

Trade Negotiations, Domestic Policies, and the Choice of Safeguard Regimes

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November 2005

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[†]I am especially indebted to Kyle Bagwell, for his insight, comments, and very helpful guidance on an earlier draft (the first Chapter of my dissertation). I also am grateful to Jagdish N. Bhagwati, Nuno Limao, and Robert Staiger for their insight and helpful comments. Any remaining errors are solely my responsibility.

Abstract

In international agreements, if governments do not *formally* link trade to other issues with non-pecuniary externalities, how can rules that *informally* link trade agreements to non-trade agreements facilitate trade liberalization? The current paper analyzes this question in the context of self-enforcing agreements. To this end, a three-country general equilibrium setting is assumed wherein technology shocks affect the import volume. Then, given that governments enter into international agreements, the paper shows that under certain conditions, restricting trade instruments to the Most Favored Nation basis helps governments further lower the average tariff and/or the average domestic standard (policy). More specifically, if (i) the government's objective function is sufficiently concave with respect to domestic standards (policies) and (ii) policies are strategic complements, then restricting trade instruments, i.e., tariffs and safeguard measures, to the Most Favored Nation basis increases world welfare.

JEL Classification Code: F02, F13.

Keywords: Safeguard measures, tariffs, negotiations, self-enforcing agreements, Most-Favored-Nation clause, labor and environmental standards, domestic policies, trade liberalization

1 Introduction

Governments have agreed to enter into multilateral trade agreements, namely the General Agreement on Tariffs and Trade (GATT) and its successor, the World Trade Organization (WTO). These agreements can be thought of as “rule-based” institutions; in other words, and following the legal literature on the GATT/WTO, prior to negotiating over trade policies, governments agree to a set of rules or principles that describe the limits of accepted behavior and thereby govern the “bargaining chips” that can be brought to the actual trade policy negotiations that follow. One of the rules that govern negotiations is nondiscrimination, which together with reciprocity, has been shown to internalize the terms of trade externality and facilitate governments in reaching an efficient outcome.

The current paper identifies another role that nondiscrimination can play in negotiating trade policy, especially since trade concessions are increasingly made conditional on cooperation on non-trade issues, or what is known as “linkages.”¹ It points to an alternative course for linking agreements; it shows that nondiscrimination informally links international agreements and legal obligations to trade agreements. This conclusion is important, given the number of international legal obligations, i.e., preferential or multilateral agreements, which exist on non-trade issues (e.g., the Kyoto Protocol on environmental standards, the International Labor Organization on labor standards, the World Health Organization on health standards, and NATO on security issues).

Central to the GATT agreement, signed in 1947 by 23 nations, was the reduction of tariffs. This had the direct result of bringing down the average ad valorem tariff on industrial goods from over 40 percent in 1947 to under 4 percent by the time of the Uruguay Round in 1995. Furthermore, following the Kennedy Round of 1969, the objectives of the GATT and of its successor, the WTO, were expanded so as to help bring

¹In the Doha Trade Round, for example, some governments *wish* to introduce investment and competition policy, as well as labor and environmental standards, into the World Trade Organization (WTO).

down non-tariff barriers as well. Remarkably, these reductions were achieved in the absence of any external enforcement mechanism intended to punish GATT/WTO violators; in other words, commitments were kept only as long as nations continued to view adherence to the agreements as being in their mutual interest.

It is precisely because the contracting parties of the GATT/WTO have made it their top priority to reduce trade distortions that the subject of “safeguards,” as an exception to the general rule of liberalizing trade, comes into play. When governments know they can increase tariffs temporarily in the event of a surge in import volume, they agree to negotiate a more substantial tariff reduction during the negotiation stage.

This brings us to the second point made in the paper: Given the clear need for some sort of safeguard regime, the current paper attempts to shed some light on the optimal one. In particular, it questions whether safeguard measures should be constrained to the Most Favored Nation (MFN) basis, and points to the interdependence of safeguard measures and tariffs.^{2,3}

To answer these questions, a general equilibrium setup is used, in which two countries, 1 and 2, export one good to a third country, H, which in turn exports a second good.

If governments then set their tariffs unilaterally, they will be too high, for the governments will have failed to take into account the cost imposed on foreign exporters. Thus, governments have an incentive to cooperate when the agreements are self-enforcing, in the sense that (a) there is no external enforcement mechanism, and (b) no country has an incentive to deviate from the agreement. A repeated game is used, in order to model cooperation in a self-enforcing agreement.

Moreover, to shed light on the negotiated tariffs, the interactions among the three governments are preceded by a negotiation round, in which the baseline tariffs and the

²MFN requires that for any contracting party and for a given good, the contracting party must not discriminate against any of its trading partners by means of its import tariff.

³The term *non-selective* is used in this paper as a synonym for MFN.

safeguard regime to be used from that point in time onward are negotiated. Then, in each period, technology shocks create a surge in imports to H and determine which of the two countries, 1 or 2, is efficient. This surge in imports may create a demand for protection; in other words, it may create a demand for a temporary increase in tariffs. Thus, to derive the optimal characteristics of a safeguard regime in trade agreements and its impact on the average tariff in equilibrium, two alternative safeguard regimes are constructed:

1. Selective safeguards; i.e., the importing country can discriminate when it is applying safeguards (SL).
2. Non-selective safeguards that follow Article XIX; i.e., safeguards are applied to an imported product, irrespective of its source (EC).

Next, a non-trade issue with non-pecuniary cross-border externalities is introduced, whereby the level of externalities is determined by the level of domestic standards (policies). Moreover, to explain the welfare consequences of nondiscrimination and its importance in linking international agreements and legal obligations, a preferential agreement between H and 1 is assumed. In particular, it is assumed that H and 1, but not 2, cooperate when setting domestic standards (policies).

The aforementioned framework sheds light on the cost due to diverting trade from the efficient producers to the inefficient producers. Furthermore, if this cost is sufficiently high then governments will reduce the tariff levied on the efficient producer and increase the tariff levied on the inefficient producer. Then, if the government's objective function is sufficiently concave and if policies are strategic complements, then it is optimal to restrict the use of tariffs and safeguard measures to the MFN basis since the average tariff and/or the average standard is lower when EC is chosen. The intuition stems from the mechanics governments use in order to make concessions, where these concessions are greater the more concave the governments objective functions are.

Now for a brief overview of the rest of this paper: Section 2 surveys the literature, Section 3 outlines the economic model, and Section 4 describes the game. The importance of the trade-diversion effect and the optimal safeguard regime are derived in Sections 5.1 and 5.2, respectively. Section 6 introduces a preferential agreement and characterizes the new equilibrium. Concluding remarks are offered in Section 7.

2 Related Literature

This paper is most closely related to Bagwell and Staiger (1990), who modeled a two-country symmetric world in which the need for safeguards arises owing to exogenous supply shocks that affect sector x ; in other words, their analysis is a partial-equilibrium analysis. By using the methodology developed by Rotemberg and Saloner (1986), Bagwell and Staiger were able to offer a rationale for the existence of safeguards. They did so by revealing that if a country is allowed to raise its tariffs when the surge in imports is large enough, it will agree to lower them when the surge is not so large. Note that the need for safeguards may also arise owing to political pressures – see Rosendorff and Milner (2001), who modeled cooperation in a repeated prisoners’ dilemma game, and Sykes (1991), who pointed to the importance of flexibility in trade agreements given political uncertainty.

This paper complements the aforementioned papers by utilizing a general equilibrium model with technology shocks, and by identifying the optimal safeguard regime, thereby supplying a rationale for restricting safeguards to non-selectivity. Furthermore, the paper can also be viewed as simply an extension to the old line of thought according to which restricting safeguards to the MFN basis increases the cost of using these instruments.⁴

⁴This point goes back to Rosendorff and Milner [2001], who argued that one must strike a delicate balance when deciding on the cost attributed to the use of safeguard measures. Setting too high a cost might cause the agreements to collapse, whereas an overly low cost implies that safeguards will be used too frequently.

The current paper is also related to Limao (2005), who investigated the benefits from linking trade and environmental policy. Both papers assume that governments choose both trade and non-trade (environmental) policies, and that agreements are self-enforcing. The current paper is, however, different in that it assumes three countries, as opposed to two, and it also assumes that linkage is not possible; in other words, trade policy is part of a multilateral agreement, whereas the domestic standards (or policies) are part of a preferential agreement. These differences help us shed light on the optimal tariff structure and safeguard measures, while pointing to the benefit from restricting these instruments to the MFN basis. The paper therefore illustrates the importance of restricting trade instruments to the MFN basis, unrelated to the terms of trade externality (e.g., Bagwell and Staiger, 1999) or to the commitment problem (e.g., Maggi and Rodriguez-Clare, 1998), or to political externalities (e.g., Ethier, 2003 and 2004).

It is important to note the advantage of restricting trade instruments to the MFN basis, thus informally linking trade and non-trade issues. The intuition is related to that derived in the literature on international obligations, which the current paper complements by explicitly modeling both the trade and non-trade agreements (as opposed to those papers, which assume implicitly that an agreement on non-trade issues exists but do not model it explicitly, e.g., Kovebock and Thursby 1992 and 1997). This difference in modeling allows us to shed further light on the benefit from the use of rules in a rules-based institution to facilitate trade liberalization.

Sykes (1991, 1997) and Cass and Knoll (1997) discussed the importance of lobbies in trade negotiations over managed trade instruments, whereas Levy (1999) showed that the level of cooperative tariffs is dependent on both the discount factor and the weight a government gives to interest groups in a repeated game framework. Furthermore, Bagwell and Staiger (2004) show that the nullification-or-impairment rule, as it exists within the GATT/WTO guidelines, represents an important second line of defense against bi-

lateral opportunism; the first line of defense being MFN and Reciprocity.⁵ The current paper supplements this literature by deriving the interactions during the negotiating stage between tariffs, domestic standards (policies), and managed trade instruments.⁶

3 The Economic Structure of the Model

The model includes three countries: one home country (denoted H), and two foreign countries (denoted 1 and 2). H is denoted with no superscript, while 1 and 2 are denoted $*i$ for $i \in \{1, 2\}$. Countries $*1$ and $*2$ have a comparative advantage in the production of x , whereas country H has a comparative advantage in producing y . Given consumers using both products in equilibrium, $*1$ and $*2$ export x to H, while H exports y to $*1$ and $*2$. Figure 1 depicts the trade flow of goods x and y .

Let τ^i be the ad valorem tariff levied by H on imports of x from $*i$, and let τ^{*i} be the ad valorem tariff levied by $*i$ on imports of y from H. Define $p^{*i} = \frac{p_x^{*i}}{p_y^{*i}}$ and $p = \frac{p_x}{p_y}$, where p_x and p_x^{*i} denote the price of x in H and in $*i$, respectively. Similarly, define p_y and p_y^{*i} . It is then assumed that tariffs are non-prohibitive and that export policy is not allowed, so that the relations between “world prices” and domestic prices are seen to be $p = p^{wi} (1 + \tau^i)$ and $p^{*i} = \frac{p^{wi}}{(1 + \tau^{*i})}$, where $p^{wi} = \frac{p_x^{*i}}{p_y}$. Also, let $\boldsymbol{\tau} \equiv (\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$.

Let s denote H’s domestic standard (policy), and let s^{*i} denote $*i$ ’s domestic standard (policy). Also, let $\mathbf{s} \equiv (s, s^{*1}, s^{*2})$. It is then assumed that negative (non-pecuniary) externalities exist; or, in other words, negative cross-border effects exist.

Production in each country is determined by selecting a point on the production possibility frontier, such that the marginal rate of transformation between x and y is equal to the local relative prices. Furthermore, domestic standards (policies) can potentially alter

⁵For a survey on the importance of MFN in trade agreements, see Horn and Mavroidis (2000).

⁶See Bagwell and Staiger (2001a) who investigated the interdependence between tariffs and standards when no cross-border externalities exist.

the shape of a country's production possibility frontier and in turn, for given local prices, alter its production choices. Formally, the quantity of y supplied in H is $S_y(\frac{1}{p}, s)$, where $\frac{\partial S_y}{\partial(\frac{1}{p})} > 0$ and $\frac{\partial S_y}{\partial s} > 0$. The quantity of x supplied in H is $S_x(p, s, \theta_{min})$, where $\frac{\partial S_x}{\partial p} > 0$, $\frac{\partial S_x}{\partial s} > 0$, and θ_{min} denotes the productivity in producing good x in H. The quantity of y supplied in $*i$ is $S_y^{*i}(\frac{1}{p^{*i}}, s^{*i})$, where $\frac{\partial S_y^{*i}}{\partial(\frac{1}{p^{*i}})} > 0$ and $\frac{\partial S_y^{*i}}{\partial s^{*i}} > 0$. The quantity of x supplied in $*i$ is $S_x^{*i}(p^{*i}, s^{*i}, \theta^i)$, where $\frac{\partial S_x^{*i}}{\partial p^{*i}} > 0$, $\frac{\partial S_x^{*i}}{\partial \theta^i} > 0$, and $\frac{\partial S_x^{*i}}{\partial s^{*i}} > 0$. The technology shock, θ^i , is an iid random variable with a common known distribution, $F(\theta^i)$, and no mass points, where $\theta^i \in [\theta_{min}, \theta_{max}]$. The technology shock, θ^i , measures the productivity of producers of x in $*i$; in other words, an increase in θ^i shifts the supply curve out and to the right. Note that technology shocks may cause a surge in the trade volume of x , since $\frac{\partial S_x^{*i}}{\partial \theta^i} > 0$. Moreover, the technology shock is what differentiates producers of x in $*2$ from producers of x in $*1$, thus determining which country is efficient and which is inefficient. In what follows, let $\theta \equiv (\theta^1, \theta^2)$.

It is assumed that consumers are identical across countries. Domestic consumption of x and y can be represented, respectively, as $C_x(p, r)$ and $C_y(\frac{1}{p}, r)$, and $\frac{\partial C_x}{\partial p} < 0$ and $\frac{\partial C_y}{\partial(\frac{1}{p})} < 0$. Note that consumption is a function of local relative prices and of tariff revenues, r , where the latter are distributed as lump sums to domestic consumers. It also is assumed that both goods are normal. The consumptions of x and y in $*i$ are defined similarly.

Then, by using H and $*i$'s budget constraints and the market-clearing condition, we can derive the reduced form of the governments' objective functions. Hence, the objective functions of the governments in H and $*i$ are, respectively, $W(\boldsymbol{\tau}, \mathbf{s}, \boldsymbol{\theta})$ and $W^{*i}(\boldsymbol{\tau}, \mathbf{s}, \boldsymbol{\theta})$, where $\frac{\partial^2 W}{\partial \tau^i{}^2} < 0$ and $\frac{\partial^2 W^{*i}}{\partial \tau^{*i}{}^2} < 0$, and where if $\tau = (0, 0, 0, 0)$ then $\frac{\partial W}{\partial \tau^i} > 0$ and $\frac{\partial W^{*i}}{\partial \tau^{*i}} > 0$. In addition, assume that $\frac{\partial^2 W}{\partial s^i{}^2} \leq 0$ and $\frac{\partial^2 W^{*i}}{\partial s^{*i}{}^2} \leq 0$.

We also make the following assumptions, where $i = \{1, 2\}$.

Assumption 1. $\frac{\partial^2 W}{\partial \tau^j \partial \tau^i} > 0$, $\frac{\partial^2 W}{\partial \theta^i \partial \tau^i} > 0$, $\frac{\partial^2 W}{\partial \tau^{*i} \partial \tau^k} < 0$, and $\frac{\partial^2 W^{*i}}{\partial \tau^i \partial \tau^{*i}} < 0$ for $i \neq j$.

$\frac{\partial^2 W}{\partial \tau^j \partial \tau^i} > 0$ implies that an increase in τ^j increases the volume of trade between H and $*i$, ceteris paribus, and therefore increases $\frac{\partial W}{\partial \tau^i}$. Note that $\frac{\partial^2 W}{\partial \theta^i \partial \tau^i} > 0$ also implies that an increase in θ^i increases the volume of trade between H and $*i$. The motivation for $\frac{\partial^2 W}{\partial \tau^{*i} \partial \tau^k} < 0$ is that an increase in τ^{*i} lowers $\frac{1}{p}$, and therefore decreases the amount of x consumed in H. This implies that, all else being equal, $\frac{\partial W}{\partial \tau^k}$ decreases, since the volume of trade in x decreases. Similar logic can be used to motivate $\frac{\partial^2 W^{*i}}{\partial \tau^i \partial \tau^{*i}} < 0$.

Assumption 2. $\frac{\partial W}{\partial \tau^{*i}} < 0$, $\frac{\partial W^{*i}}{\partial \tau^i} < 0$ and $\frac{\partial W^{*i}}{\partial \tau^j} > 0$ for $i \neq j$.

$\frac{\partial W}{\partial \tau^{*i}} < 0$ is motivated by the assumption that an increase in τ^{*i} is deleterious to H's term of trade. Note also that $\frac{\partial W^{*i}}{\partial \tau^i} < 0$ and $\frac{\partial W^{*i}}{\partial \tau^j} > 0$, for $i \neq j$, are motivated by the assumption that, all else being equal, an increase in the volume of exports, due to a reduction in τ^i or an increase in τ^j , increases W^{*i} .

Assumption 3. $\frac{\partial^2 W^{*i}}{\partial \theta^i \partial \tau^{*i}} > 0$.

Assumption 3 has no impact on our main result. It does, however, help us simplify the arguments that follow, since it pins down the impact of the technology shocks in sector x on the volume of trade in sector y , and thereby helps us identify those realizations of θ that cause the demand for protection in sector y to increase.

Assumption 3 implies that the price elasticity of demand for imports is greater than 1 in absolute value. It is motivated in part by Acemoglu and Ventura (2002), who showed that the elasticity of GDP growth, with respect to the terms of trade, is 1.66 in absolute value. In other words, we know from balanced trade that a larger technology shock in sector x implies a larger volume of imports of y from H to $*i$, since the price elasticity of the demand for imports is greater than 1 in absolute value. Note that if this assumption did not hold, then a surge in imports of x from $*i$ to H would imply a decrease in the imports of y from H to $*i$.

In making these assumptions we have assumed that prices do not succumb to the Metzler and Lerner Paradox.

4 The Game

The next section describes the one-period game, which is extended to an infinitely-repeated framework in Section 4.2.

4.1 The One-Period Game

Since no export policy is allowed, and there are no dynamics, the equilibrium tariffs on x and y are derived from the game played by H, *1, and *2 when they choose $\{\tau^1, \tau^2\}$, τ^{*1} , and τ^{*2} , respectively, so as to maximize their own objective functions. In the Nash equilibrium, each government's tariff policy satisfies its first-order conditions (FOC). In other words, H's FOC are $\frac{\partial W}{\partial \tau^1} = 0$ and $\frac{\partial W}{\partial \tau^2} = 0$, whereas the FOC of *1 and *2 are, respectively, $\frac{\partial W^{*1}}{\partial \tau^{*1}} = 0$, and $\frac{\partial W^{*2}}{\partial \tau^{*2}} = 0$, and the Nash tariffs are denoted $\{\tau_N^1(\theta), \tau_N^2(\theta)\}$, $\tau_N^{*1}(\theta)$, and $\tau_N^{*2}(\theta)$, respectively. In addition, $\boldsymbol{\tau}_N \equiv \{\tau_N^1(\theta), \tau_N^2(\theta), \tau_N^{*1}(\theta), \tau_N^{*2}(\theta)\}$.

When we say that the “direct effect of the technology shock dominates” we mean that the initial change in the volume of trade due to the change in the technology shock determines the sign of the derivatives $\frac{\partial \tau_N^j(\theta)}{\partial \theta^i}$ and $\frac{\partial \tau_N^{*j}(\theta)}{\partial \theta^i}$, for $j, i = \{1, 2\}$.

Proposition 1

*If θ^i increases and the direct effect of the technology shock dominates, then $\frac{\partial \tau_N^i(\theta)}{\partial \theta^i} > 0$, $\frac{\partial \tau_N^{*i}(\theta)}{\partial \theta^i} > 0$, $\frac{\partial \tau_N^k(\theta)}{\partial \theta^i} < 0$, and $\frac{\partial \tau_N^{*k}(\theta)}{\partial \theta^i} < 0$, for $k \neq i$.*

Proposition 1 highlights H's benefit from levying a higher tariff on the efficient producer, given that the direct effect of the technology shock dominates.

In a similar fashion, each government's domestic standard (policy) is derived. In other words, H's FOC is $\frac{\partial W}{\partial s} = 0$, whereas the FOC of *1 and *2 are, respectively, $\frac{\partial W^{*1}}{\partial s^{*1}} = 0$, and $\frac{\partial W^{*2}}{\partial s^{*2}} = 0$, where the Nash domestic standards (policies) are denoted $s_N = s_N(\theta)$, $s_N^{*1} = s_N^{*1}(\theta)$, and $s_N^{*2} = s_N^{*2}(\theta)$, respectively. In addition, $\mathbf{s}_N \equiv \{s_N, s_N^{*1}, s_N^{*2}\}$.

Proposition 2

The Nash equilibrium is inefficient.

The reason for this proposition is that governments do not internalize the terms-of-trade externality when setting their own policies, and therefore the volume of trade is too low. Put differently, a tariff scheme can easily be constructed that makes all countries better off, and at least one country strictly better off. For example, decrease τ^i and τ^j by a very small amount, ε , and note that this change causes H a second-order loss (we started from the Nash tariffs) and $*i$ and $*j$ a first-order gain (the volume of trade in x increases for both $*i$ and $*j$). Then, reduce τ^{*i} and τ^{*j} by a very small amount, ε , such that H is better off (the volume of trade in y increases). The Nash equilibrium is, therefore, not efficient since, when starting from the one-period Nash tariffs, decreasing tariffs causes a second-order loss to the importing country and a first-order gain to the exporting country. Moreover, domestic standards (or policies) in equilibrium are inefficient since cross-border effects exist (in contrast to Bagwell and Staiger (2001b), in whose work cross border effects do not exist).⁷

For the sake of simplicity, we assume that there is a unique interior Nash equilibrium in the static game.

Next, we extend this framework to a repeated game, in order to model cooperation in a self-enforcing agreement. Here, the benchmark case cooperation is limited to trade instruments; this assumption is relaxed in Chapter 6. Furthermore, it is assumed that if a country deviates from the equilibrium path, all of the countries revert, from the next period on, to the interior Nash equilibrium in the static game. In other words, this work focuses on grim-trigger strategies that depend only upon the current state.

⁷See also Limao (2005).

4.2 The Infinitely Repeated Game

4.2.1 The Negotiation Stage

The interactions between the governments are modeled as a dynamic game. This game is an infinite repetition of the static game described in Section 4.1, whereby, as of time 0, the governments agree on the baseline tariffs for sectors x and y , $\bar{\tau}$, as well as on the safeguard regime to be used from that point in time onward. Let $\bar{\tau} \equiv (\bar{\tau}, \bar{\tau}, \bar{\tau}^{*1}, \bar{\tau}^{*2})$, where $\bar{\tau}$ denotes the baseline tariff set on imports of x and where $\bar{\tau}^{*i}$ denotes the baseline tariff set by i^* on imports of y .

Although the paper does not model the negotiation process, it is assumed that the negotiations conclude when countries choose a point on the efficiency frontier; in other words, governments choose tariffs that maximize $W^w (W(\cdot), W^{*1}(\cdot), W^{*2}(\cdot))$, where E is the expectation operator and $E[W^w(\cdot)]$ is the function governments maximize during the negotiation stage. Henceforth, these tariffs will be referred to as the most cooperative tariffs.

4.2.2 The Post-Negotiation Stage

At the start of each period following the negotiation stage, θ is realized and observed by all. Existing period protection policies and domestic policies are then set, and current welfare is realized. At the beginning of the next period all past choices are observed, and new values of θ are determined. The timing of the events that follow the negotiations is depicted in Fig. 2.

Domestic Standards (Policies) Since the paper assumes that linkages are not possible, domestic standards (policies) and tariffs are set independently of each other. In this section we assume that governments only cooperate on trade instruments. In Section 6,

this assumption is relaxed, and it is assumed that H and *1 cooperate on the level of the domestic standards (policies).

Next we examine the sub-game perfect Nash equilibria, in which countries cooperate by means of low protection levels and credibly threaten to forever revert to the interior Nash equilibrium in the static game if cooperation is violated.

Before we derive the most cooperative tariff by using SL, however, let us denote $\tau_{SL} = (\tau_C^1(\theta), \tau_C^2(\theta))$ and $\tau_C^* = (\tau_C^{*1}(\theta), \tau_C^{*2}(\theta))$, where the subscript C denotes the variables when the players cooperate and the subscript D denotes a player's best-response strategy. Also, let δ be the discount factor.

Selective Safeguards (SL) The most cooperative tariffs are derived in a fashion similar to that described by Bagwell and Staiger (1990). The current paper simply extends these researchers' framework to a three-, instead of two-country world, and assumes that technology shocks, rather than supply shocks, create import surges.⁸ We will first derive the no-defection conditions, and then discuss the characteristics of the most cooperative tariff that they imply.

Clearly, a defecting country cannot do any better than when it plays its best response. Hence, if H defects, its import tariffs will equal its best-response tariff in the static game, $\tau_D = (\tau_D^1(\tau_C^*, \theta), \tau_D^2(\tau_C^*, \theta))$. Similarly, if $*i$ for $i \in \{1, 2\}$ defects, its import tariff will equal its best-response tariff in the static game, $\tau_D^{*i} = \tau_D^{*i}(\tau_C^{-*i}, \theta)$, where $\tau_C^{-*i} \equiv (\tau_C^1(\cdot), \tau_C^2(\cdot), \tau_C^{*j}(\cdot))$ and $j \neq i$. Therefore, by fixing θ and τ_C^* , we can characterize H's incentive to deviate as being equal to the difference between the benefit derived from H's playing its best response and that gained through the use of the most cooperative tariffs:

$$\Omega(\tau_{SL}, \tau_C^*, \theta) \equiv W(\tau_D, \tau_C^*, \theta) - W(\tau_{SL}, \tau_C^*, \theta). \quad (1)$$

⁸A more detailed presentation of what follows can be supplied by the author upon request.

Also, by fixing θ , τ_{SL} , and $\tau_C^{*j}(\cdot)$ we can characterize $*i$'s incentive to deviate as being

$$\Omega^{*i}(\tau_{SL}, \tau_C^*, \theta) \equiv W^{*i}(\tau_{SL}, \tau_D^{*i}, \tau_C^{*j}(\cdot), \theta) - W^{*i}(\tau_{SL}, \tau_C^*, \theta) \text{ for } i \neq j, \quad (2)$$

when it is assumed that $\frac{\partial^2 W}{\partial \theta^i \partial \tau^i} > \left| \frac{\partial^2 W}{\partial \theta^i \partial \tau^j} \right|$ and that $\frac{\partial^2 W}{\partial \tau^i \partial \tau^j}$ is small enough. This implies that the impact of the technology shock, θ^i , on the volume of trade between H and $*i$ is greater than such an impact on the volume of trade between H and $*j$.⁹ These assumptions also imply that, all else being equal, H prefers to levy the higher tariff on the efficient producer and the lower tariff on the inefficient producer.¹⁰

Next, expected future gain to H, from not defecting today, is defined as

$$\omega(\tau_{SL}, \tau_C^*) \equiv \frac{\delta}{1 - \delta} [EW(\tau_{SL}, \tau_C^*, \theta) - EW(\tau_N, \theta)]. \quad (3)$$

Since θ is iid across all periods, ω is independent of the current values of θ and τ_{SL} . The function τ_{SL} will affect ω , however, since the function's distribution characteristics influence future expected values.

Similarly, let us define the expected future gain to $*i$, from not defecting today, as

$$\omega^{*i}(\tau_{SL}, \tau_C^*) \equiv \frac{\delta}{1 - \delta} [EW^{*i}(\tau_{SL}, \tau_C^*, \theta) - EW^{*i}(\tau_N, \theta)] \text{ for } i \in \{1, 2\}. \quad (4)$$

We can now, once more following the footsteps of Bagwell and Staiger (1990) and using the assumptions made so far, derive the most cooperative tariff function using Eqs. (1),

⁹Note the similarity here to the theory of immiserizing growth, which says that owing to a distortion, the primary growth gain produced by optimal policies may be smaller than the change in loss caused by distortion due to growth [Bhagwati et al., 1998, p. 372].

¹⁰Gatsios (1990) and Choi (1995) showed that an importing country prefers to use discriminatory tariffs, in which a higher tariff is levied on the efficient producer, while using a static model of oligopolistic competition with fixed technology. Note, however, that both of these researchers employed a partial-equilibrium analysis, while focusing on only one sector. To speak in terms of the current paper, they focused on sector x . As for Hwang and Mai [1991], they claimed that in an oligopolistic setting (also with two exporting countries and one importing, and again focusing on sector x), an importing country using selective tariffs will impose a higher tariff on the more efficient producer, as long as the decreasing returns-to-scale are small enough. Note that this intuition is preserved in the current paper.

(2), (3), and (4). If credible cooperation is to occur, the cooperative tariff rates, τ_{SL} and τ_C^* , must be such that, for every θ , no country has an incentive to defect¹¹:

$$\Omega(\tau_{SL}, \tau_C^*, \theta) \leq \omega(\tau_{SL}, \tau_C^*), \text{ and} \quad (5)$$

$$\Omega^{*i}(\tau_{SL}, \tau_C^*, \theta) \leq \omega^{*i}(\tau_{SL}, \tau_C^*) \text{ for } i \in \{1, 2\}.$$

The “no defection” conditions seen here implicitly define a cooperative tariff function. There are of course many functions that satisfy Eq. (5), but here the focus is on the most cooperative tariff function, which is derived by keeping ω fixed where $\omega \equiv (\omega, \omega^{*1}, \omega^{*2})$. Using this process enables not only to determine the most cooperative tariff as a function of θ , $\bar{\tau}$, and ω , but to fix the necessary conditions that it must satisfy.

If δ is too large, the threat of deviation is never binding. (The “no defection” constraint is true with strict inequality.) Hence, it is assumed that δ is not too large. The critical value of θ , such that Eq. (5) holds with equality, can be solved by setting tariffs equal to $\bar{\tau}$, and by using Eqs. (1) and (2):

$$\theta_{SL}^i = \theta_{SL}^i(\bar{\tau}, \omega, \theta_j), \text{ and} \quad (6)$$

$$\theta_{SL}^{*i} = \theta_{SL}^{*i}(\bar{\tau}, \omega^{*i}, \theta_j) \text{ for } i \neq j,$$

where the critical value of θ^i , such that $\Omega(\cdot) = \omega$, is denoted θ_{SL}^i . As for the critical value of θ^i , such that $\Omega(\cdot)^{*i} = \omega^{*i}$, it is denoted θ_{SL}^{*i} . (Note that in order to derive the critical values of θ^i , we hold ω constant.) Here δ is not too large; therefore, for some realizations of θ , a demand for protection will arise; i.e., $\theta_{SL}^i \in [\theta_{\min}, \theta_{\max})$ and $\theta_{SL}^{*i} \in [\theta_{\min}, \theta_{\max})$. Furthermore, for $\theta^i \in (\theta_{SL}^i, \theta_{\max}] \cup (\theta_{SL}^{*i}, \theta_{\max}]$, Eq. (5) is violated at $\bar{\tau}$. The assumptions made thus far imply that τ_{SL} and/or τ_C^* must exceed above $\bar{\tau}$ if

¹¹Note that given θ' , the function τ_{SL} equals $(\tau_C^1(\mathbf{s}, \theta'), \tau_C^2(\mathbf{s}, \theta'))$.

equality is to be reestablished.¹² Thus, the most cooperative tariff rule can be expressed as $\tau_{SL}(\bar{\tau}, \tau_C^*, \theta, \omega)$ and, for $i \neq j$, as $\tau_C^{*i}(\bar{\tau}^{*i}, \tau_C^{*j}(\cdot), \tau_{SL}, \theta, \omega^{*i})$.

Figure 3 describes $\Omega(\tau_{SL} = (\bar{\tau}, \bar{\tau}), \tau_C^*, \theta)$ in the $\theta^1 - \theta^2$ plane. The plane is divided into two regions, I and II, with region I depicting the realization θ such that no safeguard is imposed, and region II depicting the realization of θ such that a positive safeguard is imposed in cooperation. Note also that $\Omega(\tau_{SL} = (\bar{\tau}, \bar{\tau}), \tau_C^*, \theta)$ increases to the northeast. Finally, the AA curve, which shifts up and to the right as ω increases, depicts $\theta_{SL}^2 = \theta_{SL}^2(\bar{\tau}, \tau_C^*, \theta, \omega, \theta_{SL}^1)$. Note also that, given θ and ω , an increase in τ_C^* shifts the AA curve up and to the right, since an increase in τ_C^* reduces $\frac{1}{p}$; that in turn reduces the surge in imports of x to H, because x becomes more expensive relative to y in country H.

Non-Selective Safeguards (EC) By using techniques similar to those we have just used to derive τ_{SL} , we can derive the most cooperative tariff while using EC: τ_{EC} and τ_C^{*i} , where $\tau_{EC} = (\tau_C(\theta), \tau_C(\theta))$.

5 Selective versus Non-Selective Safeguard Regimes

Before deriving the main result of the paper, we characterize the trade diversion effect, and shed light on the interdependence between safeguard measures and tariffs. This will point to two opposing forces that affect the optimal safeguard regime: (a) the benefit to H from levying a higher tariff on the efficient producer, and (b) the benefit to the foreign countries from restricting safeguard measures such that a lower tariff is levied on the efficient producer. Both of these forces are of first-order magnitude, since the cooperative tariffs are lower than the Nash tariffs.

¹²Note that the change in τ_C^* is determined by Assumption 3, which determines the impact of the technology shock on the volume of trade in sector y .

5.1 Trade Creation and Trade Diversion

A safeguard regime creates (diverts) trade if the tariff levied on the efficient producer, denoted by superscript e , is lower (higher) than the tariff levied on the inefficient producers, denoted by superscript ne (recall that $\theta^e > \theta^{ne}$). Put differently, trade diversion implies that $\tau^e > \tau^{ne}$.

To derive the cost from trade diversion, start by restricting tariffs to non-selectivity and, given θ , compute the most cooperative tariffs. Next, slightly increase the tariff levied on the inefficient producer and decrease the tariff levied on the efficient producer, while keeping H indifferent. If this change yields a *positive gain* for the foreign governments, then the cost from trade diversion is positive. Put differently, the cost from trade diversion to the foreign countries is $\left[\frac{\partial W^*}{\partial \tau^{ne}} d\tau^{ne} + \frac{\partial W^*}{\partial \tau^e} d\tau^e\right]$, where $W^* = W^{*1} + W^{*2}$. This cost can be decomposed into two parts: (i) the change in W^{*1} and W^{*2} due to a small increase in τ^e and a small decrease in τ^{ne} , and (ii) the change in the tariff required to keep the government of country H indifferent. The first part is captured by $\left|\frac{\partial W^*}{\partial \tau^e}\right|$, given $\left|\frac{\partial W^*}{\partial \tau^{ne}}\right|$. Thus, given $\left|\frac{\partial W^*}{\partial \tau^{ne}}\right|$, the larger $\left|\frac{\partial W^*}{\partial \tau^e}\right|$ is, the higher is the cost to the efficient producer of an *increase* in τ^e , given the benefit accrued to the inefficient producer from *reducing* τ^{ne} . The second part of the trade diversion effect is captured through the change in the tariffs required to keep H indifferent; in other words, the smaller is $\frac{\partial W}{\partial \tau^e}$, given $\frac{\partial W}{\partial \tau^{ne}}$, the higher the cost from trade diversion. To see this, note that we are keeping H's objective function constant; in other words, $\frac{\partial W}{\partial \tau^e} d\tau^e + \frac{\partial W}{\partial \tau^{ne}} d\tau^{ne} = 0$, which also means that $\frac{d\tau^e}{d\tau^{ne}} = -\frac{\frac{\partial W}{\partial \tau^{ne}}}{\frac{\partial W}{\partial \tau^e}}$. To summarize: the cost from trade diversion to the foreign countries, given θ , is $\Phi \equiv \left[\frac{\partial W^*}{\partial \tau^{ne}} - \frac{\partial W^*}{\partial \tau^e} \cdot \frac{\frac{\partial W}{\partial \tau^{ne}}}{\frac{\partial W}{\partial \tau^e}}\right] d\tau^{ne}$.

Proposition 3

If $\frac{\frac{\partial W^*}{\partial \tau^{ne}}}{\frac{\partial W^*}{\partial \tau^e}} \leq \frac{\frac{\partial W}{\partial \tau^{ne}}}{\frac{\partial W}{\partial \tau^e}}$ then $\Phi > 0$.

Note that the aforementioned framework implies that $\frac{\partial W^*}{\partial \tau^e} < 0$.

These conditions are depicted in Fig. 4, which has been drawn in the $\tau^1 - \tau^2$ plane. Note that the iso-welfare function of H, represented as WW , increases, while the rest of the world, represented as W^*W^* , decreases as τ^1 and τ^2 are increased. Note also that Fig. 4.a depicts the case in which $\Phi > 0$ and Fig. 4.b the case in which $\Phi < 0$. Moreover, the slopes of the iso-welfare functions of H and of the rest of the world, in the $\tau^1 - \tau^2$ plane, are $\left(-\frac{\frac{\partial W}{\partial \tau^{ne}}}{\frac{\partial W}{\partial \tau^e}}\right)$ and $\left(-\frac{\frac{\partial W^*}{\partial \tau^{ne}}}{\frac{\partial W^*}{\partial \tau^e}}\right)$, respectively. Note, that it is not always true that $\tau^{ne} > \tau^e$ is optimal, since restricting τ^e imposes a first-order loss on H. (In cooperation, the tariffs are lower than the Nash tariffs).

In what follows, when we say “the trade diversion effect is sufficiently large” we mean that $\Phi > 0$ is sufficiently large.

5.2 The Safeguard Regime

When the trade diversion effect is sufficiently large, governments in *1 and *2 gain ex ante from restricting the safeguard regime such that $\tau^e \leq \tau^{ne}$. Furthermore, in order for H to restrict itself and to levy a lower tariff on the efficient producer, the tariffs on y must be lower than the tariff set by *1 and *2 when using the safeguard regime such that $\tau^e > \tau^{ne}$. In other words, *1 and *2 gain from compensating H and from restricting the use of safeguard measures, if the cost from trade diversion is sufficiently large. Proposition 4 follows.

Proposition 4

*If the trade diversion effect is sufficiently large then the optimal safeguard regime restricts safeguard measures to $\tau^e \leq \tau^{ne}$. Furthermore, a solution exists whereby all three governments, H, *1, and *2, gain from restricting the safeguard regime.*

Proposition 4 says that cooperation internalizes both the cost to one’s trading partner of levying an import tariff and the cost attributed to the safeguard regime such that H

can be made better off by choosing the safeguard regime favored by *1 and *2, since *1 and *2 will increase the volume of y they consume.¹³

The next section comments on the equilibrium level of the domestic standards (policies), given that a self-enforcing trade agreement has been formed.

5.3 The Equilibrium Level of the Domestic Standards (Policies)

Before deriving the equilibrium level of the domestic standards (policies), given that a self-enforcing trade agreement has been formed, we assume in this paper that tariffs and domestic standards (policies) are complements.

Assumption 4. Complementarity: $\frac{\partial^2 W}{\partial s \partial \tau^i} > 0$ and $\frac{\partial^2 W}{\partial s^{*j} \partial \tau^i} > 0$, and $\frac{\partial^2 W^{*i}}{\partial s^{*j} \partial \tau^{*i}} > 0$ and $\frac{\partial^2 W^{*i}}{\partial s \partial \tau^{*i}} > 0$.

Let \hat{s} denote the level of standards (policies) set by governments, when they play the most cooperative tariffs. Proposition 5 follows.

Proposition 5

If the governments' preference exhibits complementarity, i.e., given Assumption 4, then $\hat{s} \leq s_N$.

Proposition 5 implies that, since tariffs and domestic standards (policies) are complements, playing the cooperative tariffs reduces the level of the domestic standards (policies) in equilibrium. The reason is that the cooperative tariffs are lower than the Nash tariffs, and that tariffs and domestic standards (policies) are complements.

¹³The intuition for negotiating lower tariffs is different from that presented by Ethier (2002). He suggested that selective safeguards can become an insurance mechanism promoting trade liberalization, and thus argued for the use of selective safeguards.

6 Introducing Preferential Agreement on Domestic Standards (Policies)

The main result of the paper is summarized in the following propositions, where the conditions for EC being the optimal regime – i.e., for τ^e to equal to τ^{ne} – are derived. In other words, conditions are derived where countries opt for EC simply because doing so raises the cost for H of using trade instruments and therefore constrains their use. Let $\boldsymbol{\tau}_C \equiv (\tau_C^1, \tau_C^2, \tau_C^{*1}, \tau_C^{*2})$.

In what follows, assume that H and *1 cooperate on the level of domestic standards (policies). Put differently, assume that the equilibrium level of standards is set cooperatively between H and *1, whereas *2 sets its own domestic standard (policy) following its best response function. Let superscript PA denote the level of the domestic standards (policies) when H and *1, but not *2, agree to cooperate on the level of s and s^{*1} , where $\mathbf{s}^{\text{PA}} \equiv (s^{\text{PA}}, s^{*1, \text{PA}}, s^{*1, \text{PA}})$. It is then straightforward to show that

$$E [W^w (\boldsymbol{\tau}, \mathbf{s}^{\text{PA}})] \geq E [W^w (\boldsymbol{\tau}, \mathbf{s}^{\text{N}})] . \quad (7)$$

The rationale for this stems from our assumption that negative cross-border effects exist, and governments' best response functions do not take these cross-border effects into consideration. The preferential agreement between H and *1, then, implies the following tariff structure.

Proposition 6

*If a multilateral trade agreement is signed, given that H and *1 set s and s^{*1} cooperatively and given Assumption 4, then $\tau^1 (\theta^1, \theta^2) < \tau^2 (\theta^2, \theta^1)$ and $\tau^{*1} (\theta^1, \theta^2) < \tau^{*2} (\theta^2, \theta^1)$.*

Proposition 6 follows directly from the assumption that domestic standards (policies) and tariffs are complements (Assumption 4) and that governments play the most cooperative tariffs. The result can then be derived easily from the no-defection conditions, Eq. (5).

Proposition 7

Restricting tariffs and safeguard regimes to the MFN basis maximizes $E [W^w (\cdot)]$, given Assumptions 1 to 4, if the following conditions are met:

1. $E [W^w (\cdot)]$ is sufficiently concave in \mathbf{s} .
2. $\left| \frac{\partial E[W^w(\cdot)]}{\partial s^{*2}} \right|$ is sufficiently large.
3. $\frac{\partial^2 W^{*2}}{\partial \tau^2 \partial s^{*2}}$ and $\frac{\partial^2 W^{*2}}{\partial \tau^{*2} \partial s^{*2}}$ are sufficiently large relative to $\frac{\partial^2 W^{*2}}{\partial \tau^1 \partial s^{*2}}$ and $\frac{\partial^2 W^{*2}}{\partial \tau^{*1} \partial s^{*2}}$.

Moreover, $\tau_{SL}^i(\theta) \leq \tau_{EC}(\theta) \leq \tau_{SL}^j(\theta)$ for $i \neq j$, $\tau_{SL}^{*1}(\theta) \leq \tau_{EC}^{*1}(\theta)$, and $\tau_{SL}^{*2}(\theta) \geq \tau_{EC}^{*2}(\theta)$.

Proof. The proof is relegated to the Appendix.

In Proposition 7 the conditions for governments to gain from constraining the use of tariffs are derived. In other words, the conditions where the marginal benefit from reducing s^{*2} outweighs the cost. The cost stems from the no-defection constraints, Eq. (5), since a reduction in s^{*2} increases $\tau_{SL}^1(\theta)$ and/or $s^{*1}(\theta)$. Furthermore, when the conditions stated in Proposition 7 are met,

$$E [W^w (\boldsymbol{\tau}_{\mathbf{EC}}, \mathbf{s}^{\mathbf{PA}})] \geq E [W^w (\boldsymbol{\tau}_{\mathbf{SL}}, \mathbf{s}^{\mathbf{PA}})],$$

where $\boldsymbol{\tau}_{\mathbf{EC}} \equiv (\tau_{EC}, \tau_C^*)$ and $\boldsymbol{\tau}_{\mathbf{SL}} \equiv (\tau_{SL}, \tau_C^*)$. Restricting the tariffs levied on imports of x to the MFN basis helps the government negotiate either lower tariffs on average or lower standards on average or both. Proposition 7, then, implies the following tariff structure in equilibrium.

Corollary 1

There are two cutoff values for δ , $\underline{\delta}$ and $\bar{\delta}$, where $0 < \underline{\delta} < \bar{\delta} < 0$, such that:

1. If $\delta \in [\bar{\delta}, 1)$, then $\boldsymbol{\tau}_{\mathbf{C}} = \bar{\boldsymbol{\tau}}$ where $\bar{\tau}_C^{*1} < \bar{\tau}_C^{*2}$.

2. If $\delta \in [\underline{\delta}, \bar{\delta})$, then

- (a) if the conditions stated in Proposition 7 are satisfied $\tau_{\mathbf{C}} = \tau_{\mathbf{EC}}$. Otherwise,
- (b) the tariff levied on the efficient producer τ^e is lower the greater is the trade diversion effect.

3. If $\delta \in [0, \underline{\delta})$, then $\tau_{\mathbf{C}} = \tau_{\mathbf{N}}$.

Restricting tariffs to the MFN basis is optimal when doing so reduces the average tariff (or standard), as opposed to when SL is used. Furthermore, constraining the use of tariffs to the MFN basis, when the complementarity between policy instruments is sufficiently high, reduces the average tariff levied on y more than was suggested back in Section 5. Otherwise, the tariff levied on the efficient producer τ^e is lower, the greater is the trade-diversion effect.

7 Concluding Remarks

The importance of linking the negotiation of a safeguard clause to tariff liberalizations stems from the fact that multi-lateral trade agreements are self-enforcing. Moreover, allowing countries to temporarily increase their own tariffs helps governments to negotiate more substantial tariff reductions during the negotiation round. This rationale was illustrated by Bagwell and Staiger (1990). As pointed out by Milner and Rosendoreff (2001), however, a cost should be imposed on the use of such a clause, since otherwise it will be used too frequently.

The current paper applies the intuition derived in the two aforementioned papers in order to shed light on the optimal tariff structure and safeguard regime in a self-enforcing agreement. More specifically, it shows that constraining tariffs and the safeguard regime to non-selectivity is optimal, if the complementary relationship between the different

policy instruments is sufficiently large. Furthermore, constraining the use of safeguard measures to non-selectivity helps boost the volume of trade in y , since it increases the cost of using these instruments.

This analysis has dealt with the fixed-point solution. It certainly would be of interest to extend the analysis to a study of the transitional phase in the dynamic model, by studying the change in the volume-of-trade as a result of the technology shock. We were recently reminded of the importance of the transition phase, when the United States imposed safeguards to protect its domestic steel industry. Europe then threatened to apply safeguards as well, so as to keep the world's excess supply of steel from penetrating its borders.

8 Appendix

Proof of Proposition 7

In what follows, let $(\theta_1, \theta_2) \in \theta$ and assume that the no-defection constraints, Eq. (5), bind for some realizations of θ ; in other words, that the discount factor δ is not too large.

Lemma 1. $\bar{\tau}^{*1} \leq \bar{\tau}^{*2}$.

Proof. Lemma 1 follows from our assumptions that $s^{*1} < s^{*2}$ (H and *1 agreed to cooperate when setting s and s^{*1}), and that tariffs and domestic standards (policies) are complements (Assumption 4).

Lemma 2. $\tau_{SL}^{*1}(\theta_1, \theta_2) \leq \tau_{SL}^{*2}(\theta_2, \theta_1)$, if and only if $\tau_{SL}^1(\theta_1, \theta_2) \leq \tau_{SL}^2(\theta_2, \theta_1)$.

Proof.

Claim 1. If $\tau_{SL}^{*1}(\theta_1, \theta_2) \leq \tau_{SL}^{*2}(\theta_2, \theta_1)$, then $\tau_{SL}^1(\theta_1, \theta_2) \leq \tau_{SL}^2(\theta_2, \theta_1)$.

The claim follows directly from the no-defection constraints, Eq. (5), especially those related to *1 and *2, since when the constraints bind $\tau_{SL}^{*1}(\theta_1, \theta_2) \leq \tau_{SL}^{*2}(\theta_2, \theta_1)$ implies that $\tau_{SL}^1(\theta_1, \theta_2) \leq \tau_{SL}^2(\theta_2, \theta_1)$. Otherwise, a contradiction can be derived. To demonstrate this, assume, in negation, that $\tau_{SL}^{*1}(\theta_1, \theta_2) \leq \tau_{SL}^{*2}(\theta_2, \theta_1)$ implies that $\tau_{SL}^1(\theta_1, \theta_2) > \tau_{SL}^2(\theta_2, \theta_1)$. This implies that $\Omega^{*2}(\theta_2, \theta_1) < \Omega^{*1}(\theta_1, \theta_2)$ and that $\omega^{*2}(\cdot) > \omega^{*1}(\cdot)$. We have thus derived a contradiction to our assumption that the cooperative tariffs in equilibrium are the most cooperative tariffs, since $\Omega^{*2}(\theta_2, \theta_1) < \Omega^{*1}(\theta_1, \theta_2) \leq \omega^{*1}(\cdot) < \omega^{*2}(\cdot)$.

Claim 2. If $\tau_{SL}^1(\theta_1, \theta_2) \leq \tau_{SL}^2(\theta_2, \theta_1)$ then $\tau_{SL}^{*1}(\theta_1, \theta_2) \leq \tau_{SL}^{*2}(\theta_2, \theta_1)$.

Assume, in negation, that $\tau_{SL}^1(\theta_1, \theta_2) \leq \tau_{SL}^2(\theta_2, \theta_1)$ and $\tau_{SL}^{*1}(\theta_1, \theta_2) > \tau_{SL}^{*2}(\theta_2, \theta_1)$ and that H's no-defection condition is not violated. (If H's no-defection condition is violated, then we cannot proceed.) This implies that $\Omega^{*2}(\theta_2, \theta_1) > \Omega^{*1}(\theta_1, \theta_2)$ and that $\omega^{*2}(\cdot) < \omega^{*1}(\cdot)$. The no-defection conditions of *1 and *2 then imply that when governments

play the most cooperative tariffs $\tau_{SL}^{*1}(\theta_1, \theta_2) \leq \tau_{SL}^{*2}(\theta_2, \theta_1)$, and again, we have derived a contradiction to the assumption that $\tau_{SL}^{*1}(\theta_1, \theta_2) > \tau_{SL}^{*2}(\theta_2, \theta_1)$.

Therefore, $\tau_{SL}^{*1}(\theta_1, \theta_2) \leq \tau_{SL}^{*2}(\theta_2, \theta_1)$ if and only if $\tau_{SL}^1(\theta_1, \theta_2) \leq \tau_{SL}^2(\theta_2, \theta_1)$, and Lemma 2 follows.

Lemma 3. The efficient outcome is the one where $\tau_{SL}^1(\theta_1, \theta_2) \leq \tau_{SL}^2(\theta_2, \theta_1)$ and $\tau_{SL}^{*1}(\theta_1, \theta_2) \leq \tau_{SL}^{*2}(\theta_2, \theta_1)$.

Proof. To prove Lemma 3, note that either $\tau_{SL}^1(\theta_1, \theta_2) \leq \tau_{SL}^2(\theta_2, \theta_1)$ and $\tau_{SL}^{*1}(\theta_1, \theta_2) \leq \tau_{SL}^{*2}(\theta_2, \theta_1)$, or $\tau_{SL}^1(\theta_1, \theta_2) > \tau_{SL}^2(\theta_2, \theta_1)$ and $\tau_{SL}^{*1}(\theta_1, \theta_2) > \tau_{SL}^{*2}(\theta_2, \theta_1)$ are true (this follows from Lemma 2), when the volumes of trade in both sector x and sector y are greater, and domestic standards (policies) are lower (Assumption 4), if $\tau_{SL}^1(\theta_1, \theta_2) \leq \tau_{SL}^2(\theta_2, \theta_1)$ and if $\tau_{SL}^{*1}(\theta_1, \theta_2) \leq \tau_{SL}^{*2}(\theta_2, \theta_1)$.

Next, note that the gains from using EC are greater, the more concave $E[W^w(\cdot)]$ is with respect to \mathbf{s} . The reason for this is that $s^{*1} < s^{*2}$, and \mathbf{s} and $\boldsymbol{\tau}$ are complements (Assumption 4). Hence, a reduction in $\tau_{SL}^2(\theta)$ implies a reduction in $s^{*2}(\theta)$, in equilibrium, and this reduction is larger the larger are $\frac{\partial^2 W^{*2}}{\partial \tau^2 \partial s^{*2}}$ and $\frac{\partial^2 W^{*2}}{\partial \tau^{*2} \partial s^{*2}}$ relative to $\frac{\partial^2 W^{*2}}{\partial \tau^1 \partial s^{*2}}$ and $\frac{\partial^2 W^{*2}}{\partial \tau^{*1} \partial s^{*2}}$, all else being equal. In other words, the reduction is larger the larger the direct effect of τ^2 and τ^{*2} relative to the indirect effect of τ^1 and τ^{*1} (the effect of τ^1 and τ^{*1} is coined the “indirect effect” since τ^1 and τ^{*1} directly impact the production of *1, and not of *2). Then, when these gains are sufficiently large, it will be profitable for *2 to set $\tau_{EC}^{*2}(\cdot)$ sufficiently low, so as to compensate H for using EC. Furthermore, the government in *1 can be made better off when the benefit to it from reducing s^{*2} outweighs the cost due to the increase in τ^1 . This cost is lower the larger τ^{*1} is and the smaller s^{*2} is. Therefore, given the aforementioned conditions, all three governments can be made better off by using EC, and therefore EC (weakly) Pareto dominate SL. (Note that under SL , one can always set $\tau^e = \tau^{ne}$.)

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Figure 1: Trade flow of x and y.

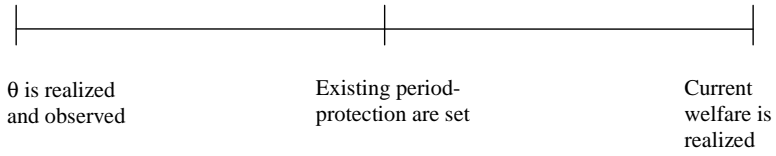


Figure 2: The sequence of events at time t greater than 1.

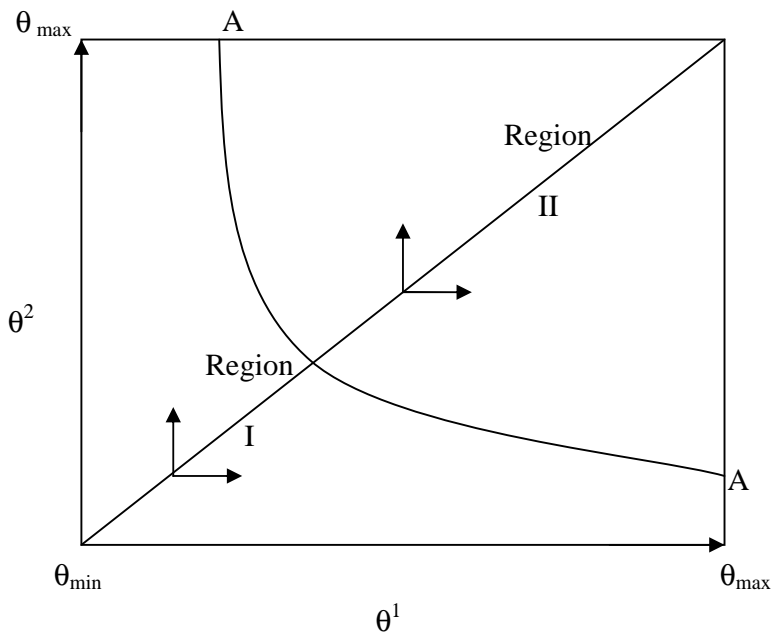


Figure 3: The gain from deviation.

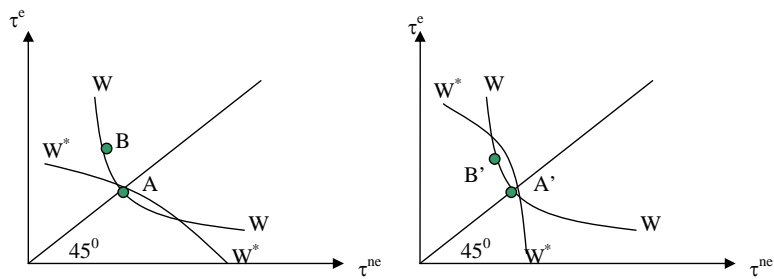


Figure IV.a. Optimal Policy is

Figure IV.b. Optimal Policy is SL.

Figure 4: The optimal safeguard regime.