.

Proof: We begin by observing that, at a point on the Contracting Frontier, we cannot have $dW/d\tau^* > 0$ or $dW^*/d\tau > 0$: otherwise, under (C1), governments would agree on the direction of movement in a tariff which each would strictly prefer, and the initial policies could not then be internationally efficient. Moreover, as international efficiency requires the tangency condition

$$\left. \frac{d\tau}{d\tau^*} \right|_{dW=0} = \frac{-dW/d\tau^*}{dW/d\tau} = \frac{-dW^*/d\tau^*}{dW^*/d\tau} = \left. \frac{d\tau}{d\tau^*} \right|_{dW^*=0},$$

it follows that at a point on the Contracting Frontier we cannot have $dW/d\tau^* = 0$ or $dW^*/d\tau = 0$. Therefore, any point on the Contracting Frontier must satisfy

$$(A1) \quad dW/d\tau^* < 0; \quad dW^*/d\tau < 0.$$

In addition, notice that $dW^*/d\tau = [(1/\tau^*)W_p^* + W_{\tilde{p}^w}^*] \partial \tilde{p}^w / \partial \tau$, and so with $\partial \tilde{p}^w / \partial \tau < 0$ it follows that $dW^*/d\tau < 0$ implies $[(1/\tau^*)W_p^* + W_{\tilde{p}^w}^*] > 0$. As a consequence, beginning from a policy combination $(s^E, t^E, \tau^E, \tau^{*E})$ on the Contracting Frontier, any set of small changes in the policies of the domestic government (s, t, τ) that reduce \tilde{p}^w from its implied level $\tilde{p}^{wE} \equiv \tilde{p}^w(s^E, t^E, \tau^E, \tau^{*E})$ will reduce the welfare of the foreign government. Under our global concavity assumption, the statement of Lemma 1 then follows. **QED**

Lemma 2: Let $(s^E, t^E, \tau^E, \tau^{*E})$ denote a point on the Contracting Frontier, and let $\tilde{p}^{wE} \equiv \tilde{p}^w(s^E, t^E, \tau^E, \tau^{*E})$ and $\tilde{p}^{w'} \equiv \tilde{p}^w(s', t', \tau^E, \tau^{*'})$ for any s', t' and $\tau^{*'}$. Then for any s', t' and $\tau^{*'}/\tau^E \geq 1$ implying $\tilde{p}^{w'} > \tilde{p}^{wE}$, $W(q(s', \tau^E, \tilde{p}^{w'}), p(t', \tau^E, \tilde{p}^{w'}), \tilde{p}^{w'}) < W(q(s^E, \tau^E, \tilde{p}^{wE}), p(t^E, \tau^E, \tilde{p}^{wE}), \tilde{p}^{wE})$.

Proof: Using the market-clearing condition (3), it may be confirmed that

$$(A2) \quad \tau \frac{\partial \tilde{p}^w}{\partial \tau} = s \frac{\partial \tilde{p}^w}{\partial s} + t \frac{\partial \tilde{p}^w}{\partial t}.$$

Moreover, it may also be confirmed that the first-order conditions that define the international efficiency frontier imply:

$$(A3) \quad \frac{dW}{ds} + \frac{dW}{dt} \left[-\frac{\partial \tilde{p}^w / \partial s}{\partial \tilde{p}^w / \partial t} \right] = 0,$$

which says that the domestic government must be indifferent to small changes in s and t that preserve the market-clearing world price \tilde{p}^w . An implication of (A3) is that, with $\partial \tilde{p}^w / \partial s < 0$ and $\partial \tilde{p}^w / \partial t < 0$, starting from any point on the international efficiency frontier $sign(dW/ds) = sign(dW/dt)$.

But by (A2), we also have that

$$\frac{dW}{d\tau} = \frac{s}{\tau} \frac{dW}{ds} + \frac{t}{\tau} \frac{dW}{dt},$$

and thus at a point on the efficiency frontier satisfying (C1), we must also have $dW/ds > 0$ and $dW/dt > 0$. As a consequence, beginning from a point $(s^E, t^E, \tau^E, \tau^{*E})$ that rests on the Contracting Frontier, it follows that

$$\frac{dW}{ds} + \frac{dW}{dt} \frac{dt}{ds} \geq 0 \text{ as } \frac{dt}{ds} \geq -\left[\frac{\partial \tilde{p}^w / \partial s}{\partial \tilde{p}^w / \partial t} \right],$$

and therefore that any set of small changes in the domestic policies of the home government (s, t) that increase \tilde{p}^w from its implied level $\tilde{p}^{wE} \equiv \tilde{p}^w(s^E, t^E, \tau^E, \tau^{*E})$ will reduce the welfare of the home government. Combined with our finding (A1) in the proof of Lemma 1 above that $dW/d\tau^* < 0$ and our global concavity assumption, the statement of Lemma 2 then follows. **QED**

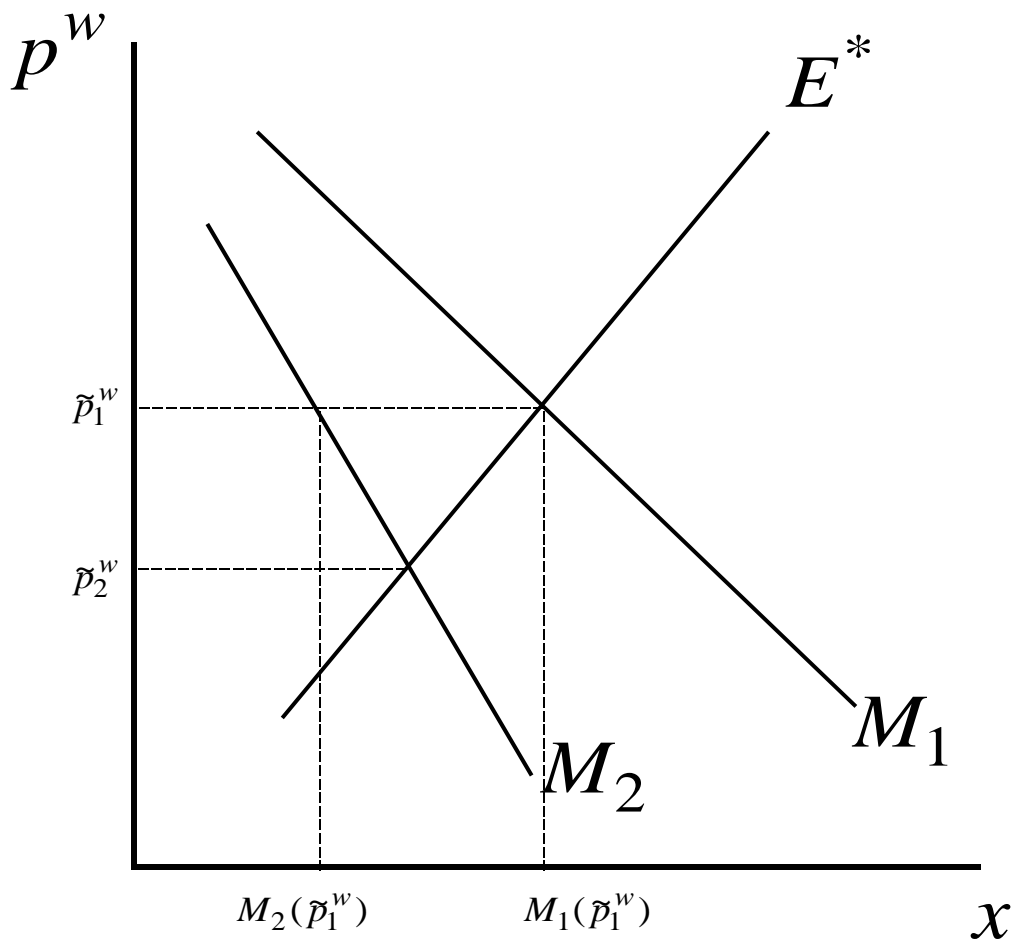


Figure 1

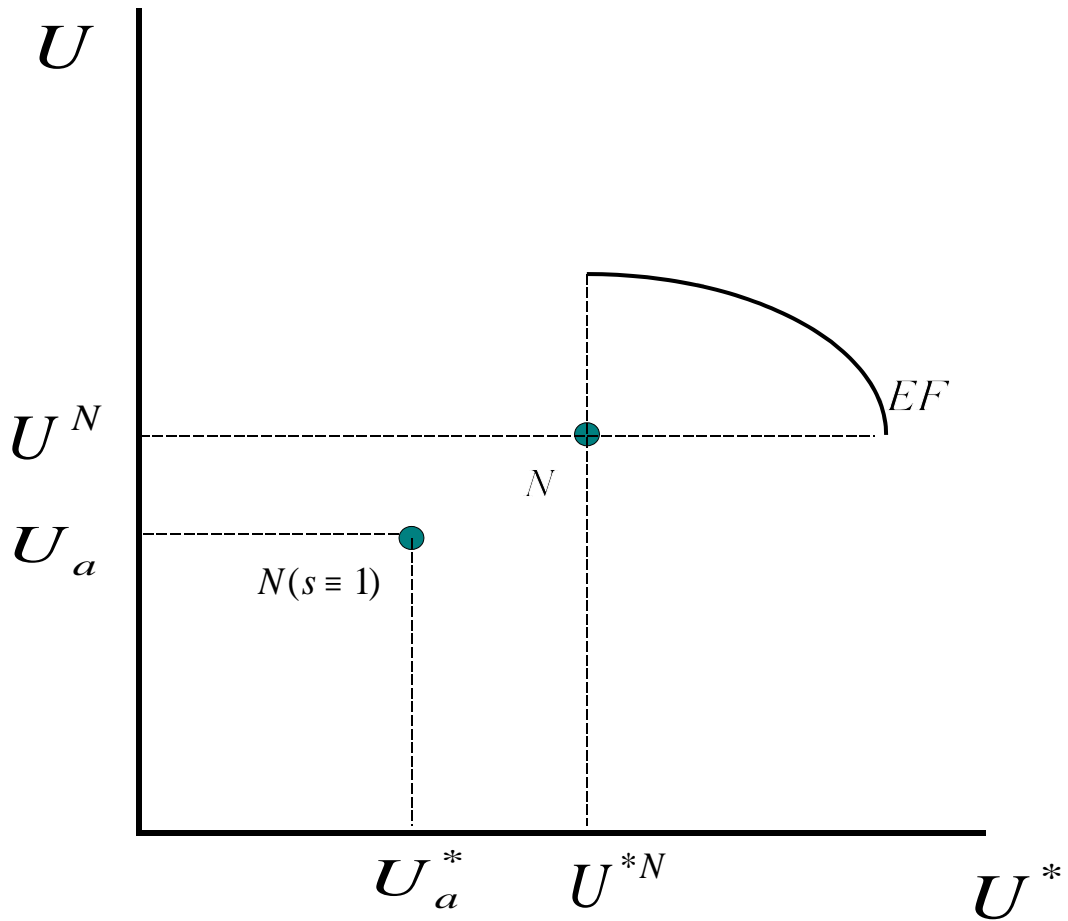


Figure 2