“GATT-think” with Asymmetric Countries*

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Abstract
We argue that a trade agreement which conforms to GATT’s reciprocity rule benefits the (stronger) less trade-dependent country at the expense of the (weaker) more trade-dependent country. Reciprocity is so unfavorable to the weaker country that it may be worse off under reciprocity than under the Nash-bargaining solution, a “power-based” approach to trade negotiations that reflects power asymmetries among trading partners. Our results question Bagwell and Staiger’s (1999, 2000) view of reciprocity as a rule that “serves to mitigate the influence of power asymmetries on negotiated outcomes.”

1. Introduction
In a series of papers, Bagwell and Staiger (BS, hereafter) have developed a comprehensive economic theory of GATT that allows to evaluate its foundational rules.1 It is widely accepted that the main pillar of GATT is the rule of reciprocity, which “refers to the ‘ideal’ of mutual changes in trade policy that bring about equal changes in import volumes across trading partners” (BS99, p. 224).2 In particular, BS identify two specific applications of reciprocity within GATT. The first refers to the common practice by governments to seek reciprocal tariff concessions in GATT negotiations. Although there is no explicit requirement that GATT negotiations conform to the rule of reciprocity, the evidence shows that governments seek, de facto, a balance of tariff concessions in GATT negotiations.3 This observation inspires BS’s formalization of the reciprocity rule. A second application of reciprocity arises in GATT’s procedures for renegotiation. In this respect, Article XXVIII of GATT states that, if a country decides to increase a previously negotiated tariff, its trading partners are allowed to withdraw “substantially equivalent concessions.”

With reference to the latter application of reciprocity, Bagwell and Staiger show that “GATT’s reciprocity rule serves to mitigate the influence of power asymmetries on negotiated outcomes” (BS00, p. 47). More generally, they argue that GATT is an approach to trade negotiations in which decisions are taken with reference to previously agreed rules (a “rules-based” approach). The natural alternative to GATT is a “power-based” approach, where agreements are reached, instead, with reference to the relative power status of trading partners and where the negotiated outcome reflects power asymmetries among them.4 Therefore, GATT’s rules, and reciprocity in particular, should favor countries with a low bargaining power relative to their stronger trading partners.

In this paper, we challenge these conclusions from a slightly different perspective. In particular, we show that, if the implicit rule of reciprocity that arises in GATT

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negotiations is taken as a constraint, then it may exacerbate, rather than mitigate, power asymmetries among countries. In order to develop our argument, we formulate a standard two-sector, general-equilibrium model of trade between two asymmetric countries. We first compare the negotiated outcome under reciprocity to free trade. We find that the stronger country (i.e. the country that is relatively less trade-dependent) is better off under GATT’s reciprocity rule than in free trade, whereas the weaker, more trade-dependent country cannot reach the free-trade welfare level under reciprocity. We next compare the negotiated outcome under GATT’s reciprocity rule to the unconstrained Nash-bargaining solution, a power-based approach to trade negotiations whose outcome reflects country asymmetries in power status. Surprisingly, we find that the weaker country is better off under a power-based approach than under reciprocity. In contrast, the stronger country is better off under GATT’s reciprocity rule than in the unconstrained Nash-bargaining solution, and its preference for reciprocity is greater the greater is the relative trade dependence of its trading partner.

The intuition behind our results is as follows. As shown by BS99, negotiating according to reciprocity means freezing the terms of trade at their pre-existing level. However, since in the non-cooperative Nash equilibrium the terms of trade are unfavorable to the weaker country, it follows that under reciprocity the weaker country is constrained to negotiate tariff reductions that leave unaltered its unfavorable terms of trade. In contrast, under an efficient and more flexible power-based approach, such as the Nash-bargaining solution, by making non-tariff concessions to its stronger trading partner, the weak country can induce it to give up its trade barriers and hence improve its terms of trade.

Our result may help explain why developing countries have often been so reluctant to actively participate in GATT negotiations, while being at the same time more and more willing to negotiate direct bilateral trade agreements with industrial countries (the so-called new regionalism), which often involve non-tariff concessions on the part of developing countries in exchange for tariff-free access to the market of their more developed trading partners.5

As noted earlier, our analysis builds on Bagwell and Staiger’s economic theory of GATT. Unlike these authors, we do not allow for political motivations in our representation of government preferences, hence we stick with the traditional case in which governments maximize national income.6 Further, in order to gain intuition on the effects of reciprocity in the presence of asymmetric countries, we implement their approach in the context of a specific trade model. In particular, we use the same pure exchange general-equilibrium trade model as in Kennan and Riezman (1988), since it proves tractable for our purposes and amenable to analytical results. Finally, we depart from Bagwell and Staiger in an important respect. BS make a distinction between reciprocity as it applies to tariff negotiations and to the renegotiation of tariffs. They argue that reciprocity is imposed as a true constraint only in the renegotiation process. In contrast, we model reciprocity as a constraint also in negotiations, for the following reasons.7 First, as mentioned earlier, reciprocity is so common a practice in GATT negotiations that it is, de facto, a constraint. Moreover, the distinction between implicit and explicit rules may have little relevance. In particular, “as there is no ‘world jail’ into which government leaders can be thrown” (BS00, p.26) when they violate GATT’s rules, it follows that both implicit and explicit rules must be self-enforcing, i.e. enforced by the threat of reverting to a worse equilibrium (e.g. the non-cooperative Nash equilibrium). This implies that the effectiveness of the WTO’s enforcement efforts crucially depends on the behavior of its member countries to be viewed as cooperative.8 In this respect, departure from such an agreed rule as reciprocity may be taken by its member
countries to indicate that cooperation has broken down, implying that GATT’s implicit rule of reciprocity may place as binding a constraint on governments’ behavior as GATT’s explicit rules. Finally, since the main focus of our paper is to provide an explanation for why developing countries are often more interested in negotiating direct bilateral trade agreements with industrial countries rather than participating in GATT negotiations, what mostly matters for our purposes is how negotiations are actually carried out within GATT.

Our paper also shares important resemblances to Park (2000). This author, too, analyzes the outcome of trade negotiations among asymmetric countries under different environments. He shows, in particular, that although negotiating a tariff pair on the efficiency frontier or negotiating free trade plus a direct transfer from the small to the large country are equivalent in a static game, issues of enforcement imply that the latter arrangement is preferable from the standpoint of small countries. Although Park’s approach is different from ours, both papers provide, from different perspectives, an explanation for why weak countries increasingly prefer to negotiate free trade in exchange for non-tariff concessions rather than tariff concessions with their stronger trading partners.

2. The Set-up

The basic set-up is as in Kennan and Riezman (1988, KR hereafter). Consider a world of pure exchange in which there are two countries, Home and Foreign, and two goods, $X$ and $Y$. Variables related to Foreign will be denoted by capital letters. The two countries share the same Cobb–Douglas preferences, in which the two goods are weighted equally:

$$u = c_x c_y, \quad U = C_x C_y,$$

(1)

where $c$ and $C$ denote consumption. As in KR, the world endowment of each good is normalized to one, so the world distribution of endowments $(x, X, y, Y)$ can be summarized by two parameters only, $\gamma$ and $\mu$:

$$x = \gamma; \quad y = 1 - \mu; \quad X = 1 - \gamma; \quad Y = \mu.$$  

In this model, each country’s autarchic price ratio equals the price ratio at which consumers choose to consume its endowment. In particular, preferences as in (1) imply that the autarchic relative price of $X$ equals $(x/y)^{-1} = (\gamma/(1 - \mu))^{-1}$ in Home, and $(X/Y)^{-1} = ((1 - \gamma)/\mu)^{-1}$ in Foreign. We assume that Home has a comparative advantage in $X$, which implies that $\gamma/(1 - \mu) > (1 - \gamma)/\mu$, and hence:

$$\gamma + \mu > 1.$$  

(2)

As noted by McLaren (1997, p. 410), a country’s relative endowment of the comparative advantage good is an index of its trade dependence (and the reciprocal is an index of its trade independence) since, ceteris paribus, the greater the ratio, the greater the gains from free trade. Hence, $\gamma/(1 - \mu)$ and $\mu/(1 - \gamma)$ are Home and Foreign’s indices of trade dependence, respectively. Also, their ratio:

$$RTD = \frac{\gamma}{1 - \mu} \frac{\mu}{1 - \gamma} = \frac{\gamma(1 - \gamma)}{\mu(1 - \mu)} > 1$$  

(3)

is an index of Home’s relative trade dependence (or of Foreign’s relative trade independence). Without loss of generality, we assume $RTD > 1$, namely, that Home
is more trade-dependent than Foreign. This ratio will turn out to be crucial for our results, since it determines a country’s ability to manipulate its terms of trade through a tariff and hence the terms of trade prevailing at the non-cooperative Nash equilibrium.

Home charges a tariff at the rate \((S-1)\) on imports of \(Y\), and Foreign charges a tariff at the rate \((T-1)\) on imports of \(X\). Utility maximization subject to the budget constraint allows to derive the two countries’ offer curves (see the Appendix):

\[
\frac{\gamma}{e_x} = \frac{S(1-\mu)}{i_y} + S + 1
\]

\[
\frac{\mu}{E_y} = \frac{T(1-\gamma)}{I_X} + T + 1,
\]

where \(e_x (= I_X)\) denotes Home exports (equal to Foreign imports) of \(X \) and \(i_y (= E_Y)\) denotes Home imports (equal to Foreign exports) of \(Y\). Solving for \(e_x \) and \(i_y \) gives:

\[
e_x = I_X = \frac{\mu \gamma - ST(1-\mu)(1-\gamma)}{S + ST(1-\mu) + \mu}
\]

\[
i_y = E_Y = \frac{\mu \gamma - ST(1-\mu)(1-\gamma)}{T + ST(1-\gamma) + \gamma}.
\]

Using (6) and (7), the two countries’ equilibrium consumption levels are:

\[
c_x = x - e_x = \frac{\gamma + T(1-\mu)}{1 + T(1-\mu) + \mu/S} \quad ; \quad c_y = y + i_y = \frac{\gamma + T(1-\mu)}{T + TS(1-\gamma) + \gamma}
\]

\[
C_X = X + I_X = \frac{\mu + S(1-\gamma)}{S + ST(1-\mu) + \mu} \quad ; \quad C_Y = Y - E_Y = \frac{\mu + S(1-\gamma)}{1 + S(1-\gamma) + \gamma/T}.
\]

Substituting (8) and (9) into (1) gives utility as a function of endowments and tariff rates:

\[
u = u(x, y) = \frac{[\gamma + T(1-\mu)]^2}{[1 + T(1-\mu) + \mu/S][T + TS(1-\gamma) + \gamma]}
\]

\[
U = U(x, y) = \frac{[\mu + S(1-\gamma)]^2}{[S + TS(1-\mu) + \mu][1 + S(1-\gamma) + \gamma/T]}.
\]

In the following, (10) and (11) will be used to compare welfare under different trade regimes. First note that, under free trade, \(S = T = 1\), so the utility levels \((u^f \text{ and } U^f)\) are:

\[
u^f = \frac{(\gamma + 1-\mu)^2}{4} \quad ; \quad U^f = \frac{(\mu + 1-\gamma)^2}{4}.
\]

Further, as shown by KR (also see the Appendix), this model admits an explicit solution for the Nash-equilibrium tariffs \((S^N \text{ and } T^N)\):

\[
S^N = \left(\frac{\mu}{1-\gamma}\right)^{1/2} \quad ; \quad T^N = \left(\frac{\gamma}{1-\mu}\right)^{1/2}.
\]

Finally (see the Appendix), the world relative price of \(X\) in the Nash equilibrium, \(P^N\), is:
where the latter equality follows from (3). Note that, since the world relative price of \( X \) equals 1 in free trade,\(^ {10} \) it follows that terms of trade are undistorted in the non-cooperative Nash equilibrium for \( RTD = 1 \), namely, when the two countries are perfectly symmetric. More generally, however, the greater is the relative trade dependence of Home, the lower (and the more distorted against it relative to the free trade) are Home’s terms of trade in the Nash equilibrium.

Substituting (13) into (10) and (11) gives the Nash equilibrium utility levels (\( u^N \) and \( U^N \)):

\[
\begin{align*}
    u^N &= \frac{\gamma + (\gamma(1-\mu))^{1/2}}{1 + (\gamma(1-\mu))^{1/2} + (\mu(1-\gamma))^{1/2}} \left( \frac{\gamma}{1-\mu} \right)^{1/2}, \\
    U^N &= \frac{\mu + (\mu(1-\gamma))^{1/2}}{1 + (\gamma(1-\mu))^{1/2} + (\mu(1-\gamma))^{1/2}} \left( \frac{\mu}{1-\gamma} \right)^{1/2}. 
\end{align*}
\]

Next, we use this set-up to analyze the negotiated outcome which conforms to the GATT’s rule of reciprocity.

3. Trade Liberalization According to Reciprocity

As noted earlier, reciprocity refers to mutual tariff cuts that bring about roughly equal changes in import volumes across trading partners. A key observation of BS99 (p. 224) is that, as long as changes in import volumes are measured at existing world prices, mutual changes in trade policy that conform to reciprocity leave the relative world price unchanged.\(^ {11} \) Hence, beginning at the non-cooperative Nash equilibrium and assuming that the reciprocity rule is imposed, we have:

\[
P^W(S, T) = P^N,
\]

where \( P^W(S, T) \) is the world relative price of \( X \). Equation (16) describes the Nash iso-world-price locus, i.e. the locus of all combinations of \( S \) and \( T \) that leave the world price ratio at the Nash-equilibrium level. Hence, beginning at the Nash equilibrium, equation (16) describes the set of tariff pairs that satisfy the reciprocity constraint.

In order to derive an explicit expression for the iso-world-price locus, note that the trade balance condition implies \( P^W e_x = i_x \). Using equations (6) and (7) and substituting into equation (16), we obtain:

\[
P^N = \frac{S + \mu + ST(1-\mu)}{T + \gamma + ST(1-\gamma)}.
\]

Equation (17) describes a positive (and convex) relation between \( S \) and \( T \), as illustrated by the \( P^N P^N \) curve in Figure 1. \( N = (S^N, T^N) \) is the Nash-equilibrium tariff pair, through which we have drawn the tariff indifference curves corresponding to the Nash-equilibrium utility levels, \( u^N \) and \( U^N \).
To find the degree of liberalization achieved according to reciprocity, we first calculate the tariff pair that maximizes each country’s welfare along the Nash iso-world-price curve, which gives the maximum degree of trade liberalization that each country is willing to achieve according to reciprocity.

As far as Home is concerned, solve (17) for $T$ to obtain:

$T = \frac{S + \mu - P^N \gamma}{P^N(1 + S(1 - \gamma)) - S(1 - \mu)}.$

Then, substitute (18) into (10) to obtain:

$u = \frac{(1 - \mu + P^N \gamma)^2 S}{P^N(1 + S)^2}.$

It is straightforward to see, from (19), that $u$ is a globally concave function of $S$ and that it reaches a maximum for $S = 1$. Hence, the tariff pair that maximizes Home’s welfare according to reciprocity is:

$S^G = 1; \quad T^G = \frac{1 + \mu - P^N \gamma}{P^N(2 - \gamma) - (1 - \mu)},$

where $T^G$ is implied by (18) for $S = 1$. It is straightforward to show that $T^G > 1$ for $P^N < 1$. Recall, from (1), that $P^N < 1$ if and only if Home is relatively trade-dependent ($RTD > 1$). Hence, the agreement that maximizes Home’s welfare under reciprocity is characterized by no restrictions on imports from Foreign ($S^G = 1$) in exchange for lower (relative to the Nash equilibrium) but still positive tariff barriers on its exports to Foreign ($T^G > 1$).

Similarly, to derive the maximum degree of trade liberalization that Foreign is willing to achieve according to reciprocity, solve (17) for $S$ to obtain:

$S = \frac{\mu - P^N(T + \gamma)}{P^N T(1 - \gamma) - 1 - T(1 - \mu)}.$
Then, substitute (21) into (11) to obtain:

\[ U = \frac{\left[ P^N(1-\gamma) + \mu \right]^2 T}{P^N(1+T)^2}. \] (22)

Note, from (22), that \( U \) is a globally concave function of \( T \) reaching a maximum for \( T = 1 \). Hence, the tariff pair that maximizes Foreign’s welfare is:

\[ \tilde{T}^G = 1; \quad \tilde{S}^G = \frac{\mu - P^N(1+\gamma)}{P^N(1-\gamma) - 2 + \mu}, \] (23)

where \( \tilde{S}^G \) is implied by (21) for \( T = 1 \). It is straightforward to show that \( \tilde{S}^G < 1 \) for \( P^N < 1 \). Hence, since Foreign is relatively trade-independent, the agreement that maximizes its welfare under reciprocity is characterized by no restrictions on imports from Home (\( \tilde{T}^G = 1 \)) in exchange for subsidized exports to Home (\( \tilde{S}^G < 1 \)).

The tariff pairs \( G = (S^G, T^G) \) and \( \tilde{G} = (\tilde{S}^G, \tilde{T}^G) \) are illustrated in Figure 1. Note that, from \( N \) to \( G \), both countries benefit from mutual tariff concessions that conform to reciprocity. At \( \tilde{G} \), however, the mutual benefits from tariff cuts are terminated, since at this point Home maximizes its welfare on the Nash iso-world-price locus. Hence, in contrast to Foreign, whose welfare increases monotonically from \( G \) to \( \tilde{G} \), Home is not willing to liberalize beyond \( G \).

It is interesting to note that, although the more trade-dependent country (Home) is, by definition, the country that benefits more from free trade, it is also the one that is more reluctant to liberalize according to reciprocity. The intuition for this result is that, although the trade-dependent country has potentially a lot to gain from trade liberalization, a liberalization which conforms to reciprocity is unappealing to it when it is implemented at the unfavorable Nash-equilibrium terms of trade.

Note also, from (20) and (23), that \((\partial T^G / \partial P^N) > 0\) and \((\partial S^G / \partial P^N) < 0\). This means that, the greater the relative trade dependence of Home (i.e. the lower \( P^N \)), the greater \( T^G \) and the lower \( S^G \). In terms of Figure 1, in the presence of greater country asymmetries, the \( P^N P^N \) locus shifts to the right, implying a greater distance between \( G \) and \( \tilde{G} \). Hence, the greater the country asymmetries, the greater the reluctance of the more trade-dependent country to liberalize according to reciprocity relative to its trading partner.

**Equilibrium under GATT’s Reciprocity Rule**

In order to pin down the tariff pair that is implemented under GATT’s reciprocity rule (henceforth, the “GATT equilibrium”), either of the following routes can be followed.

(i) It can be assumed that the two countries engage in Nash bargaining over the set of tariffs that satisfy the reciprocity constraint. In this case, the bargaining solution under reciprocity will be a point on the portion \( \tilde{G} \tilde{G} \) of the locus \( P^N P^N \) (see Figure 1), which represents the core for this bargaining game. This assumption is consistent with the approach which will be followed in the next section, where we compare the “GATT equilibrium” with the outcome of an unconstrained symmetric Nash bargaining (i.e. in the absence of the reciprocity rule).

(ii) Following BS99 (pp. 228–9), it can be assumed that, if the two countries disagree on the degree of liberalization to achieve according to reciprocity, then the tariff pair that is implemented satisfies the “restriction of proposed import limits.” This means
that the tariff pair that is implemented is the more restrictive of the proposed tariff pairs. The assumption captures the idea that neither government can be forced to import more than it wishes. In this case, the GATT equilibrium will be at \( G \), since Home is not willing to liberalize beyond this point.

Note that (ii) is equivalent to assume that under reciprocity the weak country has all the bargaining power, since point \( G \) is the weak country’s most preferred point in the core \( \tilde{G} \tilde{G} \). Note, however, that \( G \) represents the only tariff pair that is “renegotiation-proof” according to Article XXVIII of GATT. To see why, assume that the bargained outcome under (i) is a tariff pair \((S^*, T^*)\) on the locus \( \tilde{G} \tilde{G} \) lower than at point \( G \). Now, assume that Home raises its tariff from \( S^* \) to \( S^G \) and invokes Article XXVIII of GATT. In this case, as mentioned earlier, Foreign is (only) allowed to withdraw “substantially equivalent concessions” that preserve the world price, and hence will raise its tariff from \( T^* \) to \( T^G \). Hence, GATT’s procedures for renegotiations, if exploited by the weaker country, will allow it to reach its preferred point in the core (i.e. point \( G \)) after the renegotiation stage.

To sum up, both assumptions lead to the same result, i.e. that the GATT equilibrium is at \( G \), if a renegotiation stage which conforms to Article XXVIII of GATT is assumed. More generally, if countries bargain over the set of tariffs that satisfy the reciprocity constraint and there is no renegotiation, then the GATT equilibrium will be an interior point on the locus \( \tilde{G} \tilde{G} \). In the following, we show that our key results are robust with respect to the specific assumptions concerning how to select the GATT equilibrium on the locus \( \tilde{G} \tilde{G} \). More precisely, we first show that our results hold at \( G \) and then argue that they are strengthened for any other point on the locus \( \tilde{G} \tilde{G} \).

Substituting (20) into (19) and (22) gives the two countries’ utility at point \( G \):

\[
\begin{align*}
    u^G &= \frac{(1 - \mu + PN \gamma)^2}{4PN} \\
    U^G &= \frac{[(2 - \gamma)PN - 1 + \mu][1 - \gamma PN + \mu]}{4PN}.
\end{align*}
\]

By comparing (2) to (12), it is immediate to see that, for \( PN = 1 \), \( u^G = u^F \), and \( U^G = U^F \). Hence, the GATT’s rule of reciprocity leads to the free-trade level when the two countries are perfectly symmetric.\(^{12}\) This special case is the main focus of BS99’s analysis.

Matters are quite different, however, in the more general case of asymmetric countries. Note, in particular, that \((\partial u^G/\partial PN) < 0 \) and \((\partial U^G/\partial PN) > 0 \), which implies that \( u^G < u^F \) and \( U^G > U^F \) for \( PN < 1 \). The intuition behind this result is clear from Figure 1. By comparing equilibrium at \( G \) to the free trade at \( F = (1, 1) \), note that, at \( G \), in addition to attaining tariff-free access to the Home market (\( S^G = 1 \)), Foreign charges a positive tariff on imports from Home (\( T^G > 1 \)), and this increases its welfare beyond the free-trade level. The positive tariff levied by Foreign also explains why Home cannot reach the free-trade utility level at point \( G \).

Finally, if Nash bargaining (with no renegotiation) over the locus \( \tilde{G} \tilde{G} \) is assumed, then, as noted earlier, the GATT equilibrium is an interior point in the core \( \tilde{G} \tilde{G} \). Since, however, \( G \) is the weak (strong) country’s most (least) preferred point in the core, it follows that in this case the strong country’s welfare would be further increased (at the expense of the weak country) in the GATT equilibrium relative to point \( G \).\(^{13}\)

Hence, GATT’s reciprocity rule allows the trade-independent country (Foreign) to reach a welfare level greater than in free trade. In contrast, the trade-dependent
country (Home) cannot reach the free-trade utility level under the GATT’s rule of reciprocity.\textsuperscript{14}

4. Rules versus Power in Negotiations among Asymmetric Countries

Following Jackson (1989, pp. 85–8), BS99 (p. 238) distinguish between a “power-based” and a “rules-based” approach to trade negotiations.\textsuperscript{15} In the former, governments negotiate directly over tariffs without reference to any agreed-upon rules and the outcome of negotiations reflects the bargaining power of trading partners. In the latter, decisions are taken instead with reference to norms to which both parties have previously agreed. Negotiations within GATT conform to a rules-based approach, since they are driven by commonly agreed rules. In contrast, the Nash-bargaining solution represents a natural formalization of a power-based approach since, as noted by Bagwell and Staiger, any difference between its outcome and the free-trade outcome simply reflects power asymmetries among trading partners.

BS argue that GATT’s reciprocity rule should favor weak countries relative to their stronger trading partners. They distinguish, however, between reciprocity as it applies to tariff negotiations and to the renegotiations of tariffs. They first show that, beginning at the non-cooperative Nash equilibrium, the informal pursuit of reciprocity in GATT negotiations leads to the political optimum (i.e. free trade, in the absence of political motivations) in the case of symmetric countries. This result does not hold in the more general case of asymmetric countries. However, by relaxing the assumption that governments negotiate according to reciprocity and assuming, instead, that the explicit rule of reciprocity as it applies in GATT’s procedures for renegotiations is imposed, BS can show that reciprocity directs the negotiated outcome closer to the political optimum relative to the Nash-bargaining solution. Since the political optimum is defined without reference to the power status of countries, they conclude that GATT’s reciprocity rule can help “mitigate the influence of power asymmetries on negotiated outcomes.”\textsuperscript{16}

In this section, we challenge this conclusion by asking a simple related question: how does the negotiated outcome under the implicit rule of reciprocity that applies to trade negotiations compare to the outcome of a power-based approach to negotiations? As argued in the introduction, the question is empirically relevant, since countries do seek reciprocal tariff concessions in GATT negotiations.

In order to answer this question, we compare the equilibrium at point $G$ (derived in the previous section) to the outcome of an unconstrained symmetric Nash bargaining. The Nash-bargaining solution is the tariff pair that maximizes $(u - u^N)(U - U^N)$, where utility at the non-cooperative Nash equilibrium (the trade war) represents the threat point. The negotiated outcome must be in the core, which means that it is Pareto-efficient and that both countries must prefer it to the trade war. These conditions require that the trade-dependent country (Home) subsidizes Foreign’s exports ($S < 1$).

In terms of Figure 1, where we have drawn the efficiency locus (the curve labeled $EE$),\textsuperscript{17} the Nash-bargaining solution is a point on the portion ($AB$) of the efficiency locus. Following McLaren (1997, p. 409), we do not solve this problem explicitly, but assume instead that the two countries agree on free trade with a side payment from Home to Foreign. In fact, moving along the efficiency locus is exactly equivalent to having free trade and varying the side payment.

Using the formulation in which bargaining leads to free trade plus a side payment $M$ from Home to Foreign, the Nash-bargaining solution maximizes
where \( P_W^y \) and \( P_W^x \) are the free-trade world prices and \( M/(P_W^x P_W^y)^{1/2} \) is the transfer in terms of utilities from Home to Foreign. Maximizing (25) with respect to \( M \) yields:

\[
\frac{M}{(P_W^x P_W^y)^{1/2}} = \frac{1}{2}(u^F - u^N) - \frac{1}{2}(U^F - U^N).
\]

Adding (26) to \( U^F \) and subtracting it from \( u^F \) gives utility in the Nash-bargaining solution:

\[
U^B = \frac{1}{2}(u^F + U^F) + \frac{1}{2}(U^F - u^N)
\]

\[
u^B = \frac{1}{2}(u^F + U^F) - \frac{1}{2}(U^F - u^N).
\]

Finally, using (12) and (15), we can express \( U^B \) as a function of the endowments \( \gamma \) and \( \mu \) (a similar expression holds for \( u^B \)):

\[
U^B = \frac{1+\gamma-\mu}{4} + \frac{1}{2\left[1+(\gamma(1-\mu))^{1/2}+(\mu(1-\gamma))^{1/2}\right]}
\]

\[
\times \left[\frac{\left[\frac{\mu+(\mu(1-\gamma))^{1/2}}{\mu+(1+(\gamma(1-\mu))^{1/2})\left(\frac{\mu}{1-\gamma}\right)^{1/2}}\right]^{1/2}}{\gamma+(1+(\mu(1-\gamma))^{1/2})\left(\frac{\gamma}{1-\mu}\right)^{1/2}}\right].
\]

Note that, although \( U^B \) is a complicated function of \( \gamma \) and \( \mu \), it can be easily interpreted numerically. We are interested, in particular, in the difference \( (U^G - U^B) \) between utility at point \( G \) and under the unconstrained Nash-bargaining solution in the feasible range of \( \gamma \) and \( \mu \). In this respect, note that, since Home (Foreign) has a comparative advantage in \( X (Y) \) and is relatively trade-dependent (-independent), (2) and (3) hold, so we must simultaneously have that \( \gamma + \mu > 1 \) and \( [\gamma(1-\gamma)/\mu(1-\mu)] > 1 \). In the Appendix, we show that (2) and (3) cannot hold simultaneously for \( \mu < \frac{1}{2} \). Conversely, for \( \mu > \frac{1}{2} \), (2) and (3) are both satisfied for \( 1 - \mu < \gamma < \mu \). Hence, the feasible range of the endowments is:

\[
\gamma \in (1-\mu, \mu), \quad \mu \in (\frac{1}{2}, 1).
\]

Figure 2 plots \( (U^G - U^B) \) as a function of \( \gamma \) for various values of \( \mu \) in the feasible range of \( \gamma \) and \( \mu \). The most striking feature of Figure 2 is that \( (U^G - U^B) \) is always greater than zero, which means that the trade-independent country is always better at point \( G \) than under the unconstrained Nash-bargaining solution.\footnote{Note also that, since the Nash-bargaining solution is Pareto-efficient, this result also implies that \( (U^G - u^B) < 0 \), namely, that the trade-dependent country is better off at the unconstrained Nash-bargaining solution than at point \( G \). In terms of Figure 1, our result implies that the unconstrained Nash-bargaining point falls between \( A \) and \( V \), where the latter is the point in the core \( AB \) that gives the weak country the same utility as point \( G \). Finally, note that, since \( G \) is the weak country’s most preferred point on the locus of tariff pairs that satisfy the reciprocity constraint, it follows that the trade-dependent country is always worse off under GATT’s reciprocity rule than at the unconstrained}
Nash-bargaining solution. By the same token, notwithstanding the fact that in the Nash-bargaining solution the stronger, trade-independent country can exploit its greater bargaining power, it is better off under GATT's reciprocity rule than at the unconstrained Nash-bargaining point. Hence, GATT's reciprocity rule may perversely exacerbate, rather than mitigate, power asymmetries among countries, as argued instead by Bagwell and Staiger.

Figure 2 illustrates our result in utility space, with the vertical (horizontal) axis measuring $U$ ($u$) and the origin representing utility at the non-cooperative Nash equilibrium. In this figure, the curve $AB$ represents the combinations of utility levels achievable along the core for the unconstrained Nash-bargaining game (i.e. the portion

Figure 3. Bargaining Frontiers under Reciprocity and Unconstrained Nash Bargaining
of the efficiency locus in Figure 1). The other curve represents the combinations of utility levels achievable along the Nash iso-world-price locus $P^N p^N$. Its bold portion $G G$ represents the core for the bargaining game under reciprocity. Note that the bargaining frontier under reciprocity lies inside the bargaining frontier for the unconstrained Nash bargaining, except at a tangency point, corresponding to the utility levels at the intersection between the loci $AB$ and $G G$ in Figure 1. The figure also shows the iso-quantity contours that characterize the objective function specified in Nash bargaining. Note that, if countries engage in Nash bargaining over the set of tariff pairs that satisfy the reciprocity constraint, then the negotiated outcome is at the tangency between an iso-quantity contour and the bargaining frontier $G G$. In contrast, if countries engage in an unconstrained (symmetric) Nash bargaining, then the negotiated outcome is at the tangency between an iso-quantity contour and the bargaining frontier $AB$. As shown in the figure, our model implies that the negotiated outcome under reciprocity, in addition to being inefficient, is also unequal, since it gives the weak country a lower utility than at the unconstrained Nash-bargaining solution.

The intuition behind this paradoxical result is that a narrow application of reciprocity to tariff concessions makes it unappealing to the country less capable of manipulating the terms of trade through tariffs. In contrast, under a flexible (and efficient) approach to trade negotiations, by means of non-tariff concessions (formally, a side payment) the weaker country can attain what it mainly wishes, i.e. a tariff-free access to the market of its stronger trading partner.

5. Conclusions

Building on Bagwell and Staiger’s “GATT-think” and on Kennan and Riezman’s (1988) pure exchange general-equilibrium trade model, we have analyzed the welfare implications of GATT’s reciprocity rule in the presence of asymmetric countries. As in McLaren (1997), we have focused, in particular, on asymmetries in power status stemming from differences in the relative trade dependence of trading partners. Our basic findings are the following. (1) Beginning at the non-cooperative Nash equilibrium, both countries gain from trade liberalization according to reciprocity, although the stronger, less trade-dependent country gains proportionately more. (2) Although the more trade-dependent country is, by definition, the one that gains potentially more from trade liberalization, it is also the one that is more reluctant to liberalize according to reciprocity. (3) Reciprocity is so unfavorable to the trade-dependent country that it may be better off under the Nash-bargaining solution (a power-based approach to trade negotiations that reflects power asymmetries among trading partners) than under GATT’s reciprocity rule. (4) Reciprocity is so favorable to the trade-independent country that it may be better off under this rule than under free trade or under the Nash-bargaining solution. These results have led us to conclude that GATT’s reciprocity rule may exacerbate power asymmetries among trading partners.

Our analysis helps to make sense of the often-heard complaints on the part of developing countries concerning the fairness of the GATT–WTO. These countries, most of which have a production structure highly skewed toward agricultural and textile-leather-apparel products (which makes them highly trade-dependent), often complain, first, that in industrial countries agricultural products are protected by average tariff rates that are eight times higher than those of industrial products (besides all sorts of non-tariff barriers); secondly, that although average tariff rates for industrial products have been drastically reduced, remaining tariffs in manufacturing are concentrated in the textile-leather-apparel sectors. Our analysis suggests that this outcome is an
implication of the internal logic of reciprocal tariff concessions in the presence of asymmetric countries.

Our analysis can also shed light on the so-called new regionalism, i.e. the fact that developing countries increasingly seek to negotiate bilateral trade agreements with industrial countries. For instance, the NAFTA, or the eastward enlargement of the EU, are recent, successful, examples of this new trend in international relations, although, as shown by Baldwin (1997), efforts made by developing countries to negotiate FTAs with industrial countries have often been frustrated by the refusal opposed by the latter. As emphasized by Park (2000) and Perroni and Whalley (1994), a distinguishing feature of the new regionalism is that the weaker country negotiates tariff-free access to the market of its trading partner in exchange for non-tariff concessions. In this respect, an important point made in this paper is that a trade-dependent country can be better off under such a flexible and efficient approach to negotiations than under an approach based on reciprocal tariff cuts, whereas the stronger, trade-independent country can be better off under the latter approach.

In closing, some important caveats are in order. First, our main results have been derived in the context of a specific (although quite popular) trade model. Hence, their general validity is yet to be proven and is a topic for further research. However, we believe that the mere possibility that a trade-independent country will be better off under GATT's reciprocity rule than under the Nash-bargaining solution is an interesting result per se, since it suggests that GATT's reciprocity rule can highly distort negotiated outcomes in favor of stronger countries. Secondly, our analysis was not intended to show that the common practice of seeking a balance of concessions within the GATT–WTO is, by itself, detrimental to weaker countries. Rather, we have argued that a narrow application of reciprocity to tariff concessions makes it unappealing to the countries less capable of manipulating the terms of trade through tariffs, since they do not have much to reciprocate and hence cannot attain what they mainly wish, namely, a tariff-free access to the markets of their stronger trading partners. In contrast, extending the scope of reciprocity to include the possibility of non-tariff concessions by developing countries in exchange for tariff concessions by industrial countries (for instance, in agriculture or in the textile-apparel-leather sectors) could increase the range of mutually beneficial North–South trade agreements within the GATT–WTO. In this respect, the recent broadening of the WTO agenda to include negotiations on services, environmental standards, intellectual property rights, and foreign direct investment may be considered an important step in the right direction. Finally, the GATT–WTO is much more than reciprocity, on which we have exclusively focused in this paper. In particular, the principle of non-discrimination has allowed developing countries to benefit from tariff cuts negotiated among industrial countries. Moreover, the generalized system of preferences (GSP) operated by industrial countries has further reduced the average tariff rates applicable to imports from least developed countries. However, as shown, inter alia, by Michalopoulos (1999, p. 48), the GSP and other preferential schemes have not helped enhance access of least developed countries’ low-skill-intensive exports to industrial countries’ markets, which makes the issues analyzed in this paper still relevant.

Appendix

Offer Curves

As for Home’s offer curve, consumers maximize $u$ (see equation (1)) subject to the following budget constraint:
where \( P^W \) is the world relative price of \( X \), and \((S - 1)i_y\) is tariff revenue. Substituting \( c_x = \gamma - e_x \) and \( c_y = 1 - \mu + i_y \) into the budget constraint gives the trade balance condition: \( P^W e_x = i_y \). With Cobb–Douglas preferences as in (1), in which the two goods are weighted equally, utility is maximized by allocating equal expenditures to each good: \( P^W c_x = S c_y \). Substituting the expressions for \( c_x \) and \( c_y \), the above can be written as:

\[
P^W = \frac{S(1 - \mu + i_y)}{\gamma - e_x}.
\]  

(A1)

Finally, plugging (A1) into the trade balance condition gives Home’s offer curve (equation (4) in the main text).

Similarly, Foreign consumers maximize \( U \) subject to the budget constraint:

\[ TP^W C_X + C_Y = TP^W (1 - \gamma) + \mu + (T - 1) I_X. \]

Substituting \( C_X = 1 - \gamma + I_X \) and \( C_Y = \mu - E_Y \) into the budget constraint gives the trade balance condition: \( P^W I_X = E_Y \). Utility is maximized by allocating equal expenditures to each good: \( TP^W C_X = C_Y \). Using the expressions for \( C_X \) and \( C_Y \), the above can be written as:

\[
P^W = \frac{\mu - E_Y}{T(1 - \gamma + I_X)}. \]  

(A2)

Substituting (A2) into the trade balance condition gives Foreign’s offer curve (equation (5) in the main text).

**Nash-equilibrium Tariffs**

When governments set tariffs unilaterally, each chooses a tariff that maximizes the utility of the representative consumer for given tariff choice by the other government. Hence, the Home government maximizes \( u \) (equation (10)) with respect to \( S \), while the Foreign government maximizes \( U \) (equation (11)) with respect to \( T \). The first-order conditions are, respectively:

\[
\frac{(1 - \gamma)}{1 + S(1 - \gamma) + \gamma / T} = \frac{\mu / S^2}{1 + T(1 - \mu) + \mu / S}
\]

(A3)

\[
\frac{\gamma}{T + ST(1 - \gamma) + \gamma} = \frac{T(1 - \mu)}{1 + T(1 - \mu) + \mu / S}.
\]

(A4)

Rearranging (A3) and (A4) gives Home and Foreign’s tariff reaction functions:

\[
S = \frac{1}{T} \left[ \frac{\mu \gamma}{(1 - \mu)(1 - \gamma)} \right]^{1/2}
\]

(A5)

\[
T = \left[ \frac{\gamma(S + \mu)}{S(1 - \mu)(1 + S(1 - \gamma))} \right]^{1/2}.
\]

(A6)

Solving (A5) and (A6) for \( S \) and \( T \) gives the Nash-equilibrium tariffs, \( S^N \) and \( T^N \), as in equation (13).
Finally, substituting \( S^N \) and \( T^N \) into (6) and (7) and using the trade balance condition, \( P^N e_x = I_x \), gives the relative price of \( X \) in the non-cooperative Nash equilibrium, \( P^N \), as in equation (1).

**Feasible Range of \( \gamma \) and \( \mu \)**

First note that, for \( x \in [0, 1] \), the function \( x(1-x) \) is an inverted parabola symmetric around \( x = \frac{1}{2} \), as shown in Figure A1. It follows that, for \( \mu > \frac{1}{2} \), \( \gamma (1-\gamma) > \mu (1-\mu) \) requires that \( 1-\mu < \gamma < \mu \). Note that, in this case, the condition \( \gamma + \mu > 1 \) is also satisfied. In contrast, for \( \mu < \frac{1}{2} \), \( \gamma (1-\gamma) > \mu (1-\mu) \) requires that \( \mu < \gamma < 1-\mu \). In this latter case, however, the condition \( \gamma + \mu > 1 \) is not satisfied. Hence we conclude that our assumptions that Home has a comparative advantage in \( X \) (i.e. \( \gamma + \mu > 1 \)) and that it is relatively trade-dependent (i.e. \( [\gamma (1-\gamma)/\mu (1-\mu)] > 1 \)) imply the restrictions on \( \gamma \) and \( \mu \) given by condition (29) in the main text.

**References**


Notes

1. See, in particular, Bagwell and Staiger (1996, 1999, 2000, 2001, BSXX hereafter). “GATT-think” in the title of this paper refers to Bagwell and Staiger’s economic theory of GATT. It is also the title of BS00, which refers, in turn, to the ironic label given by Krugman (1991) to the set of principles that govern trade negotiations within the GATT–WTO.

2. Another pillar of GATT is the principle of non-discrimination, according to which member countries agree that any tariff applied to imports of one trading partner applies also to all other trading partners. The rule of non-discrimination is trivially satisfied in the two-country model analyzed in this paper. BS99 show that in a higher dimensional context, non-discrimination is complementary to reciprocity, since it preserves its effectiveness in a multi-country setting. In particular, they show that an agreement based on reciprocity is “renegotiation-proof” if and only if it also satisfies the rule of non-discrimination.


4. See also Jackson (1989) on this point.

5. In recent North–South free-trade agreements, such as the NAFTA or the eastward enlargement of the EU, the main non-tariff concessions on the part of developing countries have involved liberalizing foreign direct investment, enforcing stricter intellectual property rights, raising environmental standards, and (more generally) agreeing to change laws and regulations concerning various aspects of their internal economy. See also Perroni and Whalley (1994) and Park (2000) on this point.

6. As emphasized in BS96 (p. 3), political motivations are important in shaping the efficiency frontier of governments, but they play no role in explaining the logic of reciprocal trade liberalization. Hence, for simplicity, we only consider the traditional case in which governments maximize national income, which implies that free trade rests on the efficiency frontier. See Staiger and Tabellini (1987) and Maggi and Rodriguez-Clare (1998) for an investigation of the political motivations for trade agreements.
7. Our assumption implies that negotiated tariffs are constrained to lie on the Nash iso-world-price locus. BS99 use the same approach to show that the informal pursuit of reciprocity is efficiency-enhancing. This point is explored at greater length in section 3.
8. See also Deardorff (1997) on this point.
9. As in BS99, we abstract from the issue of enforcement in this paper. See Maggi (1999) for an analysis of the role that the WTO can play in facilitating multilateral enforcement efforts. See also Bond and Park (2002) on how gradualism in trade agreements can help cooperation among asymmetric countries in a repeated tariff-setting game.
10. The free-trade-relative price of $X$, $P^F$, equals the price at which consumers choose to consume the world endowment. Given preferences as in (1), it follows that

$$P^F = \left(\frac{x + X}{y + Y}\right)^{-1} = 1.$$ 

11. This observation allows BS to demonstrate that reciprocity can be efficiency-enhancing. The key insight of BS is the following. As is well known, unilateral tariff-setting is inefficient because governments do not bear the full consequences of their tariff choice, since part of the cost of a tariff increase is shifted to foreign exporters whose products sell at a lower world price. Hence, there is a negative terms-of-trade externality in tariff-setting that induces governments to impose tariffs that are higher than would be efficient. However, since trade liberalization according to reciprocity leaves world prices unchanged, it neutralizes the terms-of-trade externality induced by unilateral tariff-setting and so allows governments to agree on mutually beneficial tariff cuts.
12. Note, from (20) and (23), that the locus $G$ reduces to the free-trade point $F$ when the two countries are symmetric.
13. Note, from Figure 1, that along the locus $G$, $T \geq 1$ and $S \leq 1$ (with $S < 1$ when $T = 1$ and $T > 1$ when $S = 1$). This explains why the stronger (weaker) country is always better (worse) off under reciprocity than in free trade.
14. Our simulation results also show that, in the feasible range of parameters (i.e. as long as equations (2) and (3) are satisfied), inequality

$$\frac{U^G - U^N}{U^N} > \frac{U^G - U^N}{U^N}$$

always holds, which means that the increase in utility at point $G$ relative to the trade war outcome is always greater for the stronger country.
15. See also BS00 on this point.
16. The intuition behind BS’s result is that reciprocity, by imposing an “efficiency penalty” (with respect to the Nash-bargaining solution) outside the political optimum, reduces the incentive by the governments to negotiate an outcome that is too far from the political optimum.
17. As first shown by Mayer (1981), $S = 1/T$ describes the efficiency locus in tariff-space, since these tariff pairs equalize the local price ratios. In the example shown in Figure 1, the free-trade point $F$ is not in the core. This is the case for sufficiently large country asymmetries (see Mayer, 1981, and KR). We do not need this assumption for any of our results, however.
18. Our simulation results also show that Foreign’s preference for point $G$ is greater the greater is the trade dependence of Home relative to Foreign, as measured by the absolute difference

$$\frac{\gamma - \mu}{1 - \mu}$$

between Home and Foreign’s trade dependence.
19. See, for instance, Moore (2001) for a summary of the main requests by the developing countries to the WTO.
20. Baldwin (1997, p. 871) argues that in the early 1990s Chile, Brazil, Argentina, Uruguay, and Paraguay all formally or informally approached the US with requests for FTAs. The Bush
administration refused to negotiate with these countries, and encouraged instead the creation of a free-trade area among them. Hence, Mercosur was partly created by the Southern Cone countries in order to accomplish a pre-condition for subsequent talks with the US.

21. The reason is that almost all products having tariff “peaks” in developed countries are excluded from the preferential schemes. See also Cernat et al. (2002) for an analysis of the market access issues faced by developing countries.