

Tariff Retaliation versus Financial Compensation in the Enforcement of International Trade Agreements*

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Abstract

We analyze whether financial compensation would be preferable to the current system of dispute settlement in the World Trade Organization (WTO) that permits member countries to impose retaliatory tariffs in response to trade violations by other members. We show that monetary fines are more efficient than tariffs in terms of granting compensation to injured parties but they suffer from an enforcement problem in that they must be paid by the violating country. If fines have to be ultimately supported by the threat of retaliatory tariffs, their use fails to yield a more cooperative outcome than the current system. We also consider the use of bonds as a means of settling disputes. If bonds can be posted with a third party (via an escrow account say), they do not have to be supported by retaliatory tariffs and can improve the negotiating position of countries that are too small to effectively threaten tariff retaliation.

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1 Introduction

One of the major goals of the World Trade Organization (WTO) is to reduce policy barriers to international trade. Yet, its system for dispute settlement allows members to raise tariffs in response to trade violations committed by other members. Under the Dispute Settlement Understanding (DSU) of the WTO, a country found guilty of a trade violation is asked to eliminate policies that are deemed to be in violation of WTO rules. In the event that it fails to comply, it is asked to compensate countries harmed by its violation by granting tariff concessions in goods other than the one in which the violation has been found to occur. If injured countries are not adequately compensated, WTO rules permit them to impose retaliatory tariffs (i.e. withdraw previously granted tariff concessions).¹ Although there are constraints on the amount of retaliation permitted by the WTO, the fact that the dispute settlement procedure even allows tariff retaliation appears to be in direct conflict with the ideal of freer trade.² Both this and the fact that many small countries cannot effectively retaliate via tariffs have lead to calls for alternative trade dispute remedies.

There are at least two possible reasons why tariff retaliation might be permitted by the DSU of the WTO. First, the threat of retaliation can encourage members to comply with WTO rules: in the absence of any fear of foreign retaliation, members would be tempted to raise their own trade barriers whenever so urged by their import lobbies since domestic exporters would have little incentive to counter-lobby in order to keep the local market open.³ Second, the increase in tariffs by an injured party *may* partially compensate it by either improving its terms of trade (which happens if it is large enough to affect world prices) or by benefiting its import lobbies that maybe favored due to political economy

¹See Hoekman and Kostecki (2001) for a good overview of the WTO's dispute settlement procedures.

²According to Ethier (2003) the role of the WTO's dispute settlement procedure is "not to facilitate punishment: It is to constrain it." He notes that the WTO imposes three constraints on retaliation: (a) peaceful resolution is given primacy over retaliation; (b) reciprocity is maintained by allowing only an equivalent withdrawal of concessions; and (c) disputes are handled in a bilateral manner in order to not let them become multilateral issues. Lawrence (2003) notes that WTO rules are designed to preserve the existing balance of concessions (i.e. to maintain *reciprocity*)

³As is well known, the incentives for trade protection are usually stronger when part of the costs of protection fall on foreign exporters, something that is necessarily true whenever a country is not a price taker in world markets.

considerations.⁴ Even if retaliatory tariffs enforce cooperation and/or enable compensation in trade agreements, they may not necessarily be the optimal mechanism for achieving these objectives. In principle, monetary fines payable by a country that violates WTO rules could have both a deterrent effect and a compensatory one while simultaneously avoiding the well-known inefficiencies of tariffs. Our goal in this paper is to evaluate whether the use of fines and bonds can improve upon the WTO 's current dispute settlement system based on retaliatory tariffs.

The idea that trade disputes could be settled via financial compensation is hardly new. For example, in the early 1960s, both Uruguay and Brazil proposed that less developed countries should be provided financial compensation for GATT violations by developed countries.⁵ As Dam (1970) notes, this proposal may be attractive for several reasons. First, the principle of financial liability to injured parties underlies domestic laws across the world and its use in international law seems natural. Second, tariff retaliation may not even be in the interest of an injured party. For example, optimal tariffs for countries that are too small to influence world prices would be typically near zero.⁶ As a result, any retaliation requiring them to raise their tariffs will only *further* reduce their welfare. Hence in the most recent trade negotiations (i.e. the Doha Round), there have been new proposals to reform the DSU and to introduce alternatives to tariff retaliation as a remedy. These proposals have generally originated in developing countries who typically lack sufficient market power to hurt large countries or to achieve compensation through tariff retaliation.⁷

⁴As is well known, for small countries, the benefit to the import-competing sector comes at the expense of lower social welfare in the country imposing the tariff.

⁵The idea has gained substantial currency in recent years. For example, in an article in the influential *Financial Times* of 34th June, 2004, Bronckers and Van Den Broek have argued strongly in favor of financial compensation as a means of settling trade disputes.

⁶Of course, the presence of domestic distortions or imperfections in market structure could imply positive optimal tariffs for even countries that lack market power in world markets.

⁷One alternative is for such countries to retaliate in other parts of the WTO agreement. In the recent bananas dispute involving the European Union (EU) and several banana exporters, Ecuador was authorized to do so and it threatened the EU that it would not respect the intellectual property provisions in the TRIPS for EU products unless the EU carried out the DSU ruling (WTO document WT/DS27/ARB/ECU, 2000). Limão (Forthcoming) provides a formal analysis of the enforcement effects of this type of linkage of cooperation across issues with international spillovers in the context of trade agreements. Although this is legally possible, Ecuador must no longer think this recourse is sufficiently satisfactory since it is one of the countries that recently proposed monetary fines to address trade disputes (WTO document TN/DS/W/9,

Monetary fines as an instrument to resolve trade disputes may also be problematic. For example, the implementation of monetary compensation faces two important hurdles: (1) it may require considerable information and (2) it may be difficult to enforce (Dam [1970]) The information problem is that it is difficult to determine the financial loss incurred by an exporter. However, we think this is not a valid argument against *replacing* the current retaliation system by fines for two reasons. First, the dispute settlement system serves a dual purpose: compensation for and deterrence of violations. For deterrence to succeed, the benefit of the violation to the importer must be lower than the cost imposed on it by the compensation. This condition can be met even if the punishment is unrelated to the magnitude of the violation's adverse welfare effect on exporters. However, to achieve the compensation objective, some measure of injury must be used. Note that this is also true of the current retaliatory system and indeed would be so of any other mechanism that requires compensation to be proportional to injury. Under current WTO rules, a country that is allowed to retaliate by raising tariffs can do so up to the point where it eliminates as much trade as the initial WTO-illegal tariff did.⁸ This *trade coverage* concept is clearly neither a good measure of the cost of the violation to the injured country nor of the required compensation. In fact, it may deliver more or less compensation than the level of the injury.⁹ A similar problem confronts a monetary fine calculated on the basis of some fraction of the *trade coverage* measure. However, the advantage of a fine is that it allows for compensation of *all* affected countries rather than only those that are sufficiently large

2002). A different proposal was put forward by Mexico who argued that injured countries be allowed to trade their retaliation rights, i.e. to "sell" them to countries that have sufficient market power to credibly threaten tariff retaliation. Bagwell, Mavroidis, and Staiger (2004a) analyze this proposal and formally show how a properly designed auction for retaliation rights would be efficiency improving.

⁸The precise wording of article 22.4 of the DSU is that the retaliation may be "equivalent to the level of nullification or impairment".

⁹The cost to exporters of facing a higher tariff can be anywhere between zero (if it can simply ship the good elsewhere at the same price) and the value of the lost exports (if it supplies the good inelastically). The benefit to the injured country of increasing its tariffs to eliminate that same amount of trade can be negative (if it has no market power) and is at most the value of eliminated trade in the unlikely situation where it faces a perfectly inelastic export supply from the non-compliant country. Therefore, the current system of tariff retaliation will at times provide insufficient compensation for the injury and at other times too much.

to effectively utilize tariff retaliation.¹⁰

We believe that the major hurdle facing the implementation of a dispute remedy based on financial compensation is its enforcement. The problem is simply stated: How does one ensure that the required fine, whatever it is ruled to be, is actually paid by a violating country? While the injured country can implement retaliatory tariffs without requiring any cooperation from the violating country, such is not the case for fines. Ultimately, the violating country has to agree to pay the fine and it will only do so if it is in its best interest since there exists no supra-national authority that can enforce the payment of the fine. This problem is clearly reflected in the current DSU – it allows for compensation but does not specify the form it must take. Article 22.2 of the DSU states that the compensation must be mutually agreed upon and if it is not, the injured country can apply for retaliation. The only case that we know of where a dispute resulted in monetary compensation was when the US was found guilty of non-payment of royalties by US *firms* to the EU.¹¹ This shows that while monetary compensation is possible under the DSU, it simply has not been agreed to in most trade disputes that have been handled by the WTO.¹²

An important objective of this paper is to analyze the effect of alternative dispute remedies on the level of enforcement, i.e. how much cooperation they deliver or how effective they are at maintaining relatively low trade barriers. We also analyze how effective the different systems are in providing compensation to countries injured by trade violations. In so doing, we argue that a key issue is to account not only for how a remedy is able to enforce cooperation but also *how the remedy itself can be enforced*. For fines to succeed in enforcing low tariffs and providing compensation, it is crucial that they be backed by a ‘supporting’ instrument that is not controlled by the violating country. Retaliatory tariffs are the obvious choice for such a supporting instrument. However, we show that a system

¹⁰For a more recent discussion by a GATT/WTO legal scholar for improvement of the WTO’s trade dispute system and use of monetary compensation as a remedy see Schaffer (2003).

¹¹See WT/DS160/ARB25/1, 2001 at <www.wto.org>

¹²However, recently monetary fines have been introduced by the US in its preferential trade agreements with Singapore, Chile, the central American countries, and Australia. More specifically, in these agreements, monetary fines are typically a preferred form of compensation when there is a violation related to the trade or intellectual property right provisions.

where retaliatory tariffs are used to support the payment of fines yields no more cooperation than one that uses tariffs alone to retaliate against violations. But fines supported by tariffs have an advantage over tariff retaliation as a primary remedy: if a violation does occur, the payoff to the injured country is higher under fines even though the cost of the penalty for the violating country is unchanged. This establishes the ex-post efficiency of fines. The intuition is simple: tariffs are an inefficient form of compensation because the welfare gain they generate for the injured country (if it has market power) is always less than the welfare cost to the country being punished.¹³

Given that credible tariff retaliation threat is usually not an option for small countries, it is important to know whether such countries can avail of alternative enforcement mechanisms. To this end, we ask whether international cooperation can be sustained by a system where each country posts a bond of a given amount prior to trading, with the understanding that its bond will be used to pay a fine in case it commits a trade violation. We find that bonds can only improve enforcement relative to a system based on retaliatory tariffs if they are held by a third party. Otherwise, i.e. if bonds are exchanged by two countries, a deviating country would have no incentive to return the other country's bond and ultimately the threat of tariff retaliation would be required. By contrast, if bonds are deposited in an escrow fund (i.e. with a third party), tariff retaliation is no longer necessary since the bond posted by the violating country can be used to compensate the injured country. Such an escrow scheme was in fact proposed by Chile in its bilateral trade agreement with the US.¹⁴

There are two additional reasons why bonds may be useful from the perspective of small countries. First, bonds can be used as a supporting mechanism for fines instead of tariff retaliation (although it is not immediately clear why countries would need both fines

¹³In a different context, Hoekman and Saggi (2005) argue that since most developing countries lack the institutional capacity for fighting foreign export cartels via antitrust enforcement, developed countries ought to ban such cartels in return for tariff concessions or some monetary compensation. Cartelization creates an inefficiency much like the use of a tariff by a large country in that the loss suffered by the injured party exceeds the gain of the other party. They show that if tariff retaliation is a credible option for an importing low income country, the transfer it has to pay to secure a ban on export cartels is lower.

¹⁴“Chile Looks for Monetary Sanctions as Enforcement Mechanism”, INSIDE U.S. TRADE 13, 11/11/2002.

and bonds). Second, bonds can help small countries obtain tariff concessions from large countries. This second point needs elaboration. One problem facing small countries in reciprocal trade negotiations is that their individually optimal tariffs are quite low (even though they can jointly exert enough market power to be able to hurt large countries). Therefore, when there is a deviation by a large country, none of the small countries has an incentive to punish it via tariff retaliation. In fact, each of them would prefer some other country to do so. Anticipating this free riding, a large country has no motive to offer tariff reductions in products primarily exported by small countries. Bonds solve the free riding problem since small countries no longer need to retaliate via tariffs. This allows small countries to credibly coordinate their threats against a large country and thus obtain tariff concessions from it.¹⁵

The structure of the paper is as follows. In section 2 we introduce the model and derive tariffs under two polar cases: one where there is no trade agreement and another where there is complete cooperation (i.e. when there exist no enforcement problems). In section 3 we introduce the alternative enforcement mechanisms and contrast their enforcement outcomes with those under tariff retaliation. Given that the issue of alternative mechanisms is not well understood we start with the simpler case of similar countries and then, in section 4 we discuss the implications of bonds for small countries. In the same section we discuss the compensation outcomes of fines versus tariff retaliation when a violation does occur and also comment on some aspects of this comparison that are not covered by our model. In section 5, we summarize and discuss the results.

2 Model

In the baseline case, we consider two symmetric countries (home and foreign) producing two homogeneous goods, $i = x, y$, where x denotes home's import. Under trade, domestic import prices are given by $p = p^w + \tau$ where p^w is the "world" price and τ is a specific import tariff. Home's excess demand is then $M_i \equiv D_i(p_i) - S_i(p_i)$ where D_i measures

¹⁵Of course, the difficulty lies in getting large countries to accept such a scheme.

demand for good i and S_i its supply. Denoting foreign variables with an “*”, the world price p^w is determined by the usual market clearing condition and is therefore a function of the policy variables. For the home country’s import good, the market clearing condition is given by

$$M_x(p_x^w, \tau) + M_x^*(p_x^w) = 0 \quad (1)$$

A similar condition applies to foreign’s import good, y . We assume that no export policies are used so that trade policy is simply described by the level of the import tariff in each country, τ and τ^* . Moreover, we assume that countries have market power in trade so that their optimal tariffs are positive. It is then simple to verify that, in this setup, the world price p_i^w is decreasing in tariffs τ and τ^* and that tariffs raise domestic prices.

We focus directly on a reduced form objective function for the government that may allow extra weight (measured by $\lambda_i \geq 1$) to be placed on producer surplus relative to consumer surplus and tax revenue:

$$W_i \equiv \int_{p_i}^{\infty} D_i(p_i) dp_i + \lambda_i \int_0^{p_i} S_i(p_i) dp_i + \tau_i M_i \quad (2)$$

When the government’s objective in choosing trade policy is to simply maximize $W \equiv \sum_i W_i$ this represents the reduced form of a political contributions model such as Grossman-Helpman (1994).¹⁶

Each country’s tariff in the absence of a trade agreement, i.e. the Nash equilibrium, is obtained by maximizing (2) while taking the other country’s tariff as given. Since we do not model export policies good, subscript i can be dropped. Let

$$\tau^N \equiv \arg_{\tau} \max W \quad (3)$$

¹⁶In Grossman-Helpman (1994) the government’s objective is $W^{GH} = a\bar{W} + c$, where \bar{W} is social welfare, c is political contributions and a is the marginal rate of substitution between the two. In W_i the term $\lambda - 1$ can be directly interpreted as the inverse of a when factor ownership is extremely concentrated.

which implies that the optimal Nash tariff in ad-valorem terms, τ^N/p^w , is given by:

$$\frac{\tau^N}{p^w} = \frac{1}{\varepsilon} + (\lambda - 1) \frac{S/M}{\xi} \quad (4)$$

The first term on the right hand side of the above equation, $1/\varepsilon$, is the inverse of the foreign import demand elasticity and it reflects the terms-of-trade motive for the use of tariffs. The second terms reflects a political economy motive that is increasing in the extra weight placed on producers (λ) and decreasing on home's import demand elasticity (ξ).¹⁷ Given symmetry, the foreign country's import tariff is also the same, i.e. $\tau_x^N = \tau_y^{N*}$.

At the other extreme, if countries were able to cooperate without any enforcement problems they would choose tariffs that maximize their joint objective $W + W^*$. This is equivalent to maximizing the objective of either one once we employ symmetry and note that $\tau = \tau^*$. Thus we obtain

$$\tau^g \equiv \arg_{\tau^c} \max W_x(\tau^c) + W_y(\tau_y^* = \tau^c) \quad (5)$$

which implies that the globally optimal ad-valorem tariff τ^g/p^w is given by

$$\frac{\tau^g}{p^w} = (\lambda - 1) \frac{S/M}{\xi} \quad (6)$$

It is simple to see that the globally optimal cooperative tariff is lower than the non-cooperative tariff (i.e. $\tau^g/p^w < \tau^N/p^w$). The difference between the Nash and globally cooperative policies confirms that market power in trade leads to international externalities that can potentially be resolved by trade agreements (as argued in Bagwell and Staiger [1999]). Moreover, it points out that even in the presence of an international agreement, countries may choose to have positive tariffs due to internal political economy distortions.¹⁸

Since the globally optimum tariff is below the level that is optimal for each *individual*

¹⁷See the appendix for the derivation and exact definitions.

¹⁸Note that S , M , and ξ are not parameters, they are endogenous variables that depend on tariffs and world prices and therefore will typically differ across the expressions for τ^N and τ^g .

country, both countries have an incentive to deviate from it and would do so if it faced no punishment. We now address how countries can enforce cooperation.

3 Enforcement of trade agreements

The absence of a supra-national authority to punish violators implies that international agreements must be self-enforcing. Cooperative self-enforcing agreements are well characterized by certain repeated games.¹⁹ We begin with the standard approach in the literature of using the threat of tariff retaliation to enforce cooperation and then contrast its outcome with alternative enforcement mechanisms.

3.1 Supporting cooperation via tariff retaliation

Consider an indefinitely repeated game where the stage game delivers the Nash tariff described in the previous section. Assume that governments observe each other's actions at the end of each period. The strategy we assume countries employ is to start by cooperating until one deviates by raising its tariff. Any deviation is followed by a punishment phase of n periods after which cooperation is resumed. The motive for modelling temporary punishments is that they are clearly more realistic than infinite Nash reversion after any deviation. Although the latter is a possibility, we view it as the ultimate punishment corresponding to an unravelling of the GATT/WTO system that results from member countries not following its rules. The more common occurrence are trade disputes that are met with temporary punishments similar to what we model.²⁰

To find the lowest cooperative tariff that is renegotiation proof we must first define the payoffs to each government under the alternative situations that can arise. In the absence of any cooperation the payoff to each country is simply given by the government's objective

¹⁹See Dixit (1987) and Bagwell and Staiger (1990) for example.

²⁰We focus on a case where there are no anticipated shocks so that no deviations occur in equilibrium. In section 4 we examine the compensation aspect of different remedies when unexpected shocks cause a deviation to occur.

evaluated at τ^N :

$$W^N \equiv W_x(\tau^N) + W_y(\tau^{*N} = \tau^N) \quad (7)$$

Similarly, when countries cooperate, i.e. set their tariffs at τ^c (that is determined below), the payoff to each of them is given by:

$$W^c \equiv W_x(\tau^c) + W_y(\tau^{*c} = \tau^c) \quad (8)$$

If a country deviates, it does so by imposing its optimal Nash tariff τ^N on its trading partner who, in that period, still utilizes the cooperative tariff, τ^c . The payoff to a country in the period it deviates is therefore given by

$$W^D \equiv W_x(\tau^N) + W_y(\tau^* = \tau^c) \quad (9)$$

Since we allow for renegotiation after a deviation we must model the punishment phase before cooperation is resumed. We assume that countries agree that a deviation will be followed by n periods of punishment where the country that deviated faces $\tau^* = \tau^N$ and must show its willingness to restart cooperation by setting its own tariff at the cooperative level $\tau^c < \tau^N$. The payoff for the deviating country during the punishment phase (of n periods) is therefore

$$W^P \equiv W_x(\tau^c) + W_y(\tau^* = \tau^N)$$

Given the above payoffs, the incentive compatibility constraint needed to sustain cooperation is

$$W^D + V^\tau \leq \frac{W^C}{1 - \delta} \quad (10)$$

where $\delta = \bar{\delta}\rho < 1$ and $\bar{\delta}$ reflects a proper discount factor and ρ the probability that the game continues for one more period. The above constraint states that the sum of the payoff of a deviation and the continuation payoff should not exceed the discounted payoff

of cooperation, where the continuation payoff under tariff retaliation is defined as

$$V^\tau \equiv \sum_{t=1}^n \delta^t W^P + \sum_{t=n+1}^{\infty} \delta^t W^C \quad (11)$$

Since $W^P < W^N$ the punishment phase is subgame perfect only if it is not profitable for the country that is being punished to simply abandon the agreement and revert to Nash forever. So we require that V^τ exceed the Nash payoff in order to be weakly renegotiation proof (WRP):²¹

$$V^\tau \geq \frac{\delta}{1-\delta} W^N \quad (12)$$

Because $W^C > W^P$ the longer the punishment phase, the lower is V^τ . Therefore the maximum punishment that is WRP is found by increasing n to lower the continuation payoff until it is equal to $W^N \delta / (1 - \delta)$. We define this value of n as n^{\max} and it is implicitly given by

$$V^{\tau \min} \equiv \delta \frac{1 - \delta^{n^{\max}}}{1 - \delta} W^P + \frac{\delta^{n^{\max}+1}}{1 - \delta} W^C = \frac{\delta}{1 - \delta} W^N \quad (13)$$

It is simple to confirm that the lowest cooperative tariff that is WRP is the same as that under infinite Nash reversion. To see this simply replace (13) in (10) to obtain

$$W^D + \frac{\delta}{1 - \delta} W^N \leq \frac{1}{1 - \delta} W^C \quad (14)$$

The lowest cooperative tariff is implicitly defined when the expression above holds with equality.

²¹Farell and Maskin (1989) and Van Damme (1989) show that using the following punishment as part of the strategy is WRP: the party that deviates accepts to be punished and during that period it plays cooperatively. In this case clearly $W^P < W^N$. The WRP concept requires the strategy not to be Pareto dominated (i.e. $W^{*P} > W^{*C}$) so that cooperation does not Pareto dominate the punishment phase for the injured party. When this is the case, the foreign country is better off when home is punished than under cooperation but home is worse off.

3.2 Fines and tariff retaliation

We now consider the effect of switching from tariff retaliation to monetary fines to punish deviations from a trade agreement. One key difference between these options is that the fine must be voluntarily paid by the deviating country whereas retaliatory tariffs are imposed by the other country. This means that if the country that deviates decides *not* to pay the fine, the only thing the other country can ultimately do is to leave the agreement altogether (i.e. revert to non-cooperation in tariffs). Given this, the most cooperative tariff that can be achieved for a given fine of value k is determined as follows.

First, after a deviation, a country must face a punishment payoff of $W^P = W^C - k$. This is the payoff where both countries set their tariffs at the cooperative level τ^c , to be determined below, net of the monetary fine k , which we assume takes place in the form of a numeraire good that is valued according to a quasilinear utility.²² It is reasonable to suppose that if the fine is paid, the transfer occurs in a single period. Thus we set $n = 1$ without loss of generality since we can always alter the value of the fine (k) to mimic the effects of changes in n . The incentive constraint is then similar to the one we had previously, with the possible exception of the continuation payoff that is now V^k :

$$W^D + V^k \leq \frac{W^C}{1 - \delta} \quad (15)$$

The continuation payoff V^k is now simply the cost of the fine ($-\delta k$) plus the stream of cooperative payoffs

$$V^k \equiv -\delta k + \frac{\delta}{1 - \delta} W^C \quad (16)$$

If we ignore the renegotiation proofness constraint, there exists a sufficiently large k that would deliver the global optimum, τ^g . However, we must ensure that the punishment

²²We can easily model this explicitly by assuming, for example, that each period countries get an endowment of some value $\beta > k$ that can be consumed or partially used for the fine. Alternatively, the numeraire can be produced using labor only in a constant returns production process. Since in either case the surplus from the numeraire good before fines is identical under cooperation and/or deviation, we need not include it explicitly in the payoff expressions since such inclusion does not alter the incentive constraints (and thus tariffs).

payoff is WRP and if trade retaliation is infeasible then a deviating country would have no incentive to pay the fine. Thus, ultimately there must be a punishment for not doing so. In the context of our model, the only punishment that the other country can impose is to increase its tariff. Therefore the WRP is defined with respect to the payoff under infinite Nash reversion and it requires that

$$V^k \geq W^N \delta / (1 - \delta) \quad (17)$$

Thus WRP requires the maximum fine, k^{\max} , and resulting minimum payoff that the deviating country can be held to, $V^{k \min}$, to be

$$V^{k \min} \equiv -\delta k^{\max} + \frac{\delta}{1 - \delta} W^C = \frac{\delta}{1 - \delta} W^N \quad (18)$$

So the maximum fine that is WRP is the present discounted value of cooperation in the trade agreement, i.e.

$$k^{\max} = (W^C - W^N) / (1 - \delta) \quad (19)$$

From this we can obtain the lowest cooperative tariff that is WRP when fines are used and enforced by the threat of abandoning the agreement altogether by replacing $V^k = V^{k \min}$ in (15) to obtain

$$W^D + \frac{\delta}{1 - \delta} W^N \leq \frac{W^C}{1 - \delta} \quad (20)$$

As should be immediately clear, the above constraint is *identical* to that in equation (14). Thus, the most cooperative tariff that can be achieved, by the maximum punishment that maintains WRP is *exactly the same as that which can be achieved by tariff retaliation and both are identical to the most cooperative tariff that can be supported by infinite reversion to Nash tariffs. Therefore, when countries are symmetric, monetary fines supported by tariff retaliation cannot enforce any more cooperation than a system that relies on tariff retaliation alone.*

There is one important corollary of the above result. Since the most cooperative tariff

is identical under the two enforcement mechanisms that we contrast, the payoffs are also exactly the same in the absence of any shocks. This is because in the absence of shocks there are never any deviations in equilibrium and along the equilibrium path countries always obtain the cooperative payoff W^C (that depends only on the level of the cooperative tariff). In section 4.2 we will see that when shocks do cause deviations along the equilibrium path, the payoffs under the two mechanisms are different. Before doing so we analyze whether an alternative enforcement mechanism can improve cooperation relative to the ones analyzed above.

3.3 Using bonds to support cooperation

Suppose that at the start of each period countries must post a bond of value b measured in an untaxed numeraire good and used to pay a fine in case of violation. Assume also that countries observe this and cooperate only if such a bond is posted by both of them. Naturally, once bonds are posted, countries are free to decide whether to cooperate on tariffs or not. If either country does not post a bond, both play Nash in tariffs forever (we later discuss the case where the punishment phase is finite).

As a baseline, suppose that there is no third party that holds the bonds so that governments must post them with each other (either a third party is not available or is too expensive due to transaction costs and/or non-verifiability). If at the end of a period both countries cooperated then their bonds are “returned” to them, otherwise the country that deviated loses its bond.

Under infinite Nash reversion, if a country deviates in tariffs it will be optimal for it not to return the other country’s bond. *In this case, the equilibrium tariff remains unchanged relative to the case of no bonds.* To see this, note that the incentive constraint is given by:

$$(W^D + b^* - b) + \frac{\delta}{1 - \delta} W^N \leq \frac{W^C}{1 - \delta} \quad (21)$$

where the payoff under Nash reversion is the same as before since under no cooperation both countries simply set their tariffs at τ^N and bonds are irrelevant. The functional form of the

cooperation payoff is also unchanged because we assume that if countries cooperate they receive their bond and consume it at the end of the period (and we assume no discounting within the period). The key difference is the deviation payoff, which is now given by the original value, W^D , net of the value of the bond that is lost, $-b$ and the one not returned, b^* . However, if, as we expect due to symmetry and stationarity, the optimal bond is the same for both countries (i.e. $b^* = b$), the constraint in (21) is identical to the one in (14) and thus the resulting cooperative tariff is equal to that under infinite Nash reversion.

Now consider the case where the punishment phase is finite. Countries start cooperating by initially posting a bond b with each other. If a country deviates from the cooperative tariff, it loses its bond. For cooperation to be resumed, the deviating country must return the present discounted value of the bond of the injured country, b^*/δ . If it does so in the period after which the deviation occurs, tariffs return to the cooperative level. The incentive constraint for cooperation can be written as:

$$W^D + b^* - b + V^b \leq \frac{W^C}{1 - \delta} \quad (22)$$

We can again write the minimum continuation payoff that is WRP:

$$V^{b \min} \equiv -\frac{\delta b^{* \max}}{\delta} + \frac{\delta W^C}{1 - \delta} = \frac{\delta}{1 - \delta} W^N$$

which implies a maximum bond of

$$b^* = b = \delta \frac{W^C - W^N}{1 - \delta} \quad (23)$$

Replacing this in (21) we obtain an IC for the lowest cooperative tariff under bonds that is exactly the same as in (21), which we already noted yields the same tariff as infinite Nash reversion. *Therefore when countries are symmetric, the most cooperative tariff using bonds without a third party as an enforcement mechanism is the same as that under the other enforcement mechanisms: infinite Nash reversion in tariffs, WRP tariffs, or WRP fines supported by the threat of infinite Nash reversion.*

3.4 Bonds with third party enforcement

If a third party holds the bonds, a country that cooperates always receives its bond at the end of the period (in addition to receiving the bond of the deviating country). Therefore the gain from deviation is now $W^D - b$. Moreover, since the country that deviates has no control over the bond of the other country, cooperation can be resumed in the following period. Therefore the IC is now

$$W^D - b + \frac{\delta}{1-\delta}W^C \leq \frac{W^C}{1-\delta} \quad (24)$$

where, since the full punishment of deviation is incurred in the deviation period, the continuation payoff is simply $\frac{\delta}{1-\delta}W^C$. This implies that the WRP constraint is always satisfied and that a bond

$$b = \frac{\delta}{1-\delta}(W^C - W^N) \quad (25)$$

is feasible. This bond enforces the same tariffs as bonds without a third party (as well as Nash reversion etc.). However, a larger bond can also be used since the WRP does not bind and such a bond can enforce a lower tariff. Therefore the use of bonds held by third parties can improve on the level of cooperation achieved by the other enforcement mechanisms and it requires no threat of tariffs.

Consider now the case when fines are used for temporary punishment and a bond is posted but forfeited only if a fine is not paid. After a tariff deviation, the bond is held and its present discounted value is only released when the fine is paid. So the IC is now

$$(W^D - b) + V^{\tau b} \leq \frac{W^C}{1-\delta} \quad (26)$$

The maximum fine and associated minimum $V^{\tau b}$ that ensures the punishment is WRP, requires the payoff of paying the fine and receiving the bond held at the time of deviation and continuing tariff cooperation to be at least as large as the payoff from not paying the

fine, forfeiting the bond and continuing tariff cooperation.

$$V^{\tau b \min} \equiv \delta b / \delta - \delta k^{\max} + \frac{\delta}{1 - \delta} W^C = \frac{\delta}{1 - \delta} W^C \quad (27)$$

Therefore the maximum fine that is WRP is $k^{\max} = b/\delta$. Substituting in (26) we obtain

$$W^D - b + \frac{\delta}{1 - \delta} W^C \leq \frac{W^C}{1 - \delta} \quad (28)$$

This is the exact same condition that we had in the absence of fines, i.e. (24). Again, we could choose the bond value $b = \frac{\delta}{1 - \delta}(W^C - W^N)$ (or higher) to obtain a cooperative tariff that is at least as low as that can be supported by fines under infinite tariff reversion. The key difference relative to the case of no bonds is that now the same cooperative tariff (or lower) can be obtained *without* ever requiring tariff retaliation or its threat. One final point is that, in terms of enforcement levels, there is no obvious advantage to using fines supported by bonds as opposed to simply using bonds since the lowest cooperative tariff is identical under the two alternatives.

4 Extensions

4.1 Asymmetries in country size

Now that we understand how alternative enforcement mechanisms work in the case of symmetric countries we discuss some implications of our analysis for the realistic scenario where countries are asymmetric in size. This is important because, as we noted in the Introduction, small countries may lack the ability to use tariff retaliation and apparently stand the most to gain from a switch to fines.²³ In fact, Bagwell, Mavroidis, and Staiger

²³Developing countries are also less likely to bring cases against other countries. As Shaffer (2003) notes, such countries often lack the legal knowledge necessary to successfully bring cases to the WTO and can access the requisite expertise at costs that are basically prohibitive from their perspective. Furthermore, they may also fear political and economic pressures from rich countries, further undermining their ability to bring WTO claims. Thus, by failing to participate in the WTO's dispute settlement system, "developing countries are acting rationally because it simply is not cost-effective for most of them to organize internally

(2004b) note that there has been *no* trade dispute in which a developing country (defined as a non-OECD member) has imposed retaliatory measures to induce compliance when faced with a trade violation.²⁴

The first problem that we must confront in modelling asymmetry is that if a country is truly small from a trade perspective then, under the current trading system, it will not obtain multilateral tariff reductions in products that it alone exports. This is simply due to the reciprocal nature of tariff concessions. If a small country's tariff reductions do not affect the price received by an exporter then the exporter has no incentive to offer reciprocal tariff concessions to the small country.²⁵ One alternative is that small countries "offer" non-trade related concessions, as was done with TRIPS in the Uruguay Round. However, here we want to focus strictly on the exchange of trade concessions. Therefore we consider a case where each individual country trading with a large country is small but there is a group of countries that is collectively large in importing one of the goods exported by the large country. We then ask if there is a problem in the current enforcement system that may be ameliorated with an alternative mechanism.

Suppose that there is a set of small countries, that are *jointly* large in importing a particular good, and that they all export some other good to a large country. If the small countries could coordinate jointly negotiate with the large country and *threaten retaliation* unless the large country reduced its tariffs (and kept them low), then they could achieve tariff concessions in the good they export to the large country. Although it may be possible to threaten such retaliation in a negotiation at a point in time, the threat may not be credible because if the large country deviates, none of the small countries individually has the incentive to punish the deviation (their individually optimal tariffs are close to zero). Punishment for compliance purposes is a public good and is subject to a free rider problem.

to take advantage of the WTO's legalized international dispute settlement system" (Shaffer, 2003).

²⁴Further empirical evidence on this issue is available in Bown (2004a and 2004b).

²⁵As Bagwell, Mavroidis, and Staiger (2004a) note, the reciprocity underlying WTO negotiations implies that if a country is ineffective in retaliating, it must be that it had offered very little in the way of concessions in the first place. Hence, a limited ability to retaliate goes hand in hand with the potential to free ride on reciprocal liberalization being undertaken between other countries on which small countries may free ride due to their MFN status.

Therefore, ex-ante small countries may never be able to coordinate and extract concessions from the large country.

One way to overcome the free-riding problem is to remove the need for individual small countries to retaliate in the case of a deviation by the large country. This can be achieved if the large country posts a bond with a third party. This is more difficult to do if only fines are used since the fines themselves require enforcement and in the absence of bonds this requires the threat of tariff retaliation.

The results we derived so far using bonds as the enforcement mechanism can be applied to the case where there is a large country and κ small countries if we make the following assumptions. Each of the small countries is identical and their demand and supply functions are equal to D_i/κ and S_i/κ so the payoff in sector i is simply W_i/κ . If these countries coordinate their efforts during trade negotiations, they will then maximize their joint objective $W = (\sum_{i,\kappa} W_i)/\kappa$, thus yielding the same jointly optimal non-cooperative tariff, τ^N . Note however that this tariff is higher than if they were to *individually* choose their optimal tariffs since the latter would reflect their lower market power.

In implementing the bond enforcement mechanism each would have to post a bond of value b/κ and its compensation in case the large country deviated would again be inversely proportional to the number of small countries. The large country would have an incentive to lower and maintain its tariff at τ^c , the level achieved by the infinite reversion level derived in (24) *even* if the small countries never retaliate. No small country has an incentive to deviate since doing so simply results in a loss of b/κ . They also have no collective incentive to deviate since the IC in (24) applies.

If bonds cannot be used to support fines, perhaps fines could be auctioned by smaller countries to those that have sufficient market power to back their claims by retaliatory tariffs. Bagwell, Mavroidis and Staiger (2004a) show that if a violating country can also bid for the right to retaliate (in order to retire it), then it ends up winning the auction and the final result is effectively a cash payment to the injured party that does not have the capacity to retaliate. Furthermore, they show that an auction in which the violating party

also participates is in general superior to one in which it does not. Their results imply that if the right to retaliate could be auctioned, compliance with WTO rules is likely to improve since then even smaller countries could effectively threaten retaliation. It is easy to see that their argument is even stronger in our context: by its very nature, the right to collect a specific amount of monetary compensation ought to be more tradable (and hence more valuable to third parties) than the right to retaliate via tariffs.²⁶ After all the tradability of retaliatory measures requires the participation of at least one country large enough to credibly threaten retaliation. Such is clearly not the case for fines backed by bonds.

4.2 Compensation under alternative mechanisms

As we note in the Introduction, WTO dispute settlement remedies have both an enforcement and a compensation role. Thus far we have focused only on the enforcement aspect and shown that enforcement cannot generally be improved by replacing the current system with fines (or bonds that are not held by a third party). Since the most cooperative tariff under those alternative mechanisms is identical so is the payoff to governments. The reason is that in our model assumes perfect foresight and no shocks, so that in no violations occur in equilibrium. Clearly the assumption of no shocks is not realistic and consequently neither is the result that no deviations occur along the equilibrium path. In the real world, we observe plenty of disputes and violations are found to have occurred in many of the cases. This is important because once we allow for deviations to actually occur, the payoffs to countries depend not only on the cooperative tariff but also on the exact mechanism being used to deal with violations. We now show that fines can generate higher compensation for the injured country at the same cost to the violator even if the cooperative tariff enforced is identical.

We illustrate our point in the simplest possible way. Rather than assuming that the governments have perfect foresight and a well defined distribution about all possible shocks, we assume they have no information and that they base their policies on the set of para-

²⁶Of course, tariff retaliation might be valued due to underlying political economy considerations since it allows a government to benefit a specific local group (unlike a cash payment collected by the treasury).

meters currently observed and expect them to hold in the future. We then consider the impact of an unexpected shock, e.g. it may be a political economy shock to the parameter λ so that in a given period a country desires a higher tariff than the cooperative level. We assume that in the following period that parameter returns to the original level. Such a temporary unanticipated shock and the resulting tariff increase would likely trigger a dispute and a ruling against the country because tariffs are bound in the WTO and are not on a contingent set of parameters (probably because it is difficult to write an agreement that is conditional on parameters that may be hard to observe by other countries).

The question we ask is the following: Given that a country deviates from the agreement due to an unexpected shock, under which mechanisms are the continuation payoffs higher for itself and the injured country? We focus on fines supported by either tariffs or bonds not held by third parties so that it yields the same enforcement outcome as temporary tariff retaliation. Since we focus on the most cooperative tariff, the minimum payoff that the deviating country can be held to under either alternative is the discounted Nash payoff, $W^N \delta / (1 - \delta)$. The question then is which, if any, alternative yields the highest compensation for the injured country. The continuation payoff for the injured country under temporary tariff retaliation when the most cooperative WRP is implemented is

$$\delta W^{*P} \frac{1 - \delta^{n^{\max}}}{1 - \delta} + \frac{\delta^{n^{\max} + 1}}{1 - \delta} W^{*C} \quad (29)$$

where we recall that the payoff for the injured country under the punishment phase W^{*P} exceeds W^{*C} because the punishment involves the injured setting its optimal tariff τ^N and the other country setting its cooperative tariff, τ^c .

Under a fine supported by infinite Nash tariff reversion that payoff is

$$\delta k^{\max} + \frac{\delta}{1 - \delta} W^{*C} \quad (30)$$

This reflects the received fine payment and the immediate resumption of cooperation with a payoff W^{*C} per period, identical to the one in expression (29) since we derived that

both sustain the same cooperative tariff. Therefore the compensation under fines is higher than under tariff retaliation if and only if the last expression exceeds (29), which can be simplified to provide a simple interpretation:

$$k^{\max} > \frac{1 - \delta^{n^{\max}}}{1 - \delta} (W^{*P} - W^{*C}) \quad (31)$$

Therefore the injured country obtains more compensation under the fine if the equilibrium fine exceeds the present discounted value of the extra payoff during punishment relative to cooperation. When the above constraint binds (i.e. $k = k^{\max}$), we have

$$\frac{W^C - W^N}{1 - \delta} = \frac{1 - \delta^{n^{\max}}}{1 - \delta} (W_y^*(\tau^* = \tau^N) - W_y^*(\tau^* = \tau^c)) \quad (32)$$

so that that the extra payoff captures exactly the terms-of trade gains from using the optimal tariff relative to cooperating in the import sector.

Using the definitions of k^{\max} and n^{\max} in (18) and (13) as well as the fact that overall IC in (20) holds with equality we can show that this is always true so that the injured country will get higher compensation under fines relative to tariff retaliation. The basic reason for this is apparent from the (32) where we use the definition of the maximum fine, which is the present discounted value of cooperation in the trade agreement relative to infinite Nash reversion. This gain from the agreement is similar for the injured country due to symmetry (or to the group of small countries according to the interpretation in the previous section) and it exceeds any temporary terms-of-trade gain that the injured country makes during the n^{\max} punishment periods.

In sum, although fines backed by tariff retaliation (or bonds not held by third parties) enforce no more cooperation than tariffs alone, they deliver more compensation to the injured country. This can be an important advantage in the presence of frequent unanticipated shocks.

4.3 Tariffs versus fines: some further comments

Thus far we have made two broad points about fines. First, if fines have to be supported by tariffs then they really cannot deliver a superior outcome in terms of sustaining cooperation. Second, fines are a preferred method for compensating injured parties because they do not involve the inefficiencies of tariffs. So does that imply that the WTO's dispute settlement should use fines as the primary means of settling disputes with tariffs authorized as a last resort? We argue below that such a conclusion does not necessarily follow from our analysis.

First, tariffs allow for the selection of targets by the retaliating country whereas fines do not. More specifically, the DSU simply sets the level of trade coverage that can be affected by retaliatory tariffs and leaves the retaliating country free to choose the goods on which it wants to impose tariffs. In this context, WTO rules do indicate a hierarchy of retaliatory responses. Suspension of concessions should first be considered in the sector in which the violation occurs. If that is not satisfactory, an injured party must respond within the same trade agreement (i.e. GATT). Retaliation in other WTO agreements (such as TRIPS) is permitted only as a last resort. Even if retaliation were to occur in the same sector, an injured party has substantial leeway in *selecting* targets. As Lawrence (2003) notes, parties typically choose to retaliate in a fashion that maximizes incentives for compliance. In many recent cases, retaliating parties selected a number of import categories whose values summed to the total trade coverage permitted and then subjected them to tariffs that were high enough to eliminate all trade in those categories and/or chose products produced in swing states, which typically have greater political influence. An important potential consequence of such targeted retaliation is that it can galvanize export industries in the country that commits the original violation so that they exert pressure on the government to comply with the WTO's ruling regarding its original infraction.

Second, while our model assumes that fines are not distortionary in the sense that tariffs are, one needs to account for the larger budgetary constraint confronting governments. Ultimately, fines have to be financed by some sort of taxation. The difference with respect to tariffs is that any distortions resulting from fines are likely to be primarily national in

nature whereas the distortions created by tariffs also have an international aspect to them (at least for the case of larger importers). However, if fines are raised via general taxation, the cost to the country would be dispersed and this may have the advantage of not being susceptible to political economy pressures created by the use of tariffs that typically benefit a small group (i.e. protected local producers).

We should note that no matter which instrument is used to compensate injured parties, WTO rules do *not* properly account for the damage suffered during the time it takes to settle disputes. If a country faces tariff increases in a foreign market and brings a case to the WTO, the defendant country does not have to alter its policies in any way during the time it takes to settle the dispute. More importantly, even if a particular policy is found to be in violation, the removal of that policy does not compensate the injured party for the harm suffered during the time period for which the policy was in place. This feature of the dispute settlement process creates a strong incentive for violating parties to drag out disputes. For example, Shaffer (2003) notes that despite losing a series of textile safeguard cases against several developing countries, the United States was able to effectively close its market to imports for almost three years without having to offer any compensation. Whether WTO rules should be altered to allow for such retroactive compensation is a topic worthy of further research.

5 Conclusion

While the dispute settlement procedure of the WTO has often been argued to be considerably superior to that of the GATT, there is a widespread feeling that the system is not quite adequate and is in need of improvement. In this paper, we have analyzed one particular aspect of this system – i.e. the right to impose retaliatory tariffs when a violating country fails to comply with a ruling that asks it to remove those policies that in violation of WTO rules. Apart from having the flavor of permitting an escalation of protectionism, this feature of the dispute settlement process also seems, at least at first glance, to be inferior to one based on monetary compensation.

We argue that one of the major problems confronting the use of monetary fines is that they are difficult to enforce. Ultimately, the enforcement of such fines may require the use of some type of retaliatory instrument and if such is the case, fines fail to yield anymore cooperation than tariffs. We also analyze whether bonds (posted prior to trading and revoked in case of a violation) can substitute for tariffs. Here, the key issue is whether they can be posted with a third party or not. If access to a third party is missing, bonds also fail to improve upon tariffs. Thus, despite their problems, retaliatory tariffs have the advantage that they are controlled by injured parties and can be used in the event a violating country fails to comply with the ruling of a WTO panel.

The major problem confronting tariffs, apart from the global deadweight losses they create, is that they simply cannot be used by countries that do not have sufficient market power in the goods they import. As a result, the current dispute settlement system does not provide developing countries with any real ability to retaliate against violations by other countries. As Bagwell, Mavroidis, and Staiger (2004a) have shown, making the right to retaliate tradable via an auction can help remedy this defect. A similar argument applies to the use of fines. If they are indeed adopted, fines would need to be tradable for developing countries to benefit from their introduction. Such tradability would either require the posting of bonds with third parties or the existence of large countries willing to bid for the right to collect a fine.

6 Appendix

The Nash tariffs in (4) are obtained by solving the following first-order condition for τ

$$W_\tau = 0 : (1 + p_\tau^w)[\tau M_p + (\lambda - 1)S] - p_\tau^w M = 0$$

In (4) $1/\varepsilon \equiv \frac{M^*}{p^w M_p^*}$ and $\xi \equiv -\frac{\partial M}{\partial p^w} \frac{p^w}{M} = -M_p p^w / M$.

The global optimum tariffs in (6) are obtained by solving the following first-order con-

dition for τ^c

$$W_x(\tau^c) + W_y(\tau_y^* = \tau^c) = 0 : (1 + p_\tau^w)[\tau^c M_p + (\lambda - 1)S] = 0$$

Claim: Compensation is higher for injured country under the fine that sustains the most cooperative tariff than under tariff retaliation, which is true iff

$$\begin{aligned} k^{\max} &> \frac{1 - \delta^{n^{\max}}}{1 - \delta} (W^{*P} - W^{*C}) \\ \Leftrightarrow k^{\max} &> \frac{1 - \delta^{n^{\max}}}{1 - \delta} (W_y^*(\tau^* = \tau^N) - W_y^*(\tau^* = \tau^c)) \\ \Leftrightarrow \frac{W^C - W^N}{1 - \delta} &> \frac{1 - \delta^{n^{\max}}}{1 - \delta} (W_x(\tau^N) - W_x(\tau^c)) \\ \Leftrightarrow W^C - W^N &> (1 - \delta^{n^{\max}})(W^D - W^C) \\ \Leftrightarrow W^C - W^P &> W^D - W^C \\ \Leftrightarrow W_y(\tau^{*C}) - W_y(\tau^{*N}) &> (W_x(\tau^N) + W_y(\tau^{*C}) - (W_x(\tau^c) + W_y(\tau^{*C}))) \\ \Leftrightarrow W^C &> W^N \end{aligned}$$

where the first line uses (29) and (29), the second uses the definition of the punishment and cooperative payoffs, the third the definition of k^{\max} in (18) and the symmetry assumption across countries. The fourth line uses the definition of deviation and cooperative payoffs. The fifth line uses the definition of $\delta^{n^{\max}}$ in (13) and simplifies. The sixth uses the definitions of the payoffs. The last line is necessarily true because Nash tariffs are inefficient and each country's payoff under Nash tariffs is lower than its cooperative payoff.

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