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Richard E. Baldwin
and
Frédéric Robert-Nicoud

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

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Abstract
This paper posits a formal political economy model where the principle of reciprocity in multilateral trade talks results in the gradual elimination of tariffs. Reciprocity trade talks turn each nation's exporters into anti-protectionists at home; they lower foreign tariffs by convincing their own government to lower home tariffs. Due to the new array of political forces, each government finds it politically optimal to remove tariffs that it previously found politically optimal to impose. The one-off global tariff cut then reshapes the political economy landscape via entry and exit – reducing the size/influence of import-competing sectors and increasing that of exporters. In the next round of trade talks governments therefore find it politically optimal to cut tariffs again. The process may continue until tariffs are eliminated.

Keywords: Trade policy; Economic integration
JEL Classifications: F13; F15

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Richard Baldwin is a Professor of International Economics at the Graduate Institute of International Studies. He is also the Policy Director of the CEPR and affiliated to the NBER. Frédéric Robert-Nicoud is an Associate of the Centre for Economic Performance and Career-Track Lecturer in Economic Geography at the London School of Economics. He is also a CEPR Research Affiliate and Associate Editor of the Journal of Regional Science and Urban Economics.

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A SIMPLE MODEL OF THE JUGGERNAUT EFFECT OF TRADE LIBERALISATION

Richard Baldwin and Frédéric Robert-Nicoud[†]

1. Introduction

The GATT is probably the most successful post-war international organisation in the sense that it actually fulfilled its original purpose. The GATT was set up to liberalise trade among its members and – with a few important exceptions – tariffs on trade among the original GATT members fell approximately to zero. This success deserves careful study. This paper posits a formal model of how world trade talks could reduce tariffs to zero.

The standard account of multilateral liberalisation starts from the prisoner's dilemma. Optimal tariff arguments lead nations to pursue terms-of-trade gains in an uncoordinated manner and the result is high tariffs all around. Because terms-of-trade battles are worse-than-zero-sum, Pareto-improving cooperation is possible and this is why the GATT succeeded. This traditional view might be called the GATT-as-coordination-device model of trade liberalisation. The Bagwell and Staiger (1999) view of the GATT refines this standard view by restricting outcomes to cooperation that are self-reinforcing. This standard view surely constitutes the deep fundamentals of the GATT's success; as a matter of pure logic, mutual gains from cooperation must be at the heart of any successful agreement between sovereign nations.

The juggernaut theory adds a more detailed political economy and economic structure to the basic approach. The extra elements account for three facts: 1) why tariff cutting takes place in the context of reciprocal trade talks (rather than spontaneously); 2) why the tariffs cuts act in a ratchet-like fashion (rather than fluctuating with the degree of cooperation); 3) why the liberalisation took 40 years, and 4) why tariffs in all the sectors involved in reciprocal trade talks have been brought to zero or near zero. In short, the key addition is a vector of 'state variables' which is influenced by and influences the tariff choice; here the state vector is the number of firms in the import-competing and export sectors in each nation.

The basic theory

Our theory asserts that liberalisation begets liberalisation, so once the liberalisation ball starts rolling it is difficult or impossible to stop. The basic logic is simple. Wind back the clock to 1947 when the GATT entered into force and tariffs were at 1930s level, i.e. levels stemming from uncoordinated tariff setting. These tariffs – like prices in a competitive market – balanced the supply and demand for protection in the political market. The main demanders of import protection were import-competing firms and workers they employed. The government was the supplier of protection but concern for the general economic health of the nation meant that the supply of protection was not perfectly elastic.

Starting from this situation, announcement of multilateral trade negotiation (MTN) based on the principle of reciprocity alters the array of political forces inside each and every nation participating in the talks. Reciprocity is the key. It converts each nation's exporters from bystanders in the tariff debate to opponents of protection within their

own nation. Exporters can win the prize of better access to foreign markets only if tariffs in their home nation are lowered, so lobbying against domestic tariffs becomes a way of lowering foreign tariffs. To put it differently, MTNs change the political objective function facing all governments. Because the MTN rearranges the political economy forces inside every nation involved in the talks, a new political equilibrium emerges in each nation; an equilibrium that involves lower tariffs, but not necessarily zero tariffs. According to the GATT practice, these tariff cuts are phased in over 5 to 10 years in all participating nations.

This part of the juggernaut model has long been recognised in histories of trade liberalisation, although the basic idea dates much further back (Irwin 1996). For relatively recent examples see Robert Baldwin (1984), Richard Baldwin (1994, 2000) and Hoekman and Kostecki (1995). Even more recently, its logic has been studied formally in precisely defined settings by Grossman and Helpman (1995), Staiger (1995), Bagwell and Staiger (2002) and Maggi and Rodriguez-Clare (2007).

The novel aspect of the juggernaut idea lies in its view of liberalisation as a dynamic process. Specifically, it stresses that the one-time tariff-cut is not the end of the story. The tariff-cut phase-ins alter the economic landscape in all nations, thus generating a sort of "political economy momentum". Specifically, export sectors expand output and employment as foreign tariffs come down, and import-competing sectors reduce production and employment as home tariffs are lowered. In other words, the long-run supply responses in the export and import-competing sector are greater than the short-run responses. The key addition is a 'state variable' in the political economy models which is influenced by and influences the tariff choice. Here the state variables are the number of firms in the import-competing and export sectors in each nation.

In any endogenous tariff model where a sector's political influence is positively linked to its size, the liberalisation-induced changes in the economic landscape have knock-on political economy implications. A few years down the road, when another multilateral Round is launched, reciprocity again re-aligns the tariff-setting balance by turning exporters into anti-protectionists. But this time, the pro-tariff camp is systematically weaker in every nation and the pro-liberalisation camp is systematically stronger in every nation. The result is that all participating governments find it politically optimal to cut tariffs, but again not necessarily to zero. As these fresh tariff cuts are phased in,

the cycle repeats until tariffs are eliminated. The GATT's principle of tariff bindings prevents backsliding between Rounds.

This process means that any sector in any nation that is included in the reciprocal trade talks will eventually get liberalised. Or to put it colloquially, once the juggernaut starts rolling, it crushes all tariffs in its path although this may take four or five decades.

The line of reasoning is simple. We will show that the steady state tariff under unilateral tariff setting is above the steady state tariff chosen under MTN rules. We then trace out the adjustment path between the two steady states as the number of firms in the import-competing industry shrinks to its long run MTN level. We turn first to the unilateral tariff.

2. Basic model

Consider a two-country, two-sector economy. Countries initially set tariffs independently (they do not subsidize exports, perhaps recognising that the other country can perfectly offset these). This situation corresponds to the textbook case of a prisoner dilemma: the non-cooperative tariff is higher than the tariff that would be chosen cooperatively. Moreover, we assume each sector is organised in the wake of Grossman and Helpman (1994), that is, Protection is For Sale (PFS). As a result of the government putting a higher weight on producers' surplus, the equilibrium non-cooperative tariffs are even higher than the tariffs that would be chosen by utility-maximising governments (see also Baldwin 1987 and Baldwin and Baldwin 1996).

When they join the GATT, negotiations over tariffs are viewed as 'concessions': in effect, countries trade market access with each other. Recognising this fact, exporters see it in their interest to lobby their government for lowering tariffs in the import competing sector. They do so not as an end in itself (we rule out the 'ice cream clause') but because this is the currency that buys them market access in the partner countries.

As we show, in a neoclassical trade model the very fact that trade barriers are decided in multilateral trade negotiations has a big impact on the chosen tariffs –they may drop to zero.

Underlying economy

To focus on the political economy aspects, the PFS framework assumes an extremely simple underlying economy. Preferences of all factor owners are identical and quasilinear and separable sector-by-sector, namely the indirect utility functions are:

$$v = E + \sum_{j=M,X} s_j[p_j]$$

where M and X are the two non-numeraire sectors and $s_j(p_j)$ are sector-specific consumer surplus functions. Here we assume that one sector imports and the other exports. The numeraire sector uses only labour under constant returns to scale. To simplify the supply side, we use a Ricardo-Viner set-up with mobile labour and sector-specific factors where labour's price is pinned down by productivity in the numeraire sector and each sector-specific factor is paid the Ricardian rent. Costless trade in the untaxed numeraire sector equalises wage rates internationally. Thus E for a typical consumer equals her labour income wL plus her share of tariff revenue, r, plus the payment to whatever sector-specific factors she may own.

Since terms of trade effects are essential to exporters' interest in foreign tariffs, we cannot adopt the small-country fiction of atomistic firms.

For simplicity's sake, we assume two mirror image nations, i.e. nations who are identical in all aspects except that their trade patterns are mirror images of each other. We assume that the trade is due to Ricardian technological differences that we elaborate below and thus we set $s_j[p_j] = s[p_j]$, for all j.

Government's objective, lobbies and contributions

As in the PFS framework, the government's objective function Ω is a weighted sum of standard utilitarian social welfare function W and lobbying contributions C, namely:

(1) $$\Omega = a(W) + (1-a)(C_M + C_X); \qquad a \in [0,1]$$

where C_j is the political contribution of sector j (M for the import-competing sector and X for the export sector) to the government and '*a*' is the weight on social welfare. As usual in the PFS framework, the contribution schedules are equal to the industry/lobby's welfare minus a constant, B, namely:

(2) $$C_i[p_j] = \pi_j[p_j] + \alpha_j N\left(r[p] + s[p] + \frac{L}{N}\right) - B_j$$

where π is total the Ricardian surplus earned by firms in sector j, N is the total mass of people in the nation, r is per capita tariff revenue (assumed to be redistributed to the population in a lump sum manner), L is total labour compensation (recall the normalisation w=1) and α_j is the fraction of the population that owns the sector-j specific asset. To avoid the usual awkward implications of lobbyists worrying about tariffs on consumer goods outside their sector, we assume that α_j is so small that it can be well approximated as zero. The original Helpman-Grossman article calls this 'example 3', but here we call it PFS-lite since under the appealing assumption that lobbies care only about rents, the PFS framework is extremely simple (Baldwin and Robert-Nicoud 2006). Indeed, the PFS-lite case is identical to a 'politically realistic objective function' where the producer surplus of organised industries receives a higher weight in the government's maximisation problem (Baldwin 1987). Specifically, combining (1) and (2), we see that the government chooses tariffs to maximise a social welfare function that places a weight of $a \leq 1$ on consumer surplus and tariff revenue and a weight of '1' on Ricardian surplus.

Supply and demand

Let D_j denote domestic demand for sector j's good and p_j denote that good's internal price. Thus, by Roy's identity:

$$D_j(p_j) = -\frac{\partial}{\partial p_j} s_j[p_j] = -\frac{\partial}{\partial p_j} s[p_j]$$

The supply curves are different across nations within a sector (so that trade occurs), but both sectors are marked by the same supply curves (the only difference is that Home has a comparative advantage in X while foreign has a comparative advantage in M). For example in the M sector,

$$Z_M^h = bn_M z(p_M)\ ,\ Z_M^f = n_X z(p_X)\ ;\ \ p_X \equiv p_M - T\ ,\ 0 \leq b < 1$$

where the Z's are Home and Foreign supplies, p_M and p_X are the Home internal price and the internal price in Foreign (i.e. Home's border price); n_M is the number of active firms in the import-competing sector; each firm supplies bz(.) units of the good. In the

X sector, the '1' and 'b' are reversed by nation and there are n_X active firms. As usual, supply and profits are linked by Hotelling's lemma:

$$Z_j(p_j) = \frac{\partial}{\partial p_j}\pi_j[p_j]$$

The equilibrium price in a typical sector, the M sector to be concrete, is trivial to characterise as a function of parameters and the tariff, T. Specifically, worldwide supply and demand match when:

(3) $$p_M = \left\{p : Z_M^h(p) + Z_M^f(p-T) = D_M^h(p) + D_M^f(p-T)\right\}$$

The corresponding welfare components are:

$$s_M = s[p_M];\ \pi_M = \pi[p_M];\ r = (p_M - p_X)M$$

where $M \equiv D_M^h - Z_M^h$ is Home's volume of imports of good M.

Entry

We assume firms in sector M can enter quickly but exit slowly. That is, firms enter up to the point where the per-firm producer surplus equals a fixed entry cost, F. The cost of entry is rising in n since we assume congestion costs (these are ad-hoc but could be micro-founded). Thus the entry condition is:

(4) $$\pi_M[p_M] = n_M^2 F$$

Firms ignore the impact of their entry on the price.

Using (3) in (4), we get the long run relationship between the number of active firms and the tariff. We call this the "FE" schedule and note that it equals:

(5) $$\text{FE}: T(n_M) = \left\{\text{T} : \pi_M[p_M(\text{T})] = n_M^2 F\right\}$$

This schedule shows what the T would have to be to ensure that any given number of domestic firms break even.

3. Unilateral tariff setting

In the absence of MTN, governments choose their tariffs separately. Given all the symmetry, the political equilibrium tariff in both nations will be identical, so we only need to investigate the home country problem. The Home government's problem is to choose the tariff T to maximise:

$$\Omega = aN\big(r[p_M, T] + s_M[p_M]\big) + \pi_M[p_M] + CONSTANTS$$

where the consumer and producer surplus in the X sector are in the constant terms since they are unaffected by the Home government's choice of T.

Normalising N=1, the first order condition is (omitting the M-subscripts to quantities):

$$0 = a\left[T\frac{dM}{dp_X}\frac{dp_X}{dT} + M\left(\frac{dp_M}{dT} - \frac{dp_X}{dT}\right) - D\frac{dp_M}{dT} + Z\frac{dp_M}{dT}\right] + (1-a)Z\frac{dp_M}{dT}$$

Simplifying, we have:

$$\begin{aligned} 0 &= a\left[T\frac{dM}{dp_X}\frac{dp_X}{dT} + M\left(\frac{dp_M}{dT} - \frac{dp_X}{dT}\right) - M\frac{dp_M}{dT}\right] + (1-a)Z\frac{dp_M}{dT} \\ &= a\left[T\frac{dM}{dp_X}\frac{dp_X}{dT} - M\frac{dp_X}{dT}\right] + (1-a)Z\frac{dp_M}{dT} \\ &= a\left[\frac{T}{p_X}\eta - 1\right]M\frac{dp_X}{dT} + (1-a)Z\frac{dp_M}{dT};\ \ \eta \equiv \frac{dM}{dp_X}\frac{p_X}{M} > 0 \end{aligned} \tag{6}$$

Assuming that the shapes of Z(.) and D(.) are such that the T that satisfies this first order condition is unique and a maximand (see appendix), we can write the tariff as a proportion of the border price as:

$$\frac{T}{p_X} = \frac{1}{\eta}\left[1 + \frac{-dp_M/dT}{dp_X/dT}\left(\frac{1-a}{a}\right)\frac{Z}{M}\right] \tag{7}$$

This tells us that the T is chosen by the standard inverse elasticity rule modified by the PFS lobbying process; for example if a=1, T is the usual unilaterally optimal tariff. In Figure 1, this corresponds to the situation in which the government puts equal weight on the upper triangle (the domestic dead-weight loss) and the lower rectangle (the terms of trade effect).

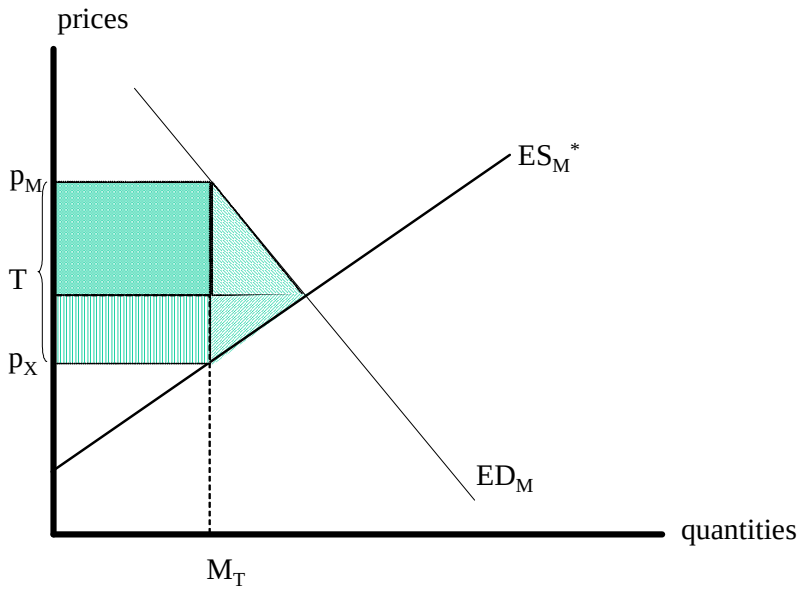

Figure 1: Unilateral tariff setting

Note that a tariff change moves the border and domestic prices in opposite directions so the coefficient on (1-*a*)/*a* is positive. This means that the tariff rises as the government puts relatively more weight on contributions, hence we write $T^{Unil} \geq T^{Opt} > 0$, namely, the unilateral tariff is at least as large as the (positive) optimal tariff when government cater to importers' special interests.

Using our functional forms, the politically optimal tariff given by (7) defines a second relationship between n and T. This one, however, holds at all moments, not just in the long run. We refer to it as GFOC_unil to recall the fact that it involves the unilateral choice of tariffs.

(8) $$\text{GFOC\_unil}: T^{Unil} = \left\{ T : \frac{1}{\eta}\left[1 + \frac{-dp_M / dT}{dp_X / dT}\left(\frac{1-a}{a}\right)\frac{Z}{M}\right] = \frac{T}{p_X} \right\}$$

The two relationships between T and n are plotted on Figure 2; the shapes drawn correspond to the case in which both demand and supply are linear.

Endogenous Industry structure and long run tariff

At any given level of n, the unilateral politically optimal tariff is given by (7), but in the long run, the number of active firms depends upon T according to the free entry

condition (5). Graphically, we can show the long-run combination of n and T in Figure 2.

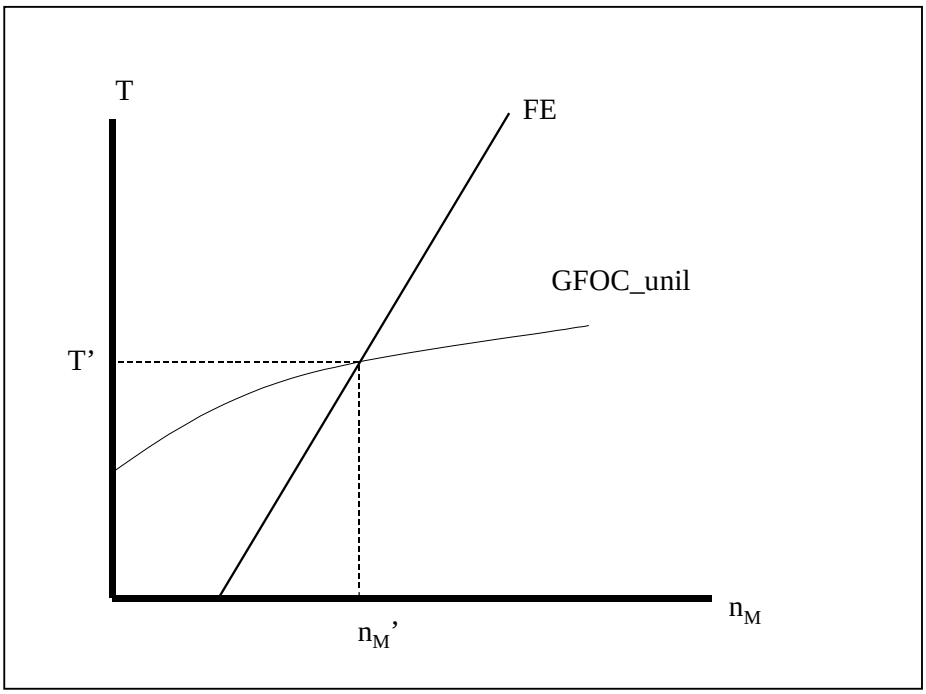

Figure 2: The long-run political equilibrium tariff in the PFS-lite model

Given our functional forms, analytic solutions for the long-run (n,T) pair are available, but the solutions – which are the solution to a pair of quadratic equations – are too unwieldy to be informative. This can be summarised in:

<u>Result 1</u>: The long-run unilateral political-equilibrium tariff is positive. Also, it is increasing in the weight the government puts on lobbies' contribution.

Proof. The proof is immediate by inspection of (8).

4. Multilateral Trade Negotiations

When governments engage in MTNs on the basis of reciprocity, domestic exporters care about domestic tariffs since getting domestic tariffs cut is the key to getting better access to the foreign market.

There are a number of reciprocity rules that we can consider. We stress the most natural rule in the context of the country symmetry, namely the foreign tariff equals the domestic tariff. Since T*=T, exporters' profits are directly affected by the domestic government's choice of T. Note that this is also the most pragmatic solution: in

multilateral trade negotiations, there are hundreds of countries negotiating over hundreds of sectors. In this context, cognitive efforts are certainly binding and postulating symmetric tariff cuts has the merit of simplicity. Another solution is to consider that governments cooperate in setting tariffs in MTNs; there too, if governments Nash bargain over tariffs, then T*=T ensues. In either case, this alters the government's first order condition. Specifically, using symmetry to set $n_X^*=n_M$, it is:

$$\Omega = a\left(r[n,T]+s_M[n,T]\right)+\pi_M[n,T]+\pi_X[n,T]+CONSTANTS, \quad n\equiv\begin{pmatrix} n_M \\ n_X \end{pmatrix}$$

Noting that π_X is decreasing in T, it is clear that the government is now facing an additional political cost to raising the tariff. In terms of Figure 1, it now internalises the lower rectangle and triangle (more precisely, it recognises that it can trade a reduction of these areas pertaining to the X-sector by reducing them in the M-sector). Clearly, in the symmetrical case, governments would chose T=0 if a=1. Anticipating a bit, if (1-a)/a increases above zero, then governments view tariffs as a way of transferring income to producers of both sectors and thus they attribute a lower weight to the dead-weight losses (the triangular areas).

Formally, the first order condition becomes:

$$0 = a\left[T\frac{dM}{dp_X}\frac{dp_X}{dT}+M\left(\frac{dp_M}{dT}-\frac{dp_X}{dT}\right)-D_M\frac{dp_M}{dT}+Z_M\frac{dp_M}{dT}-D_X\frac{dp_X}{dT}+Z_X\frac{dp_X}{dT}\right]$$
$$+(1-a)\left[Z_M\frac{dp_M}{dT}+Z_X\frac{dp_X}{dT}\right]$$

with complementary slackness. Let X denote domestic export in its export sector and let $D\equiv D_M$ and $Z\equiv Z_M$. By symmetry, M=X, so we can write this as:

(9)
$$0 = aT\frac{dM}{dp_X}\frac{dp_X}{dT}+(1-a)\left[Z\frac{dp_M}{dT}+Z_X\frac{dp_X}{dT}\right]$$
$$= a\frac{T}{p_X}\eta M\frac{dp_X}{dT}+(1-a)\frac{dp_X}{dT}Z\left[\frac{dp_M/dT}{dp_X/dT}+\frac{Z_X}{Z}\right]$$

(with complementary slackness). From this expression it is readily verified that T=0 if a=1. More generally, this first order condition implies

(10)
$$\frac{T^{MTN}}{p_X} = \max\left\{0, -\frac{(1-a)Z}{\eta aM}\left[\frac{Z_X}{Z}+\frac{dp_M/dT}{dp_X/dT}\right]\right\}$$

where, using $M(p_M)=X(p_X)$ and $p_M=p_X+T$, we get

(11) $$\frac{Z_X}{Z}+\frac{dp_M/dT}{dp_X/dT}=\frac{Z_X}{Z}+\frac{\partial X/\partial p_X}{\partial M/\partial p_M}$$

which is ambiguous in general (the first term on the right-hand side is larger than unity and the second term is negative). Nevertheless, we can use these expressions to show one general result (Result 3 below) and a more specific one (Result 2 below).

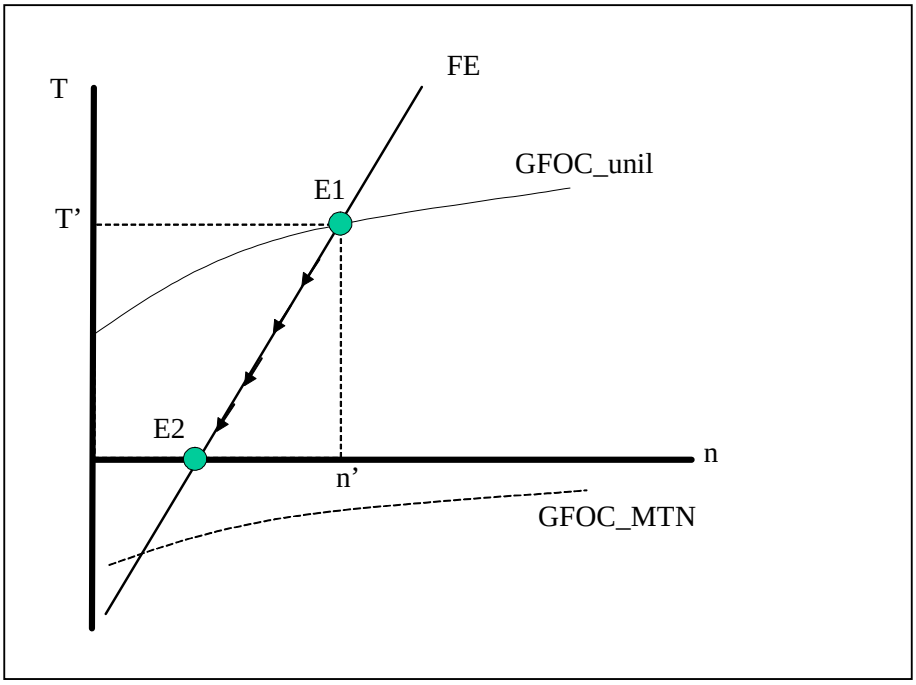

Figure 3: The long-run political equilibrium tariff: unilateral and MTN

First, we can sign (11) in a special case: if demands and supplies are linear in prices, then (11) is positive for all values of T such that trade occurs (see appendix for details). This implies that the solution to (10) is $T^{MTN}=0$ (a corner solution). This is a remarkable result: MTNs allow governments to trade protection for market access and, since the benefits of market access (that is, of reduced foreign protection) are larger than the benefits of domestic protection, they choose free trade. When governments care more about profits than welfare –call such governments 'mercantilist'– MTNs give exporters a say that will typically reinforce the forces towards trade liberalisation (by inspection it is readily verified that T^{MTN} is weakly decreasing in a when (11) is positive). To summarise:

<u>Result 2</u>: The long-run political-equilibrium tariff under reciprocity is zero when

demand and supply functions are linear. This effect is *stronger* the more mercantilist the negotiating governments are.

Proof. See appendix.

We can illustrate the contrast between the first two results in Figure 3. The FE condition shows the long run connection between n and T, while the two GFOC curves show the connections between n and T that must hold at all times under the two alternative institutional situations. The transition is shown with the arrows.

The conditions under which Result 2 holds are special indeed. However, for *any* upward-sloping supply function and any downward-sloping demand function, it turns out that the multilateral tariff is *always* lower than the unilateral tariff. To summarise:

Result 3: The multilateral tariff is lower than the unilateral one: $T^{MTN} \leq T^{Unil}$ **.**

Proof. See appendix.

This result holds trivially in cases that imply $T^{MTN}=0$.

5. Lessons from this simple model

This model shows how MTNs conducted on the basis of reciprocity change the array of lobbying facing the government's tariff choice. In this simple setting, the inclusion of exporter profits on the basis of perfectly symmetric reciprocity T*=T tends to make the government want to set T=0 regardless of the size of the import industry (as early as in the first round of trade talks in the linear case). Approximately speaking, this is due to the fact that a tariff increase raises the profit of import-competing firms by a little bit proportional to their output, while a slight increase in the foreign tariff reduces exporters' profit by a little bit proportional to their output. Given the assumed comparative advantage, exporters produce more than import competitors so any increase in tariffs actually lowers political contributions. As far as domestic welfare is concerned the point is equally clearer. A social welfare maximising government would choose a zero tariff when T*=T since any terms of trade gain would be fully offset by the reduction in exporters' profit when the foreign government matches the tariff increase.

A first almost trivial problem is that we have the dynamo working only in the import-competing industry. The number of firms in the export sector is fixed. It should be clear,

however, that a very similar story could be told in the export sector whereby progressive reduction in T* would result in a rising number of exporters.

As far as our story is concerned, the problem with this linear model is that the first MTN result is an agreement for zero tariffs (we believe that this does not hold in non-linear cases, but we have not found analytic solutions for such cases). In the linear case, all the transitional dynamics involve the slow phase of the cuts and the corresponding drop in n. Less trivial transitional dynamics would emerge if some sector-specific investments were sunk (hence the entry and exit margins would differ), which would bend the political economy forces towards the import-competing shrinking sector (see Baldwin and Robert-Nicoud 2007 for a formalisation).

Another comment suggests the direction to take. The very strict form of reciprocity we have in the model works only with perfectly symmetric nations. It is not at all realistic. In real-world MTNs, nations agree to a tariff cutting formula beforehand. For example in the Uruguay Round, the agenda that launched the Round called for tariffs to be cut, on average, by about 30%.

APPENDIX

In this appendix we restate Results 2 and 3 from the main text and provide the formal demonstrations.

Economic coherence requests to restrict analysis to the case $n_X > bn_M$ throughout, which implies that countries do not import the good in which they have a comparative advantage. We also assume throughout that the parameters of our simple economy are such that the second-order-conditions are satisfied so that the equilibrium is characterised by the solution to the first-order condition (more on this below).

It is useful to start with Result 3:

Result 3: The multilateral tariff is lower than the unilateral one: $T^{MTN} < T^{Unil}$.

Proof. T^{MTN} solves (9), which we can rewrite as

$$FOC_{MTN}(T^{MTN}) \leq 0, \quad T^{MTN} \geq 0, \quad T^{MTN} FOC_{MTN}(T^{MTN}) = 0$$

where

$$FOC_{MTN}(T) \equiv \frac{dp_X}{dT} a\eta(T) M(T) \left[\frac{T}{p_X(T)} + \frac{(1-a)Z(T)}{a\eta(T)M(T)} \left(\frac{Z_X(T)}{Z(T)} + \frac{dp_M / dT}{dp_X / dT} \right) \right]$$

is a non-increasing function (the second order condition is satisfied). Evaluating FOC_{MTN} at T^{Unil} yields

$$\begin{aligned} FOC_{MTN}(T^{Unil}) = & \frac{dp_X}{dT} a\eta(T^{Unil}) M(T^{Unil}) \\ & \times \left[\frac{T^{Unil}}{p_X(T^{Unil})} + \frac{(1-a)Z(T^{Unil})}{a\eta(T^{Unil})M(T^{Unil})} \frac{dp_M / dT}{dp_X / dT} - \frac{1}{\eta(T^{Unil})} \right. \\ & \left. + \frac{1}{\eta(T^{Unil})} + \frac{(1-a)Z_X(T^{Unil})}{a\eta(T^{Unil})Z(T^{Unil})} \right] \\ = & \frac{dp_X}{dT} a\eta(T^{Unil}) M(T^{Unil}) \left[\frac{1}{\eta(T^{Unil})} + \frac{(1-a)Z_X(T^{Unil})}{a\eta(T^{Unil})Z(T^{Unil})} \right] < 0 \end{aligned}$$

To get this result, note first that the term in the upper part of the square bracket after the first equality is zero by (6), whereas the inequality follows from $dp_X/dT<0$; since FOC_{MTN} is a decreasing function of T, this implies $T^{MTN}<T^{Unil}$, as was to be shown. *QED.*

Second, let us consider the linear case:

Result 2: The long-run political-equilibrium tariff under reciprocity is zero when demand and supply functions are linear. This effect is *stronger* the more mercantilist the government is.

Proof. Let

(12) $$D_j(p_j) = B - Ap_j, \quad z(p_j) = zp_j, \quad j = M, X; \quad A, B, z > 0$$

We solve for border prices such that imports equal exports; for Home's imports of M, the border price is denoted by p_X; the solution is:

(13) $$p_X(T) = \frac{2B - (A + zbn_M)T}{2A + z(n_X + bn_M)}$$

which is positive as long as $T \le T^{\max} \equiv 2B/(A + zbn_M)$. Substituting (12) and (13) into the definition of imports, $M = D_M(p_M) - Z_M(p_M)$ and using $p_M = p_X + T$ leads to a non-negative volume of imports if (and only if):

(14) $$T \le \bar{T} \equiv B\frac{z(n_X - bn_M)}{(A + zbn_M)(A + zn_X)} < T^{\max}$$

Next, it can be shown that $FOC_{MTN}(T)$ is non-increasing if (and only if) governments care enough about social welfare; in other words, the second-order condition for a maximum is satisfied only if $a \in [\underline{a},1]$, with $0 < \underline{a} < 1$ (the analytical solution for $\underline{a}$ as a function of the technology and preference parameters is too cumbersome to be revealing; it is available from the authors upon request). In addition,

$$FOC_{MTN}(0) = -\frac{(1-a)(n_X - bn_M)}{[(A + zbn_M) + (A + zn_X)]^2} 2zAB < 0$$

Thus, for all $T \in [0,\bar{T}]$ we have $FOC_{MTN}(T)<0$. Together, these facts imply the following result in the linear case:

$$\forall a \in [\underline{a},1]: \quad T^{MTN} = 0$$

as was to be shown. The reader might wonder what happens if $0 \le a < \underline{a}$? In this case, the second-order condition is violated (FOC_{MTN} is increasing in T) and hence T^{MTN} is equal to the prohibitive tariff defined in (14). However, under these conditions we can show that T^{Unil} is also equal to $\bar{T}$, therefore our Result 3 stands in a weak sense (albeit in a trivial way) even in this case. *QED.*

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