Are global trade negotiations behind a fragmented world of "gated globalization"?

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Abstract

In a simple model where global trade negotiations precede sequential Free Trade Agreement (FTA) formation, we show that global tariff negotiations can prevent global free trade: FTA formation can yield global free trade in the absence of global tariff negotiations, but global free trade never emerges when global tariff negotiations precede FTA formation. Global negotiations can prevent global free trade precisely because they are successful in eliciting concessions from negotiating countries. Moreover, global tariff negotiations can produce a fragmented world of "gated globalization" where some countries form FTAs eliminating tariff barriers among themselves while outsiders continue facing higher tariffs.

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1 Introduction

Since the successful completion of the Uruguay round in 1994, there has been little progress in global tariff negotiations. The "current" Doha round of negotiations, stretching over fifteen years, is essentially dead. Nevertheless, the post-Uruguay round period has been marked by a proliferation of Free Trade Agreements (FTAs) among blocks of countries. These FTAs

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are negotiated and formed under the rules set by the World Trade Organization (WTO) that essentially mandate free trade among FTA members. In principle, if all nations of the world were eventually connected to each other through such agreements, global free trade would obtain despite the lack of progress in global tariff negotiations. However, current trends suggest the vast majority of nations are unlikely to be connected to each other through FTAs in the foreseeable future with substantial trade barriers between members (insiders) and non-members (outsiders) of FTAs only constrained by the globally negotiated tariff caps of the 1994 Uruguay round. *The Economist* recently referred to this fragmented world of trade barriers coexisting with blocks of free trade amongst FTA members as "gated globalization".[1]

Despite the limited success of global tariff negotiations, the fact that FTAs provide an alternative pathway to global free trade makes it important to investigate the economic mechanisms that limit the spread of FTAs. This paper focuses on one important mechanism - that between the global tariff negotiations that preceded the recent spate of FTA formation and the eventual outcome of the FTA formation process itself. Is it possible that the global negotiations have in fact contributed to prevention of global free trade and are responsible for the fragmented world of gated globalization that resulted from subsequent FTA negotiations? What could be a plausible mechanism for such an effect? How would such a mechanism have affected global trade negotiations among forward looking nations in the first place? These are the questions addressed in this paper and to the best of our knowledge, this is the first paper in the literature to do so.

We consider a world of three symmetric countries. For our underlying trade model, we adapt the competing exporters framework of Bagwell and Staiger (1999b) to include an import competing sector and politically motivated governments. More precisely, there are three goods and each country exports two comparative advantage goods and imports one comparative disadvantage good. And each government's payoff differs from national welfare by an additional weight placed on profits of the import competing sector.

To analyze the effect of global tariff negotiations (i.e. "multilateralism") on FTA formation (i.e. "regionalism"), we compare the outcomes of two extensive form games: one where global tariff negotiations over tariff *bindings* are followed (with some exogenous probability) by FTA negotiations and a second game where there is no global tariff negotiation preceding FTA negotiations.[2] Following global tariff negotiations and FTA negotiations, countries choose their tariffs that, in turn, generates a pattern of consumption and trade. Our protocol

[1] *The Economist,* Special Report, October 2013. http://www.economist.com/news/special-report/21587384-forward-march-globalisation-has-paused-financial-crisis-giving-way

[2] In practice, global tariff negotiations are negotiations over upper bounds on tariffs, known as tariff bindings, rather than the actual tariffs that countries will set, known as applied tariffs. We model global tariff negotiations in this way.

for FTA negotiations is one of sequential bilateral FTA formation according to a randomly chosen order; the protocol ensures that after any FTA is formed, all pairs of countries that have not yet formed an FTA have the option to do so. To be clear, governments are forward looking: when undertaking global tariff negotiations they anticipate the possibility of FTA formation even though they do not yet know the precise sequential order in which country pairs will engage in FTA formation.

Apart from the presence or absence of an initial round of multilateral tariff negotiations, there is no difference between the two extensive form games that we compare. Indeed, the tariffs set by governments are assumed to be bound by WTO rules whether or not global tariff negotiations have occurred. In particular, FTA members set zero tariffs on each other while their tariffs on the outsider, and the outsider's tariffs on the insiders, are bound by globally negotiated tariff bindings and the non-discriminatory MFN (most favored nation) principle.[3] In particular, if all pairs of countries form FTAs, global free trade is attained. We wish to emphasize that our objective is not to isolate the role of the WTO but rather the role that global tariff negotiations have played, *within current WTO rules*, in generating the fragmented world where FTAs exist but fall far short of global free trade.

Our main result is that, when political economy motivations are not too strong, multilateralism prevents global free trade. In particular, a fragmented world of gated globalization with tariff barriers between outsiders and insiders emerges when FTA negotiations are preceded by global tariff negotiations; however, in the *absence* of global tariff negotiations, FTA formation continues until global free trade is attained.

At first glance, our result that global free trade does not emerge in the presence of global tariff negotiations may seem trivial. And this would be true in the absence of FTAs since politically motivated governments would negotiate non-zero "politically efficient" tariffs that maximize their joint payoff (Bagwell and Staiger (1999a)). However such politically efficient tariffs do not necessarily eliminate incentives for FTA formation. In general, FTA formation creates a world of discrimination between FTA members (insiders) and non-members (outsider) which, all else equal, reduces world welfare. Moreover, FTA formation weakens the domestic import competing sector of member countries which mitigates political economy motivations of their governments. Thus, it is possible that politically minded governments, who care somewhat about global welfare, may prefer global free trade over an FTA induced world of discrimination that results from global tariff negotiations.

What actually drives our main result is the different levels of tariff concessions given by the eventual outsider in the presence and absence of global tariff negotiations. In the absence of global tariff negotiations, the outsider has not pre-committed to any tariff bindings, and

[3] Thus, even in the absence of global trade negotiations, we assume that GATT Article XXIV holds.

this creates incentives for the insiders to engage in subsequent FTA formation with the outsider in order to gain tariff concessions from the outsider. As such, sequential FTA formation leads to global free trade. However, if global tariff negotiations occur, then all countries, including the eventual outsider, pre-commit to significant tariff concessions (via tariff bindings) before the FTA negotiations begin. Indeed, these tariff concessions obtained through multilateral negotiations are deep enough that the insiders then have no incentive to engage in subsequent FTA formation with the outsider and global free trade does not emerge. In this sense, the success of multilateralism in lowering tariffs drives our result that multilateralism prevents global free trade.

In our framework, the globally negotiated tariff bindings depend on the (exogenous) likelihood that subsequent FTA negotiations will take place and are lower when subsequent FTA negotiations are more likely.[4] This is because FTA formation weakens the import competing sector in member countries and the political economy concerns of member governments. Anticipating this allows governments to negotiate lower tariff bindings during global negotiations.

The dependence of multilaterally negotiated tariff bindings on the likelihood of subsequent FTA negotiations has practical implications for binding overhang (the difference between the tariff binding and the applied tariff), tariff changes upon FTA formation and the interpretation of trade flow changes upon FTA formation. When the likelihood of FTA negotiations lowers the globally negotiated tariff binding below what would arise if governments ignored such considerations, i.e. below the "politically efficient tariff", we find that binding overhang never arises. However, binding overhang may arise when the globally negotiated tariff bindings are set equal to the politically efficient tariff. Thus, our modeling of global tariff negotiations as farsighted and depending on subsequent FTA negotiations can help explain why essentially zero binding overhang is observed in central countries involved in the 1994 Uruguay Round such as the US, the EU and Japan. Second, in this zero binding overhang case, our model predicts that FTA members do not lower their tariff on non-members; that is, there is no tariff complementarity upon FTA formation.[5] The reason is that farsighted global tariff negotiations already incorporate any tariff complementarity effect into applied tariffs prior to FTA negotiations taking place. Third, this logic implies the interpretation of changes in trade flows upon FTA formation is complicated because the effect that FTAs have on negotiated multilateral tariff bindings is already embedded in applied tariffs prior to FTA formation taking place. This is especially important given, as

[4] While we do not impose that governments negotiate a common tariff, the symmetry of the model leads to a common tariff.

[5] The phenomenon of tariff complementarity is well known in the literature (see, for example, Richardson (1993), Bagwell and Staiger (1999b) and Ornelas (2005b)).

emphasized by Bergstrand et al. (2014, p.3), policy makers actually rely on observed trade flow changes upon FTA formation to infer the welfare effects of FTAs.

There is a large extant literature on international trade agreements that investigates how the presence of FTAs has affected the ability to successfully lower global tariffs involving non-members (either via global negotiations or via voluntary tariff concessions by FTA members) and is often couched in the terminology of how "regionalism" has affected "multilateralism" or whether FTAs are "building blocs" or "stumbling blocs" (Bhagwati (1991, 1993)) en route to global free trade.[6] In contrast, we are interested in how "multilateralism" has affected "regionalism"; in particular, we ask whether multilateralism is a building bloc or stumbling bloc to global free trade in the presence of regionalism.[7] We isolate the effects of multilateralism by comparing the outcome of a world where multilateralism and regionalism exist side by side with a world where only regionalism exists.

In a comprehensive review of the regionalism literature, Freund and Ornelas (2010, p.156) document the "... scarcity of analyses on how multilateralism affects regionalism". Freund (2000) highlights how regionalism may follow from the success of multilateralism because an exogenous fall in global tariffs can make an arbitrarily chosen bilateral FTA self-enforcing (when it is not so otherwise).[8][9] However, Freund (2000) does not consider what would happen in the absence of multilateralism which is crucial in assessing the underlying role played by multilateralism. Indeed, in our model, multilateralism is never necessary for FTA formation. On the contrary, we find that the success of multilateralism is actually the reason it prevents sequential FTA formation from expanding to global free trade.

Our paper is related to Ornelas (2008) who models multilateral negotiations both before and after an arbitrary bilateral trade agreement. He shows that world welfare rises upon FTA formation because of tariff complementarity but an FTA does not emerge in equilibrium. In contrast, we find FTA formation emerges in equilibrium yet may not be accompanied by tariff complementarity. We expand upon the mechanisms underlying these differences in Section 4.

[6] Prominent examples include Levy (1997), Krishna (1998) and Ornelas (2005a). See Freund and Ornelas (2010) for a recent extensive review.

[7] In doing so, our approach is closer to a strand of the literature beginning with Riezman (1999) that investigates the effect of FTA formation on the attainment of global free trade in a world where the only prevailing mechanism for trade liberalization is global tariff negotiation. Subsequent examples taking this perspective include Aghion et al. (2007), Saggi and Yildiz (2010) and Lake (2014).

[8] Agreements are self-enforcing in Freund (2000) in the sense of the repeated game notion popularized by Bagwell and Staiger (1997a,b).

[9] Similarly, Ethier (1998) argues regionalism is a benign consequence emerging from the success of multilateralism. Regionalism allows small countries, who do not participate in early rounds of multilateral negotiations, to form FTAs with large countries and gain an advantage over other small countries in terms of attracting foreign direct investment (FDI). Moreover, since FDI is more attractive for foreign source countries when tariffs are low, regionalism takes hold when multilateralism is successful.

Our paper also links with some other important papers in the broader trade agreements literature. Maggi (1999) emphasizes that multilateralism can play a positive role in the global trade system via monitoring. In the presence of power imbalances, the role of punishing defecting countries can be shared between all non-defecting countries including the powerful countries outside of the bilateral trading relationship where the defection occurred. In contrast, our model presents a mechanism where the presence of multilateral cooperation prior to bilateral cooperation results in a loss of world welfare.

Given the practical observation that negotiations take place over tariff bindings rather than applied tariffs, the literature has developed two main explanations for the presence of binding overhang in an optimal trade agreement. The first explanation, due to Horn et al. (2010), is that costly contracting prevents formation of a state contingent global trade agreement. The second explanation is that governments' future political economy motivations are uncertain when negotiating a global trade agreement and this creates a desire for flexibility over future applied tariff setting (see Bagwell and Staiger (2005), Amador and Bagwell (2013) and Beshkar et al. (2014)). Moreover, private information over these motivations prevents a state contingent global trade agreement.

Our explanation of binding overhang takes as given the practical observation that countries do not condition globally negotiated tariff bindings on the number of FTAs subsequently formed. Given FTA formation weakens the import competing sector of FTA members in our model, the eventual political economy motivations of FTA member governments will be weaker than those of FTA non-member governments. However, uncertainty over which countries will subsequently form FTAs leads to a common global tariff binding. In turn, binding overhang can emerge after FTA formation because the weaker political economy motivations of FTA member governments induces them to lower their applied tariffs below the globally negotiated tariff binding.

The remainder of the paper proceeds as follows. Section 2 presents our modified version of the Bagwell and Staiger (1999b) competing exporters model. Section 2.2 describes our game theoretic approach to modeling multilateralism and regionalism. Section 3 establishes that global tariff negotiations prevent global free trade. Section 4 establishes that global tariff negotiations can produce a fragmented world of gated globalization and characterizes the tariffs that result from global tariff negotiations. Finally, Section 5 concludes. Proofs are collected in the appendix.

2 Model

2.1 Basic trade model

We consider a modified version of the competing exporters model due to Bagwell and Staiger (1999b). There are three symmetric countries denoted by $i = a, b, c$ and three non-numeraire goods denoted by $Z = A, B, C$. Each country i has an endowment of $e_i^Z = e$ for goods $Z \neq I$ and an endowment of $e_i^Z = d < e$ for good $Z = I$. Below, we will see that country i is a natural exporter of goods $Z \neq I$ and a natural importer of good $Z = I$. Thus, countries j and k are competing exporters in serving country i's market. Moreover, good I can be viewed as country i's "comparative disadvantage" good and goods $Z \neq I$ can be viewed as country i's "comparative advantage" goods. In later results, the following hybrid parameter appears frequently:

$$\varphi \equiv \frac{e-d}{d}.$$

φ can be interpreted as the "strength of comparative advantage".

Demand for good Z in country i is given by $q\left(p_i^Z\right) = \alpha - p_i^Z$ where p_i^Z denotes the price of good Z in country i. In turn, no arbitrage conditions link the prices of goods across countries. Given non-prohibitive tariffs t_{ij} and t_{ik} applied by country i on countries j and k, $p_i^I = p_j^I + t_{ij} = p_k^I + t_{ik}$. Closed form solutions for prices of domestic goods can be derived from international market clearing conditions. Letting $x_i^Z = e_i^Z - q\left(p_i^Z\right)$ denote country i's *net* exports of good Z, market clearing for good Z requires $\sum_i x_i^Z = 0$. The equilibrium domestic price of good I in country i is then

$$p_i^I\left(t_{ij}, t_{ik}\right) = \alpha - \frac{1}{3}\left(d + 2e\right) + \frac{1}{3}\left(t_{ij} + t_{ik}\right).$$

The equilibrium domestic price of good $Z \neq I$ in country i is

$$p_i^Z\left(t_{zi}, t_{zj}\right) = \alpha - \frac{1}{3}\left(d + 2e\right) + \frac{1}{3}\left(t_{zj} - 2t_{zi}\right) \text{ for } j \neq i, z.$$

Given the equilibrium domestic prices, country i's net exports of good $Z \neq I$ to country $z \neq i$ are

$$x_{iz}^Z\left(t_{zi}, t_{zj}\right) = \frac{1}{3}\left(e - d\right) + \frac{1}{3}\left(t_{zj} - 2t_{zi}\right).$$

Thus, country i is a natural exporter of goods $Z \neq I$ because $e > d$ implies $x_{iz}\left(t_{zi}, t_{zj}\right) > 0$ when $t_{zi} = t_{zj} = 0$. Conversely, country i's net imports (i.e. negative net exports) of good I

from other countries are

$$m_i^I\left(t_{ij},t_{ik}\right)=\sum\nolimits_{z=j,k}x_{zi}^I\left(t_{ij},t_{ik}\right)=\frac{2}{3}\left(e-d\right)-\frac{1}{3}\left(t_{ij}+t_{ik}\right).$$

Thus, country i is a natural importer of good I because $e>d$ implies $m_i^I\left(t_{ij},t_{ik}\right)>0$ when $t_{ij}=t_{ik}=0$. Moreover, $t_{jk}=0$ implies country i has positive net exports of good Z to country z if and only if $t_{zi}<t_{PRO}$ where

$$t_{PRO}\equiv\frac{1}{2}\left(e-d\right) \tag{1}$$

is the "prohibitive tariff" below which the competing exporters structure of the model is preserved. In the rest of this paper, we make the following assumption:

$$b<\frac{1}{3}\varphi. \tag{2}$$

This ensures that the optimal tariffs imposed by governments are always lower than the prohibitive tariff given by (1).

It is well known that the effective partial equilibrium nature of the model implies country i's national welfare can simply be represented as

$$W_i\left(\tau\right)=\sum_Z CS_i^Z\left(\tau\right)+\sum_Z PS_i^Z\left(\tau\right)+TR_i\left(\tau\right)$$

where $\tau\equiv\left(t_{ij},t_{ik},t_{ji},t_{jk},t_{ki},t_{kj}\right)$ is the global tariff vector, CS_i^Z and PS_i^Z denote country i's consumer surplus and producer surplus associated with good Z and TR_i denotes country i's tariff revenue. Appendix A contains algebraic expressions for the individual components of $W_i\left(\cdot\right)$. In addition to national welfare, the government's objective function in each country includes a political economy consideration based on the political influence emanating from the import competing sector. In particular, the payoff of country i's government is given by

$$G_i\left(\tau\right)=\sum_Z CS_i^Z\left(\tau\right)+\sum_{Z\neq I}PS_i^Z(\tau)+\left(1+b\right)PS_i^I\left(\tau\right)+TR_i\left(\tau\right) \tag{3}$$

where $b>0$ reflects the extent to which the government values protection of the import competing sector. Note, the actual wedge between national welfare $W_i\left(\cdot\right)$ and the government's payoff $G_i\left(\cdot\right)$ is given by $b\cdot PS_i^I$. Thus, the strength of the government's political economy motivation is partly endogenous as it depends on the producer surplus of the import competing sector.

2.2 Global tariff negotiations and FTA negotiations

We adopt a simple, but flexible, protocol governing global tariff negotiations and FTA negotiations. We isolate the role that global tariff negotiations play by comparing the equilibrium outcomes of FTA negotiations that take place in the absence of global tariff negotiations and those that take place after global tariff negotiations. Apart from the presence or absence of an initial round of global tariff negotiations, the FTA formation games compared are identical.

Reflecting the global tariff negotiations that have actually taken place (e.g. Uruguay round, Tokyo round etc.), we model such negotiations as negotiations over the upper bound on tariffs, i.e. tariff bindings, rather than actual tariffs, i.e. applied tariffs. As such, in our model, countries could set applied tariffs below the tariff binding after FTA negotiations conclude. That is, "binding overhang" can arise in our model. In the version of the model where global tariff negotiations take place, we assume governments anticipate how the negotiated tariff bindings will affect the equilibrium outcome of subsequent FTA negotiations and set these tariff bindings cooperatively to maximize their joint expected payoff.

The FTA formation game has three main stages: a move of nature (Stage 0), FTA negotiations (Stage 1) and tariff setting (Stage 2).

Stage 0: Nature chooses whether or not FTA negotiations occur and if so, the sequential order in which pairs of countries have the opportunity to form FTAs. The probability that FTA negotiations occur is exogenously fixed at $p \in (0, 1]$; with probability $1-p$ there are no FTA negotiations, and thus no FTAs, and we move directly to the tariff setting stage (Stage 2). As for the sequential order in which countries negotiate FTAs, all of the six possible orderings are equally likely.

Stage 1: The next stage of the game (which is reached with probability p) is one of actual FTA formation. When a pair of countries has the opportunity to form an FTA, the pair is referred to as the "active pair" and the government of each country in the active pair simultaneously chooses whether or not to join an FTA with the other country in the active pair. An FTA forms if and only if both governments in the active pair choose to join an FTA. In the proofs, $a_i \in \{J, NJ\}$ denotes whether country i, as a member of an active pair, chooses to join (J) or not join (NJ) an FTA with the other country in the active pair. Stage 1 consists of three sub-stages:

Stage 1(a): Following the order previously chosen by nature, the three pairs of countries engage in sequential FTA negotiations with the outcome of each pair's FTA formation decision observed by all countries. However, as soon as the first FTA forms, the game moves to Stage 1(b). If all three pairs fail to form an FTA, FTA formation concludes and the game moves directly to tariff setting (Stage 2).

Stage 1(b): Following the ordering chosen by nature, the two pairs who have not formed an FTA sequentially decide whether or not to form an FTA (even if they had a chance and failed to form an FTA in Stage 1(a)). However, as soon as either pair forms an FTA, the game moves to Stage 1(c). If both pairs fail to form an FTA, the game moves directly to tariff setting (Stage 2).

Stage 1(c): The final pair of countries that has not yet formed an FTA has the opportunity to do so. Regardless of the outcome, the game moves to tariff setting (Stage 2).

This protocol has the desirable feature that every pair of countries that chooses to not form an FTA in a given sub-stage gets a chance to reconsider their decision in a later sub-stage if some other pair forms an FTA; FTA negotiations cease if and only if there is no pair of countries that wants to form an additional FTA.[10] This feature makes the protocol more flexible than that in Aghion et al. (2007) where a single "leader" country can make sequential FTA proposals to two "follower" countries and the follower countries never have the opportunity to form their own FTA.

Stage 2: Governments of all countries choose their applied tariffs subject to zero tariffs between FTA members and prior globally negotiated tariff bindings (if any).[11]

After the applied tariffs are set, the payoffs of the countries are determined according to the production, trade and consumption generated by these tariffs.

Using backward induction, we solve for a pure strategy subgame perfect equilibrium of the FTA formation game. In doing so, we restrict attention to subgame perfect equilibria where FTA negotiations are efficient in the sense that when any pair of countries has an opportunity to form an FTA, they always choose to do so whenever both countries gain from FTA formation; this rules out equilibria where FTA formation fails to arise because of coordination failure.[12]

We will compare the equilibrium outcome of the FTA formation game when global tariff negotiations take place prior to the FTA formation game with the equilibrium outcome of the FTA formation game when there are no global tariff negotiations. In particular, when global tariff negotiations precede the FTA formation game, the tariffs that countries set in Stage 2 of the FTA formation game are constrained by the globally negotiated tariff bindings. However, in the absence of global tariff negotiations, the tariffs countries set in Stage 2 of the

[10] Note the maximum number of FTA formation opportunities in Stage 1 is six. Stage 1(a) has a maximum of three FTA formation opportunities, Stage 1(b) has a maximum of two and Stage 1(c) has only a single opportunity.

[11] Zero tariffs between FTA members are consistent with the theoretical literature's interpretation of GATT Article XXIV. While we do not formally impose the MFN principle, symmetry of the model ensures the MFN principle is respected.

[12] We also assume a country chooses not to join an FTA when it is indifferent between joining and not joining.

FTA formation game are not bound by pre-existing tariff bindings since countries have not committed to any such bindings. Otherwise, the two FTA formation games are identical.

Before moving on to examine optimal tariffs, we present a lemma used frequently in later sections. The lemma deals with the incentive of countries to form an FTA when they are the only pair of countries who have not yet formed an FTA (i.e. Stage 1(c) of the FTA formation game).

Lemma 1 *If two FTAs have already formed then the remaining pair of (spoke) countries always find it optimal to form an FTA thus leading to global free trade. This is independent of whether global trade negotiations preceded FTA formation and any negotiated tariff bindings therein.*

2.3 Optimal tariffs

2.3.1 Optimal non-cooperative tariffs

In this section, we describe the non-cooperative optimal tariffs that countries set if they are unconstrained by tariff bindings. They are all easily derived given the welfare expressions in Appendix A.[13] These tariffs are important for solving the equilibrium structure of FTAs in the game where global tariff negotiations do not take place. However, they will also play a role in the game where global tariff negotiations do take place because, in general, the globally negotiated tariff bindings may exceed the non-cooperative optimal tariff of a country and, if so, the country sets an applied tariff below the tariff binding. To describe the non-cooperative optimal tariffs, we denote an arbitrary network of FTAs by g with the possible networks being: i) no FTAs, $g = \varnothing$; ii) a single FTA between countries i and j, $g = g_{ij}$; iii) two FTAs where country i is the "hub" who is a member of both FTAs and the other countries j and k are "spokes", $g = g_i^H$; and iv) global free trade, $g = g^{FT}$.

In the absence of any FTAs, the government of country i chooses tariffs on countries j and k, i.e. $t_{ij}(\varnothing)$ and $t_{ik}(\varnothing)$, to maximize $G_i(\cdot)$ (see (3)). Symmetry leads country i to impose non-discriminatory tariffs:

$$t_{ij}(\varnothing) = t_{ik}(\varnothing) = t_{Nash} \equiv \frac{1}{4}(e - d) + \frac{3}{4}bd.$$

Country i's optimal tariff consists of two terms. The first term is the standard terms of trade consideration based on national welfare of country i. However, unlike the traditional competing exporters model, we have non-zero endowments of comparative disadvantage goods.

[13] In the special case of $b = d = 0$, the optimal non-cooperative tariffs reduce to those found in Saggi and Yildiz (2010).

Thus, larger domestic import competing sectors (i.e. higher d) reduce world export volumes and thus mitigate an importing country's incentive to raise tariffs because of terms of trade considerations. The second term arises in our model because of government political economy motivations. This political economy effect rises both with the extra weight placed on the import competing sector's producer surplus, b, and the size of the domestic import competing sector, d. Note that our assumption in equation (2) on the range of the parameter b implies that the Nash tariffs are below the prohibitive level t_{PRO} given in (1).

We now describe how FTA formation affects countries' optimal tariffs. As is well known in the competing exporters model, FTA formation between countries i and j (insiders) leaves the optimal tariffs of country k (outsider) unchanged at the Nash tariff:

$$t_{ki}\left(g_{ij}\right) \equiv t_{Nash} = \frac{1}{4}\left(e-d\right) + \frac{3}{4}bd. \tag{4}$$

Underlying this result is the complete lack of interdependence across goods markets which means the incentive for k to manipulate the price of its imported good is independent of the tariffs on other goods and it is indeed the tariffs on these other goods that are affected by an FTA between i and j. Moreover, in our model, the outsider government's political economy motivations are based exclusively on the market of its imported good and thus are again unaffected by the tariffs in the markets for other goods.

As is well known in the competing exporters model, FTA formation induces FTA insiders to lower their tariff on the non-member outsider which is a phenomena known as tariff complementarity. An insider, say country i, has an optimal tariff on the outsider country k of

$$t_{ik}\left(g_{ij}\right) \equiv \frac{1}{11}\left(e-d\right) + \frac{3}{11}bd \equiv t^{*}_{IN}. \tag{5}$$

Tariff complementarity is evident because $t^{*}_{IN} < t_{Nash}$. As above, terms of trade considerations and political economy motivations drive an insider's tariff on the outsider. However, each of these forces are now weaker. Terms of trade considerations are weaker because tariff revenue falls upon giving tariff free access to one importer which makes it more attractive to lower the tariff on the other importer and raise tariff revenue. As in Ornelas (2005b), the political economy consideration is weaker because the producer surplus of the domestic import competing sector falls when granting tariff free access to the FTA.

Finally, as above, formation of a second FTA forms between, say, countries i and k leaves the tariff of the non-member, country j, unaffected: $t_{jk}\left(g_i^H\right) = t_{jk}\left(g_{ij}\right)$. However, as above,

the outsider country k lowers its tariff on the non-member country j so that:[14]

$$t_{kj}\left(g_i^H\right) = \frac{1}{11}\left(e-d\right) + \frac{3}{11}bd = t_{IN}^*. \tag{6}$$

2.3.2 Optimal globally negotiated tariff bindings

We now describe the optimal tariff bindings that governments negotiate jointly prior to FTA formation. As before, τ denotes the vector of tariffs and $\tau\left(t\right)$ denotes a tariff vector where all countries impose a common tariff t i.e., $t_{ij} = t$ for all i, j. Further, τ_{-ij} denotes the vector of tariffs τ *except that* countries i and j set zero tariffs on each other and, similarly, $\tau_{-ij}\left(t\right)$ denotes the tariff vector where each country imposes a common tariff t on each other except that countries i and j impose a zero tariff on each other. Finally, in the proofs, we let $\tau_{-ij}^{FTA}\left(t\right)$ denote the tariff vector that (potentially) differs from $\tau_{-ij}\left(t\right)$ because $t_{ik} = t_{jk} = \min\left\{t_{IN}^*, t\right\}$ and $t_{ki} = t_{kj} = \min\left\{t_{Nash}, t\right\}$.

We begin by considering what would be the globally negotiated tariff binding *ignoring* the possibility of subsequent FTA formation and *ignoring* the possibility that the applied tariff could differ from the tariff binding. Letting $G\left(g;\tau\right) = \sum_i G_i\left(g;\tau\right)$ denote the joint government payoff from a network of FTAs g and a global tariff vector τ, governments maximize their joint payoff by solving:

$$\max_{\tau} G\left(\varnothing;\tau\right). \tag{7}$$

The solution is that all tariff bindings equal the "politically efficient" tariff

$$bd \equiv t^{pe} \tag{8}$$

which yields the tariff vector $\tau\left(t^{pe}\right)$. Indeed, since $t^{pe} < t_{Nash}$, the politically efficient tariff would bind governments' applied tariffs in the absence of FTAs if set as the tariff binding. Thus, t^{pe} is both the tariff binding and the applied tariff in the absence of any FTAs. Importantly, $t^{pe} > 0$ implies that, even though governments could set any subset of tariffs to zero, the first best outcome from the joint perspective of governments is committing to a common non-discriminatory tariff. As such, we refer to it as politically efficient. Naturally, $t^{pe} \to 0$ as political motivations vanish via $b \to 0$ or $d \to 0$.

Now we consider the tariff bindings that governments will negotiate *anticipating* the possibility of subsequent FTA formation but still *ignoring* the possibility that applied tariffs could differ from the globally negotiated tariff bindings (except, of course, that FTA mem-

[14] Of course, since the hub country has FTAs with both of the other countries it practices free trade.

bers levy zero tariffs on each other). Given the equilibrium structure that will obtain in the following sections, we restrict our attention here to the hypothetical situation where governments negotiate tariff bindings knowing for certain that a single FTA will emerge upon FTA negotiations taking place. Then, global negotiations would solve the following maximization problem:

$$\max_{\tau} \quad \sum_{ij\in\{ab,ac,bc\}} \tfrac{1}{3}\left[p\cdot G\left(g_{ij};\tau_{-ij}\right)+(1-p)\,G\left(\varnothing;\tau\right)\right]\ . \tag{9}$$

The solution is that all tariff bindings are given by

$$bd\left(1-\frac{p}{3}\right)=t^{pe}\left(1-\frac{p}{3}\right). \tag{10}$$

This yields the global tariff vector $\tau\left(t^{pe}\left(1-\frac{p}{3}\right)\right)$ in the absence of FTAs and $\tau_{-ij}\left(t^{pe}\left(1-\frac{p}{3}\right)\right)$ in the presence of a single FTA between countries i and j. An important result of our model is that globally negotiated tariff bindings, and applied tariffs, can depend on the likelihood of subsequent FTA negotiations as in (10). We discuss this result in Section 4 after characterizing when equilibrium applied tariffs are indeed given by (10).

As noted above, the maximization problem in (9) assumes the tariff bindings bind countries applied tariffs both in the presence and the absence of FTA negotiations taking place. Given our discussion of the non-cooperative optimal tariffs in the previous section, this is true if and only if $t^{pe}\left(1-\frac{p}{3}\right)\leq\min\left\{t_{IN}^{*},t_{Nash}\right\}=t_{IN}^{*}$ which reduces to

$$b\leq\bar{b}_{TC}\equiv\frac{3}{24-11p}\varphi. \tag{11}$$

It is intuitive that global tariff negotiations bind governments' applied tariffs when political economy concerns are not too high. Low political economy concerns produce low globally negotiated tariff bindings that approach zero as political economy concerns vanish yet, even in the absence of political economy concerns, terms of trade considerations motivate individual governments to impose tariffs on each other.

As an alternative to the situation of setting a tariff binding that binds insiders and the outsider, governments could set a tariff binding that only binds the outsider upon FTA formation.[15] It is well known that goods markets are completely independent of each other in the competing exporters model. Thus, the optimal tariff binding that only binds the

[15] Since tariff complementarity implies $t_{Nash}>t_{IN}^{*}$, it is not possible to set a tariff binding that only binds insiders. Moreover, in the proof of Lemma 2, we show that setting a tariff binding that does not bind any country's applied tariff is not optimal.

outsider is merely:[16]

$$bd = t^{pe}. \tag{12}$$

Note, t^{pe} binds an insider's applied tariff if and only if $b < \frac{1}{8}\varphi$ but always binds the applied tariff of the outsider.

The natural question that now arises is whether it is optimal to bind the applied tariffs of insiders and the outsider or whether it is optimal to only bind the applied tariff of the outsider. We can establish the existence of a threshold $\bar{b}_{BND}$ (see (16) in the Appendix) where governments are indifferent between these two options. Thus, the following lemma characterizes the optimal tariff binding which we refer to as the "farsighted MFN tariff" t^{fs}_{MFN}.[17]

Lemma 2 *Suppose that governments anticipate a single FTA will emerge if FTA negotiations take place. Then, global negotiations lead to a uniform optimal tariff binding* t^{fs}_{MFN} *where*

$$t^{fs}_{MFN} \equiv \begin{cases} t^{pe}\left(1 - \frac{p}{3}\right) & \text{if } b < \bar{b}_{BND} \\ t^{pe} & \text{if } b \geq \bar{b}_{BND} \end{cases}$$

and $\bar{b}_{BND} \in \left(\frac{1}{8}\varphi, \bar{b}_{TC}\right]$ *is as defined by* (16). *If FTA negotiations (subsequently) take place and a single FTA emerges, the tariff binding* t^{fs}_{MFN} *is the applied tariff that the outsider imposes on the insiders; further, it is also the applied tariff that the insiders impose on the outsider when* $b < \bar{b}_{BND}$ *but the applied tariff of an insider on the outsider is* $t^{*}_{IN} < t^{fs}_{MFN} = t^{pe}$ *for* $b \geq \bar{b}_{BND}$.

The critical value $\bar{b}_{BND}$ highlights a trade-off faced by governments when negotiating tariff bindings. On one hand, binding the outsider's applied tariffs below t^{pe} is costly because t^{pe} is the optimal tariff binding on the outsider (see (12)). On the other hand, FTA formation weakens the import competing sector in member countries and thus weakens the political economy motivations of insiders relative to the outsider. Thus, governments jointly benefit from binding insiders' applied tariffs below t^{pe}. While $t^{pe} \to 0$ as $b \to 0$, terms of trade considerations bound an insider's optimal tariff t^{*}_{IN} (see (5)) away from zero. In turn, there is a large gain from binding the insiders' applied tariffs below t^{pe} when b is small because this implies that t^{*}_{IN} far exceeds t^{pe}; in this case, insiders act very opportunistically relative to what governments would like prior to FTA negotiations. Conversely, given $t^{pe} \to 0$ as $b \to 0$, binding the outsider's applied tariffs below t^{pe} is not very costly when b is small.

[16] That is, t^{pe} is the solution to the optimization problem as in (9) but subject to the constraint that $t_{ik}(g_{ij}) = t_{jk}(g_{ij}) = t^{*}_{IN}$.

[17] Note, governments are indifferent between setting t^{pe} or $t^{pe}\left(1 - \frac{p}{3}\right)$ as the tariff binding when $b = \bar{b}_{BND}$. Hereafter, we assume they set t^{pe} when $b = \bar{b}_{BND}$.

Hence, the globally negotiated optimal tariff binding $t^{fs}_{MFN} = t^{pe}\left(1 - \frac{p}{3}\right)$ binds the insiders and the outsider when b falls below the threshold $\bar{b}_{BND}$.

Complementary to this intuition is that binding the applied tariffs of both the insiders and the outsider is more helpful in smoothing the payoffs of insiders and the outsider when b is low since t^*_{IN} far exceeds t^{pe} in this case. Smoothing these payoffs is attractive for countries given their uncertainty about whether they will be an insider or an outsider at the stage of global tariff negotiations.

3 Global tariff negotiations and global free trade

We begin by stating an important result of the FTA formation game when global tariff negotiations precede FTA negotiations.

Proposition 1 *Global free trade never emerges when global tariff negotiations take place prior to FTA negotiations.*

The proof of Proposition 2 in the Appendix relies on results we establish later in Proposition 3. However, here we present an independent intuition that explains why global tariff negotiations prevent global free trade.

If there is no possibility of FTA formation after global tariff negotiations, or governments are purely myopic, the political economy concerns held by governments imply that they maximize their joint payoff by imposing a positive common tariff binding - the politically efficient tariff t^{pe} defined by (8). Thus, if FTA formation is impossible, Proposition 1 follows trivially. However, allowing the possibility of FTA formation after global negotiations introduces complications. First, having negotiated t^{pe} as the global tariff binding, FTA formation leads to a fragmented world of discrimination between insiders and outsiders where insiders drop tariffs on each other from t^{pe} to zero. In this case, governments may decide that, despite their political economy motivations, it is better to rid the world of discrimination by reducing the initially globally negotiated tariff bindings to zero across the board. Second, even though the tariff binding t^{pe} does not eliminate trade barriers, FTA negotiations may lead to a de facto world of global free trade if all pairs of countries decide to form FTAs. We show that neither of these happen in equilibrium and, in turn, global free trade will not emerge following global tariff negotiations.

The key argument is that governments can guarantee themselves a strictly higher joint payoff than under global free trade by setting the globally negotiated uniform tariff binding t equal to the politically efficient tariff t^{pe} prior to FTA negotiations taking place. While t^{pe} may not itself be chosen as the tariff binding during global negotiations (on the equilibrium

path), we argue that it yields strictly higher joint payoff for governments than any tariff binding that produces global free trade (either directly or, eventually, via sequential FTA formation). In other words, setting a tariff binding that results in global free trade can never be optimal during global negotiations.

But, why does setting the globally negotiated tariff binding equal to the politically efficient level yield governments a higher joint payoff than under global free trade? This is obvious if no FTA emerges in equilibrium because t^{pe} would bind governments applied tariffs (i.e. $t^{pe} < t_{Nash}$) and, by definition, maximize their joint payoff. But, it is also true if a single FTA emerges. In this case, the marginal welfare loss stemming from non-zero applied tariffs is proportional to the tariff level, while the marginal political benefit of non-zero applied tariffs is constant. Thus, given t^{pe} significantly restrains the applied tariff of the outsider (and potentially the insider as well), the political benefit of protection outweighs the welfare loss. Hence, relative to global free trade, governments prefer setting t^{pe} as the globally negotiated tariff binding if either no FTAs or a single FTA emerges in equilibrium.

Indeed, when $t = t^{pe}$, the only possible outcomes of the FTA formation game are no FTAs or a single FTA. This follows from the observation in Lemma 1 that, when given the opportunity, two spoke countries always form the last FTA that takes the world from the hub-spoke network to global free trade. Foreseeing this, an insider will only engage in formation of a second FTA with the outsider if its eventual payoff under global free trade exceeds that as an insider. The main advantage that global free trade confers on an insider is eliminating the tariff barrier it faces when exporting to the outsider. However, this incentive is relatively weak given the globally negotiated tariff binding t^{pe} significantly restrains the outsider's tariff. Moreover, the insider's own political economy motivations further reduce the incentive to engage in subsequent FTA formation. As a result, the insider chooses not to form a second FTA and therefore blocks further FTA expansion. Thus, at most a single FTA emerges in equilibrium when the globally negotiated tariff binding is t^{pe} and, in any case, governments prefer this outcome over global free trade.

While global free trade never emerges in the presence of global tariff negotiations, establishing the role played by global tariff negotiations in the attainment of global free trade depends on whether global free trade would be attained in the absence of such negotiations. To establish the equilibrium in the absence of global tariff negotiations, we now consider the FTA formation game in the absence of global negotiations. In the absence of any globally negotiated tariff bindings, the only constraint on government tariff setting is that FTA members eliminate tariffs on each other.

We begin by observing that unless political economy considerations are very strong, at least one FTA must form. In a world without FTAs, all applied tariffs would be equal to the

non-cooperative Nash tariff t_{Nash}. As such, FTA formation would bring significant welfare gains to members that outweigh the political cost to each member government. Further, we know from Lemma 1 that a hub-spoke network cannot emerge in equilibrium because the two spoke countries are better off deviating and forming their own FTA that takes the world to global free trade. Thus, the equilibrium outcome in the absence of global tariff negotiations must be either a single FTA or global free trade.

This brings us to the important issue of why the absence of global tariff negotiations can lead to global free trade as the equilibrium outcome rather than a fragmented world with only a single FTA. Both insiders and the outsider recognize formation of a second FTA will eventually lead to global free trade. However, the relative attractiveness of global free trade differs for the insiders and the outsider. For all countries, global tariff elimination brings additional market access for exporters and reduced protection for the domestic import competing sector with the latter becoming more costly as political economy motivations strengthen. But the outsider reaps an additional gain because it no longer faces discrimination in the FTA member markets. Thus, if the tariff imposed by insiders on the outsider and that imposed by the outsider on the insiders are equal, then this "discrimination effect" implies that the outsider has a weaker incentive than the insider to block global free trade.

However, as discussed in Section 2.3, tariff complementarity induces members to lower their tariff on the non-member so that the optimal tariff t^*_{IN} imposed by an insider on the outsider is strictly lower than the optimal tariff that the outsider imposes on the insider (which is equal to the Nash tariff t_{Nash}). As a result, the insider's import competing sector now loses less and the outsider's exporting sector now gains less upon expansion to global free trade. Indeed, these "tariff complementarity effects" outweigh the "discrimination effect" so that the outsider has a stronger incentive to block global free trade. Put slightly differently, the absence of tariff concessions given by the outsider motivate each insider's desire to engage in subsequent FTA formation with the outsider even though it eventually yields global free trade. When interpreting our main results, this observation will be very important.

While the outsider has a stronger incentive to block global free trade, whether it does so depends on the strength of political economy motivations. In particular, an outsider refuses to participate in subsequent FTA formation, thereby blocking global free trade, when $G_i\left(g_{jk}\right) \geq G_i\left(g^{FT}\right)$. Not surprisingly, given the optimal tariffs of insiders and outsiders discussed in Section 2.3, an outsider blocks global free trade only if political economy motivations exceed a threshold:

$$b \geq \bar{b}_{OUT} \equiv \frac{13}{137}\varphi. \tag{13}$$

If $b < \bar{b}_{OUT}$, an outsider does not block global free trade and hence global free trade emerges in the absence of global tariff negotiations. In this case, FTA formation represents the only, albeit blunt, mechanism whereby insiders can extract tariff concessions from the outsider. Proposition 2 now presents our main result.

Proposition 2 *Global tariff negotiations prevent global free trade when* $b < \bar{b}_{OUT}$ (*where* $\bar{b}_{OUT}$ *is defined in* (13)).

Global tariff negotiations prevent global free trade because global free trade never emerges in the presence of global tariff negotiations (Proposition 1) yet emerges in the absence of global tariff negotiations when $b < \bar{b}_{OUT}$. In other words, global tariff negotiations are actually the cause of a world stuck short of global free trade when political economy motivations are "not too large". Notice that, given our parameter space is restricted to $b < \bar{b}_{PRO} = \frac{1}{3}\varphi$, the striking result of Proposition 2 holds for nearly one-third of the parameter space. Moreover, given the parameter φ can be arbitrarily large as d approaches 0, the result in Proposition 2 may hold even when political economy motivations are very strong.

Gaining a better understanding of how global tariff negotiations prevent global free trade requires understanding how the presence of global negotiations changes the incentives of the outsider or the insiders such that one of them now refuses to participate in FTA expansion that would ultimately yield global free trade. As noted above, the insider opted against blocking global free trade in the absence of global tariff negotiations because it had not extracted any tariff concessions from the outsider. But, the presence of global tariff negotiations leads to a relatively low tariff binding and, as such, extracts significant applied tariff concessions from the eventual outsider. Indeed, these tariff concessions received by the eventual insider are large enough that an insider now refuses to participate in FTA expansion and, thus, blocks expansion to global free trade. Therefore, the role of tariff concessions given by the eventual outsider in global tariff negotiations drive the result that global tariff negotiations can prevent global free trade. More broadly, the success of global tariff negotiations in lowering tariff bindings and applied tariffs across all participating countries underlies why global tariff negotiations prevent global free trade.

4 A fragmented world of gated globalization

In the previous section, we established that global tariff negotiations prevent global free trade primarily because the tariff concessions generated by such negotiations eliminate the FTA expansion incentives necessary for global free trade to emerge via FTA formation. But

what is the equilibrium network of FTAs that emerge when global tariff negotiations take place? And what tariffs will result from global tariff negotiations?

We now turn to these two questions with Proposition 3 showing the answers depend on two critical values of the political economy parameter b. The first critical value is $\bar{b}_{\varnothing}$ that will be defined later in this section (see (14)). The second critical value is $\bar{b}_{BND}$ that was defined in Lemma 2 and is the critical value that determines whether the farsighted MFN tariff is given by $t^{fs}_{MFN} = t^{pe}\left(1 - \frac{p}{3}\right)$ or $t^{fs}_{MFN} = t^{pe}$.

Proposition 3 *Global tariff negotiation leads to a fragmented world with a single FTA if, and only if,*

$$b < \bar{b}_{\varnothing}.$$

Under this condition,

(a) global negotiations lead to a uniform optimal tariff binding t^{fs}_{MFN} where

$$t^{fs}_{MFN} = \begin{cases} t^{pe}\left(1 - \frac{p}{3}\right) & \text{if } b < \min\left\{\bar{b}_{BND}, \bar{b}_{\varnothing}\right\} \\ t^{pe} & \text{if } b \in \left[\bar{b}_{BND}, \bar{b}_{\varnothing}\right) \end{cases};$$

(b) the applied tariffs of all countries are equal to t^{fs}_{MFN} if FTA negotiations do not take place;

(c) when FTA negotiations occur and a single FTA emerges, t^{fs}_{MFN} is the applied tariff of the outsider on the insiders; it is also the applied tariff of the insiders on the outsider except when $b \in \left[\bar{b}_{BND}, \bar{b}_{\varnothing}\right)$ in which case the insiders impose an applied tariff of $t^{*}_{IN} < t^{fs}_{MFN}$ on the outsider.

In what follows, we outline the broad arguments underlying Proposition 3.

From Lemma 2 we know that, if governments expect a single FTA to emerge, then the optimal globally negotiated tariff binding is t^{fs}_{MFN}. If a single FTA does emerge after imposition of such a tariff binding, then it always binds the applied tariff of the outsider. In addition, it binds the applied tariff of the insiders on the outsider if, and only if, $b < \bar{b}_{BND}$ (for $b \geq \bar{b}_{BND}$, $t^{fs}_{MFN} = t^{pe}$ and the insiders set an applied tariff of $t^{*}_{IN} < t^{pe}$ on the outsider).

However, not only is t^{fs}_{MFN} the optimal (uniform) tariff binding conditional on a single FTA emerging in equilibrium but it is also true that a single FTA emerges in equilibrium conditional on t^{fs}_{MFN} being the globally negotiated tariff binding. The emergence of FTA formation is not surprising given that $b < \bar{b}_{\varnothing}$ implies b is not too large. When FTA members engage in reciprocal elimination of *any* tariff below the prohibitive tariff, their welfare rises given part of the market access that each member gains in its partner's market comes at the

expense of the non-member country. Thus, for b less than the threshold $\overline{b}_{\varnothing}$, governments' political motivations are not strong enough to make FTA formation unattractive. However, why do FTA negotiations yield only a single FTA? The answer is that, as discussed in the previous section, global tariff negotiations yield tariff concessions from all countries including the eventual outsider. In turn, insiders have no incentive to use subsequent FTA formation as a means to extract tariff concessions from the outsider. Thus, if governments impose t^{fs}_{MFN} as the (uniform) globally negotiated tariff binding, a single FTA emerges when FTA negotiations take place because the success of global tariff negotiations prevent insiders from engaging in subsequent FTA expansion.

Is it possible that governments could opt against setting t^{fs}_{MFN} as the globally negotiated tariff binding so that something other than a single FTA emerges in equilibrium? As Lemma 1 rules out the possibility of a hub-spoke network in equilibrium, the only other possibilities are global free trade or no FTAs. However, by construction, the uniform tariff binding t^{fs}_{MFN} not only maximizes the expected payoff for a government conditional on a single FTA emerging but also yields a higher expected government payoff than global free trade.[18] Thus, the only possible equilibrium outcome apart from a single FTA is that no FTAs emerge.

When is it (ex ante) optimal for governments to negotiate a global tariff binding different from t^{fs}_{MFN} that can deter all FTA formation? To answer this question, we need to first understand the kind of tariff binding that can prevent all FTAs. Whether a tariff binding prevents FTA formation depends on a trade-off between the welfare gains of FTA formation and a government's desire to protect its import competing sector. In particular, governments must have sufficiently strong political economy motivations if they forego FTA formation opportunities.

Importantly, a governments' political economy motivations depend on the wedge between its payoff and national welfare which, as seen in (3), is $b \cdot PS^I_i$. Thus, a necessary condition for no FTA formation is that the parameter b must exceed a threshold and in particular, $b \geq \frac{1}{8}\varphi$. For $b < \frac{1}{8}\varphi$, it is impossible to deter all FTAs (through any globally negotiated tariff binding).

However, $b \geq \frac{1}{8}\varphi$ is not a sufficient condition for prevention of all FTAs. Governments will choose to prevent FTA formation only if the import competing sector is strong enough given that the (protectionist) political economy motive of the government depends on the size of its producer surplus. As higher tariffs strengthen the import competing sector, the tariff binding must be large enough. In particular, all FTAs are deterred only if the tariff

[18] To be clear, by construction, the expected joint payoff of governments when setting $\tau\left(t^{fs}_{MFN}\right)$ exceeds their joint payoff under global free trade. But, symmetry implies this is not only true for the joint payoff but also true for each country individually.

binding exceeds a threshold $\underline{t}(b)$ in addition to $b \geq \frac{1}{8}\varphi$ (equation (18) in the Appendix gives the algebraic expression for $\underline{t}(b)$). Lemma 3 summarizes this discussion.

Lemma 3 *For $b < \frac{1}{8}\varphi$, there are no global tariff bindings that prevent FTA formation. For $b \geq \frac{1}{8}\varphi$, a global tariff binding prevents FTA formation only if it exceeds $\underline{t}(b)$, where $\underline{t}(b)$ is given by* (18).

Lemma 3 indicates that for $b < \frac{1}{8}\varphi$ the outcome where global negotiations lead to tariff bindings that prevent all FTAs is infeasible. So, let $b \geq \frac{1}{8}\varphi$ and consider whether it is (jointly) gainful for governments engaged in global negotiations to move from a tariff binding of t^{fs}_{MFN} (that leads to a single FTA) to a tariff binding below $\underline{t}(b)$ that deters all FTAs. A single FTA outcome is characterized by tariff discrimination between insiders and the outsider which is not ideal from the joint perspective of governments. If governments could pre-commit to not engage in FTA formation at the global negotiations stage then it would be jointly optimal to do so. In doing so, they would set a tariff binding equal to the politically efficient tariff t^{pe} which would bind the applied tariffs of all countries. However, in reality and in our framework, governments cannot credibly make such prior commitments. Nevertheless, it stands to reason that governments are prepared to sacrifice some political efficiency in order to prevent FTA formation. Naturally, preventing FTAs becomes less attractive as governments are required to move further away from the politically efficient tariff. Thus, if governments can prevent FTAs by choosing a tariff binding that is not too different from the politically efficient tariff t^{pe} then it is jointly optimal for the governments to do so; otherwise, they are better off staying with the tariff binding t^{fs}_{MFN} and the single FTA outcome.

Specifically, governments opt against preventing FTA formation if the minimum required tariff binding for prevention, given by $\underline{t}(b)$, exceeds $t^{pe} + x(b)$ (where $x(b) > 0$ is as defined in equation (20) in the Appendix). Conversely, governments will prevent FTA formation by setting a tariff binding equal to $\max\{\underline{t}(b), t^{pe}\}$ if $\underline{t}(b) < t^{pe} + x(b)$ because the associated sacrifice in political efficiency is small enough. Indeed, we can solve for a threshold value of the political economy parameter $\bar{b}_{\varnothing}$ such that governments are indifferent between preventing and not preventing FTA formation:

$$t^{pe} + x(b) = \underline{t}(b) \text{ if and only if } b = \bar{b}_{\varnothing}. \tag{14}$$

The equilibrium characterization presented in Proposition 3 now follows easily and can be seen graphically from Figure 1.

Conditional on FTA negotiations taking place, a single FTA emerges in equilibrium if and only if the political economy parameter b falls below $\bar{b}_{\varnothing}$. When $b < \bar{b}_{\varnothing}$, the sacrifice

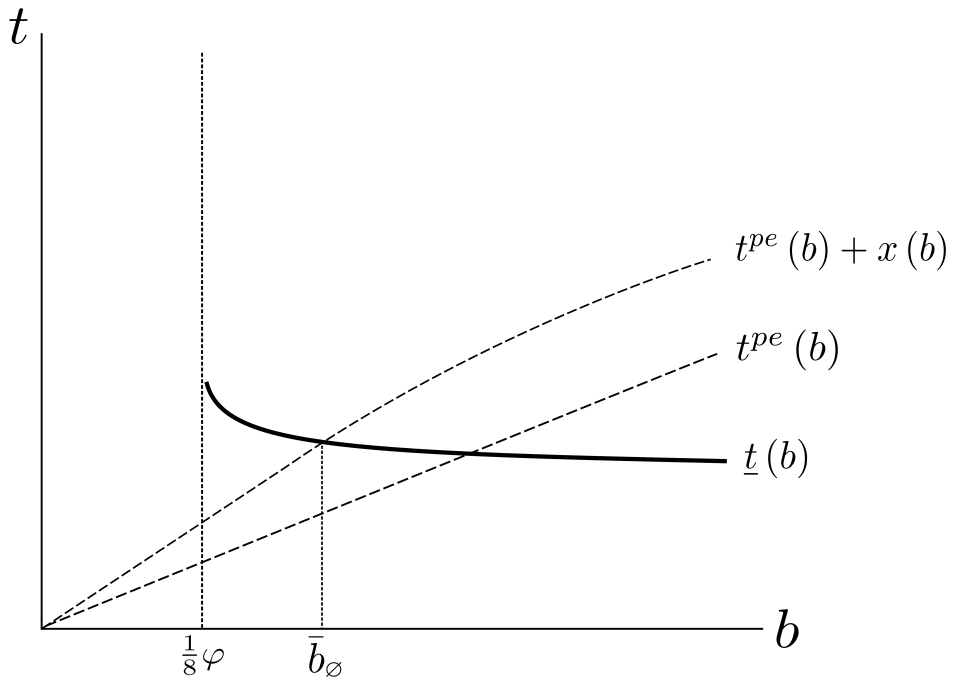

Figure 1: When does a single FTA arise in equilibrium?

of political efficiency needed to prevent FTA formation is too large. In turn, governments set the tariff binding equal to t^{fs}_{MFN} and a single FTA emerges (if FTA negotiations occur). Further, as discussed above, this tariff binding will bind the applied tariffs of insiders on the outsider and the outsider on the insiders except when $b \geq \bar{b}_{BND}$ in which case we have $t^{fs}_{MFN} = t^{pe}$ and insiders lower their applied tariff on the outsider from t^{pe} to $t^{*}_{IN} < t^{pe}$ upon FTA formation.[19] However, governments prevent FTA formation once $b \geq \bar{b}_{\varnothing}$ by setting the tariff binding $\underline{t}(b)$ or, once b is sufficiently high, t^{pe}. In these cases, the sacrifice in political efficiency is small enough that governments set the tariff bindings away from the politically efficient tariff to prevent FTA formation.[20]

Our gated globalization result in Proposition 3, i.e. the emergence of a single FTA in equilibrium, differs qualitatively from Ornelas (2008) who finds that FTA formation does not arise in equilibrium when governments bargain during global tariff negotiations *knowing* which countries would be insiders and which country would be the outsider upon formation of an FTA.[21] Crucially for Ornelas (2008), the outsider gains more than an insider from an

[19] Of course, in addition, FTA members set zero tariffs on each other.

[20] Using Figure 1, we can see that governments set the tariff bindings equal to t^{pe} once b exceeds the value where the $\underline{t}(b)$ and $t^{pe}(b)$ curves intersect. In this case, governments prevent FTA formation without sacrificing any political efficiency.

[21] Indeed, using our endowment economy trade model within the framework of Ornelas (2008) would produce identical tariffs to what we obtain here when FTA negotiations take place with certainty (i.e. $p = 1$).

FTA in the absence of global tariff negotiations (due to tariff complementarity upon FTA formation). This difference in the outside option distorts the distribution of gains in the bargaining outcome of global tariff negotiations and renders FTAs politically infeasible in the presence of global tariff negotiations. However, in our model, the possibility of FTA formation affects global tariff negotiations prior to FTAs actually taking place and prior to the realization of which countries will actually form an FTA. Thus, unlike Ornelas (2008), governments in our model engage in global negotiations under a veil of ignorance and this allows the emergence of FTAs after global negotiations take place.

Proposition 3 also indicates that the globally negotiated tariff binding is the farsighted MFN tariff t^{fs}_{MFN}. This tariff depends on the likelihood that FTA negotiations will subsequently take place when $b < \bar{b}_{BND}$ but, as indicated in Lemma 2, jumps from $t^{fs}_{MFN} = t^{pe}\left(1 - \frac{p}{3}\right)$ to $t^{fs}_{MFN} = t^{pe}$ once $b \geq \bar{b}_{BND}$. A number of implications follow from this result.

The first implication is that lower tariffs result from global tariff negotiations when FTA negotiations are more likely in the future. In other words, global tariff negotiations lead to relatively large reductions in tariff barriers when governments anticipate subsequent FTA negotiations and consider them highly likely. The shadow of future regionalism has a positive effect on the success of multilateral negotiations.

To understand this result, it is important to clarify that, in our endowment economy framework, welfare is unchanged upon formation of an FTA if the non-member's tariffs and the members' external tariffs are unchanged.[22] Therefore, the dependence of the farsighted MFN tariff on the likelihood of FTA negotiations is not related to any welfare loss due to FTA induced tariff discrimination. Rather, it arises solely from the political economy motivation of governments. As we have explained earlier, the payoff received by a government because of political economy motivations is $b \cdot PS^I_i$. Thus, viewing this product as the strength of political economy motivations, such motivations are endogenous. In particular, when a country engages in FTA formation, extending tariff free access to its partner weakens its own import competing sector (i.e. lowers its producer surplus). Thus, when negotiating global tariff bindings, a government anticipates it is likely to have weaker political economy motivations in the future. As such, governments negotiate a tariff binding $t < t^{pe}$ and an even lower t as the likelihood of FTA negotiations rise. Put simply, anticipation of weaker import competing sectors in the future after FTA formation takes place allows politically motivated governments to negotiate lower global tariffs prior to FTA formation taking place.

The second implication concerns binding overhang (i.e. the difference between the tariff

[22] This is in contrast to Ornelas (2008) who analyzes a production economy with rising marginal cost and shows that FTA induced discrimination lowers world welfare when, as we have here, FTA formation leaves the non-member's tariffs and the members' external tariffs unchanged. See Proposition 1(ii) of Ornelas (2008).

binding and the applied tariff) and tariff complementarity. When $b < \min\left\{\bar{b}_{BND}, \bar{b}_{\varnothing}\right\}$, global tariff negotiations in the shadow of FTA formation yield significant tariff concessions in the form of relatively low tariff bindings and to the extent that, in equilibrium, there is no binding overhang nor any tariff complementarity upon FTA formation. As discussed by Nicita et al. (2013), one could plausibly view the 1994 Uruguay Round of global tariff negotiations as essentially taking place between a small number of advanced economies including the EU, the US and Japan. Recent cross-country empirical evidence from Gawande et al. (2012) estimates that the EU, US and Japan have some of the lowest values of b in the world. Moreover, Beshkar et al. (2014) document that in 2007 these countries had no binding overhang on 95-99% of HS 6-digit tariff lines. In turn, given these countries have formed many FTAs, these countries have (essentially) not lowered their tariffs on non-members upon entering FTAs and, thus, FTAs involving these countries have been characterized by a lack of tariff complementarity. These observations are consistent with the predictions of our model when $b < \min\left\{\bar{b}_{BND}, \bar{b}_{\varnothing}\right\}$.

It is also important to note here that, for $\frac{1}{8}\varphi < b < \min\left\{\bar{b}_{\varnothing}, \bar{b}_{BND}\right\}$, the lack of binding overhang derives purely from the farsighted nature of globally negotiated tariff bindings given the "myopic" tariff binding would be t^{pe} even though $t^{*}_{IN} < t^{pe}$ once $b > \frac{1}{8}\varphi$. To this extent, the farsightedness of countries engaging in global tariff negotiations that take place in the shadow of subsequent FTA negotiations can help explain the lack of binding overhang in countries who were central figures in the 1994 Uruguay round of negotiations such as the EU, US and Japan.

The third implication concerns the effect of FTAs on trade flows. As discussed by Bergstrand et al. (2014, p.3), changes in trade flows following FTAs are often used to infer the welfare effects of FTAs. Given our result regarding the absence of tariff complementarity, using FTA induced trade flow changes would seem to suggest that the non-member suffers from FTA formation. Similarly, given Ornelas (2008) finds world welfare rises upon FTA formation if and only if there is tariff complementarity, FTA formation would appear to harm world welfare. However, this emphasizes the important point that, even though tariff complementarity does not arise upon FTA formation, the effect of tariff complementarity is embedded into the global tariffs *prior* to FTA formation actually taking place. As such, our results suggest any effect of increased trade flows upon FTA formation due to tariff complementarity will already be embedded in the trade flows prior to the FTA taking place. Thus, our results suggest that, via the farsighted nature of global tariff negotiations, the effect of an FTA on trade flows consists not only of the effect after the FTA comes into existence but also the effect that the possibility of such an FTA taking place has on applied tariffs *prior to* FTA formation.

5 Conclusion

Multilateralism can foster regionalism in many ways. An important channel is via the effect that globally negotiated tariff bindings have on the incentives for countries to engage in subsequent FTA formation. When political economy concerns are not too strong, global tariff negotiations among forward looking governments can lead to a world of gated globalization fragmented by FTAs and falling short of global free trade even though, in the absence of any prior global tariff negotiations, FTA formation expands to global free trade. In this sense, global tariff negotiations can *prevent* global expansion of FTAs and the emergence of global free trade. This striking result obtains precisely because global tariff negotiations are successful in extracting concessions from all participating countries which dampens the incentive of countries that form an FTA to extract greater concessions by forming more FTAs. However, in the absence of global tariff negotiations, FTA members face relatively high tariffs when exporting to non-member markets and are therefore eager to form new FTAs with the resulting proliferation of FTAs leading to global free trade.

As global tariff negotiations take into account the likelihood of subsequent FTA negotiations, global tariff bindings are lower when subsequent FTA formation is more likely. FTA formation weakens the import-competing sector of FTA members and thus weakens the political economy motive to protect the import competing sector. As such, the anticipation of subsequent FTA formation allows negotiating governments to set lower tariff bindings because they anticipate their import competing sectors will be weaker in the future.

Our results can explain the observed absence of binding overhang by countries who were major participants in global tariff negotiations (e.g. the EU, US and Japan). It also suggests that tariff complementarity may not be observed upon FTA formation because the globally negotiated tariff bindings build in the effect of tariff complementarity prior to FTA negotiations taking place. The common practice of using observations regrading tariff complementarity or changes in trade flows upon FTA formation for inferring welfare changes may therefore require re-examination.

Given the 1994 Uruguay Round of negotiations covered bound tariffs of all WTO members (even if only a few advanced countries were the actual negotiating countries), extending our analysis to model negotiations between asymmetric countries remains an avenue for future research. One interesting possibility worthy of exploration is whether such a model could deliver asymmetries in the FTA formation incentives of developing and developed countries. This could help explain the findings of Limão (2007) whereby an important rationale underlying "north-south" trade agreements is not economics per se but rather the pursuit by the north of non-economic objectives with the south.

Appendix

A Welfare expressions

The individual components of welfare can be expressed for an arbitrary vector of global tariffs τ: $CS_i = \frac{1}{18}\left(2e + d - \sum_{j\neq i} t_{ij}\right)^2 + \frac{1}{18}\sum_{j\neq i,k\neq i,j}(2e + d + 2t_{ji} - t_{jk})^2$, $PS_i^I = \frac{1}{3}d\left[3\alpha - (2e + d) + \sum_{j\neq i} t_{ij}\right]$ $PS_i^Z = \frac{e}{3}\left[3\alpha - (2e + d) + t_{zj} - 2t_{zi}\right]$ for $Z \neq I$ and $z \neq i \neq j$ and $TR_i = \frac{1}{3}\sum_{j\neq i,k\neq i,j} t_{ij}\,(e - d + t_{ik} - 2t_{ij})$.

B Proofs

We first present three lemmas that will be used in the proposition proofs. But, before doing so we address some notation issues. First, $G_i(g)$ denotes the payoff received by government i given a network of FTAs g where the possible networks and their notation is described at the beginning of Section 2.3.1. Second, we let t_{IN} and t_{OUT} denote arbitrary applied tariffs of, respectively, the insiders and outsider and let t^*_{IN} (see (5)) and $t^*_{OUT} \equiv t_{Nash}$ (see (4)) denote the optimal applied tariffs of, respectively, the insiders and outsider.

Lemma 4 *Global free trade emerges in the equilibrium of the FTA formation game if i)* $G_i\left(g^{FT}\right) > \max\left\{G_i(g_{jk}), G_i(g_{ij})\right\}$ *and ii)* $G_i(g_{ij}) > G_i(\varnothing)$.

Proof. Stage 1(c): $g = g_i^H$ for some country i at the beginning of stage 1(c). Lemma 1 implies $a_j = a_k = J$ and thus g^{FT} emerges in stage 1(c).

Stage 1(b): $g = g_{ij}$ for some countries i and j at the beginning of stage 1(b). Given symmetry, $G_i\left(g^{FT}\right) > \max\left\{G_i(g_{jk}), G_i(g_{ij})\right\}$ implies $a_l = J$ for each country l in the last active pair. Thus, an FTA forms in stage 1(b).

Stage 1(a): $g = \varnothing$ at the beginning of stage 1(a). Given stages 1(b) and 1(c), FTA formation in stage 1(a) yields g^{FT} as the outcome of the FTA formation game. Thus, symmetry and $G_i\left(g^{FT}\right) > G_i(g_{ij}) > G_i(\varnothing)$ implies $a_l = J$ for each country l in the last active pair. Hence, an FTA forms in stage 1(a) and global free trade emerges as the equilibrium outcome of the FTA formation game. ■

Lemma 5 *A single FTA emerges in the equilibrium of the FTA formation game if i)* $G_i\left(g^{FT}\right) < \max\left\{G_i(g_{jk}), G_i(g_{ij})\right\}$ *and ii)* $G_i(g_{ij}) > G_i(\varnothing)$. *The single FTA is between the first active pair if* $G_i(g_{ij}) > G_i(g_{jk})$ *but between the last active pair if* $G_i(g_{ij}) < G_i(g_{jk})$.

Proof. Stage 1(c): $g = g_i^H$ for some country i at the beginning of stage 1(c). Given Lemma 1, $a_j = a_k = J$ and g^{FT} emerges in stage 1(c).

Stage 1(b): $g = g_{ij}$ for some countries i and j at the beginning of stage 1(b). But, using symmetry, $G_i\left(g^{FT}\right) < \max\left\{G_i\left(g_{jk}\right), G_i\left(g_{ij}\right)\right\}$ implies $a_l = NJ$ for some country l in each active pair. Thus, g_{ij} remains in place and stage 1(c) is never attained.

Stage 1(a): $g = \varnothing$ at the beginning of stage 1(a). Given $G_i\left(g_{ij}\right) > G_i\left(\varnothing\right)$ and symmetry, $a_l = J$ for each country l in the last active pair. If $G_i\left(g_{ij}\right) < G_i\left(g_{jk}\right)$, then $a_l = NJ$ for each country l in the first two active pairs. Thus, the last active pair form an FTA and, given the outcome in stage 1(b), this FTA is the equilibrium outcome of the FTA formation game. Conversely, if $G_i\left(g_{ij}\right) > G_i\left(g_{jk}\right)$ then $a_l = J$ for each country l in the second active pair and, in turn, for each country in the first active pair. Thus, in this case, the first active pair form an FTA and, given the outcome in stage 1(b), this FTA is the equilibrium outcome of the FTA formation game. ■

Lemma 6 *No FTAs emerges in the equilibrium of the FTA formation game if* $G\left(\varnothing\right) > G\left(g^{FT}\right)$ *and* $G_i\left(\varnothing\right) > G_i\left(g_{ij}\right)$.

Proof. Lemma 1 says a hub-spoke network cannot emerge in equilibrium. Moreover, given symmetry, $G\left(\varnothing\right) > G\left(g^{FT}\right)$ implies $G_i\left(\varnothing\right) > \max\left\{G_i\left(g^{FT}\right), G_i\left(g_{ij}\right)\right\}$. Thus, choosing $a_i = NJ$ in stage 1(a) of the FTA formation game maximizes player i's payoff and, hence, no FTA forms. ■

We now move on to proofs of propositions and lemmas from the main text.

Proof of Lemma 1

In stage 1(c) of the FTA formation game, we have $G_i\left(g^{FT}\right) > G_i\left(g_j^H\right)$ iff $b < \frac{1}{3}\varphi + \frac{7}{6}\frac{t_K}{d}$. This must hold given (1) defines the non-prohibitive tariff and (2) (see Section 2.3.1) says that non-prohibitive tariffs require $b < \frac{1}{3}\varphi$.

Proof of Lemma 2

Assume a single FTA emerges conditional on FTA negotiations taking place. First, suppose the tariff bindings τ bind the applied tariffs of insiders and, given $t_{IN}^* < t_{OUT}^* = t_{Nash}$, the outsider. Then, (9) and (10) say the optimal tariff bindings are given by $\tau\left(t^{pe}\left(1 - \frac{p}{3}\right)\right)$. Further, (11) says these bindings bind the applied tariffs iff $b \leq \bar{b}_{TC}$.

Second, suppose the tariff bindings τ do not bind insiders' applied tariffs. That is, consider the maximization problem in (9) augmented by the constraint $t_{hk}\left(g_{ij}\right) = t_{IN}^*$ for $h = i, j$. This solution is given by (12) which says the optimal tariff bindings are given by $\tau\left(t^{pe}\right)$. These tariff bindings bind the applied tariffs of insiders, i.e. $t^{pe} < t_{IN}^*$, iff $b < \frac{1}{8}\varphi$ and of the outsider, i.e. $t^{pe} < t_{OUT}^*$, for any $b < \frac{1}{3}\varphi$ (see (2)).

The optimal tariff binding is now determined by comparing governments' joint expected payoff under these two case. Note that, for $b \geq \frac{1}{8}\varphi$,

$$\begin{aligned} & \left[pG\left(g_{ij};\tau_{-ij}\left(t^{pe}\left(1-\frac{p}{3}\right)\right)\right)+(1-p)\,G\left(\varnothing;\tau_{-ij}\left(t^{pe}\left(1-\frac{p}{3}\right)\right)\right)\right] \\ & -\left[pG\left(g_{ij};\tau_{-ij}^{FTA}\left(t^{pe}\right)\right)+(1-p)\,G\left(\varnothing;\tau_{-ij}^{FTA}\left(t^{pe}\right)\right)\right] \\ = \; & \frac{1}{1089}p\left[b^2d^2\left(144-121p\right)-30bd\left(e-d\right)+6\left(e-d\right)^2\right] \end{aligned} \tag{15}$$

with (15) positive if and only if $b > \bar{b}_{BND}$ where

$$\bar{b}_{BND} \equiv \frac{11\sqrt{9-6p}-15}{144-121p}\varphi \tag{16}$$

with $\bar{b}_{BND} \in \left(\frac{1}{8}\varphi, \bar{b}_{TC}\right]$. To verify the optimal tariff bindings are given by $\tau\left(t_{MFN}^{fs}\right)$, we need to verify that $t_{IN}^{*} > t^{pe}\left(1-\frac{p}{3}\right)$ for $b < \bar{b}_{BND}$ and $t_{IN}^{*} \leq t^{pe} \leq t_{OUT}^{*}$ for $b \geq \bar{b}_{BND}$ noting that $\bar{b}_{BND} \geq \frac{1}{8}\varphi$. First, $t_{IN}^{*} > t^{pe}\left(1-\frac{p}{3}\right)$ for $b < \bar{b}_{BND}$ follows because $\bar{b}_{TC} \geq \bar{b}_{BND}$ given one can verify that $z\left(p\right) \equiv \bar{b}_{TC} - \bar{b}_{BND}$ is increasing in p and $z\left(0\right) = 0$. Second, $t_{IN}^{*} \leq t^{pe}$ reduces to $b \geq \frac{1}{8}\varphi$ and $t_{OUT}^{*} > t^{pe}$ holds for any $b < \frac{1}{3}\varphi$.

Finally, $\bar{b}_{BND} \leq \bar{b}_{TC}$ implies applied tariffs are given by t_{MFN}^{fs} with two exceptions: i) $t_{ij}\left(g_{ij}\right) = 0$ (i.e. FTA members set zero tariffs on each other) and ii) $t_{ik}\left(g_{ij}\right) = t_{IN}^{*}$ for an insider i when $b \geq \bar{b}_{BND}$. ■

Proof of Proposition 1

Suppose global tariff negotiations take place. Then, Proposition 3 states that a single FTA emerges in equilibrium when $b < \bar{b}_{\varnothing}$. Moreover, the proof of Proposition 3 establishes that no FTAs emerge in equilibrium when $b \geq \bar{b}_{\varnothing}$.■

Proof of Proposition 2

In the presence of global tariff negotiations, Proposition 1 implies global free trade does not emerge in the equilibrium of the FTA formation game. However in the absence of global tariff negotiations, we can use Lemma 4 (see beginning of Appendix B) to show global free trade emerges when $b < \bar{b}_{OUT}$. The conditions of Lemma 4 hold for $b < \bar{b}_{OUT}$ because, using the expressions in Appendix A, we have $\bar{b}_{OUT} < \bar{b}_{FTA} < \bar{b}_{IN}$ where i) $G_i\left(g^{FT}\right) - G_i\left(g_{ij}\right) > 0$ iff $b < \bar{b}_{IN} \equiv \frac{101}{313}\varphi$ and ii) $G_i\left(g_{ij}\right) - G_i\left(\varnothing\right) > 0$ iff $b < \bar{b}_{FTA} \equiv \frac{47}{299}\varphi$.■

Proof of Lemma 3

Lemmas 4 and 5 imply $G_i\left(g_{ij}\right) > G_i\left(\varnothing\right)$ is a sufficient condition for FTA formation. Thus, $G_i\left(g_{ij}\right) \leq G_i\left(\varnothing\right)$ is a necessary condition for preventing FTA formation. To this end, given tariff bindings $\tau\left(t\right)$, let

$$f\left(t_{IN}^{*},t_{OUT}^{*},t\right)\equiv G_{i}\left(g_{ij};\tau_{-ij}^{FTA}\left(t\right)\right)-G_{i}\left(\varnothing;\tau\left(\min\left\{t,t_{Nash}\right\}\right)\right). \tag{17}$$

By considering two cases, we now show that a necessary condition for $f(\cdot)\leq 0$ is that t exceed a threshold $\underline{t}(b)$. First, suppose $t<t_{IN}^{*}$. Then, $t_{IN}=t_{OUT}=t$ and, using (17), $f(\cdot)\leq 0$ reduces to $t\geq\frac{2}{3}(e-d)-2bd\equiv\underline{t}_{1}(b)$. Second, suppose $t\in[t_{IN}^{*},t_{OUT}^{*}]$. Then, $t_{IN}=t_{IN}^{*}$ and $t_{OUT}=t$. Using (17), $f(\cdot)\leq 0$ reduces to $t\in[\underline{t}_{2}(b),\bar{t}_{2}(b)]$ where $\underline{t}_{2}(b)\equiv\hat{t}(b)-v(\theta)$ and $\bar{t}_{2}(b)\equiv\hat{t}(b)+v(\theta)$ and where $\hat{t}(b)\equiv\frac{e-d}{7}+\frac{6}{7}bd$ and $v(\theta)\equiv\frac{3}{77}\left[bd\left(400bd+54\left(e-d\right)\right)-13\left(e-d\right)^{2}\right]^{1/2}$. Thus, noting that $t_{OUT}^{*}>\hat{t}(b)$ for any $b<\frac{1}{3}\varphi$, a necessary condition for $f(\cdot)\leq 0$ is $t\geq\underline{t}(b)$ where

$$\underline{t}\left(b\right)=\begin{cases}\underline{t}_{1}\left(b\right)=\frac{2}{3}\left(e-d\right)-2bd & \text{if } t<t_{IN}^{*}\\ \underline{t}_{2}\left(b\right)=\frac{e-d}{7}+\frac{6}{7}bd-\frac{3}{77}\left[bd\left(400bd+54\left(e-d\right)\right)-13\left(e-d\right)^{2}\right]^{1/2} & \text{if } t\geq t_{IN}^{*}\end{cases}. \tag{18}$$

We now show that $f(\cdot)>0$ when $b<\frac{1}{8}\varphi$. Let $t<t_{IN}^{*}$. Then, $\underline{t}_{1}(b)>t_{IN}^{*}$ reduces to $b<\frac{19}{75}\varphi$ which holds for any $b<\frac{1}{8}\varphi$. Thus, $f(\cdot)>0$ if $b<\frac{1}{8}\varphi$. Now let $t\in[t_{IN}^{*},t_{OUT}^{*}]$. Then, $f(\cdot)$ is quadratic in t and minimized at $\hat{t}(b)$. In turn, the interval $[\underline{t}_{2}(b),\bar{t}_{2}(b)]$ is non-empty iff $v(\theta)\geq 0$ which reduces to $b\geq\frac{1}{8}\varphi$. Thus, $f(\cdot)>0$ if $b<\frac{1}{8}\varphi$. Now let $t\geq t_{OUT}^{*}$. Then, $f(\cdot)>0$ reduces to $b<\bar{b}_{FTA}$ where the proof of Proposition 2 gives $\bar{b}_{FTA}\equiv\frac{47}{299}\varphi$. Thus, $\frac{1}{8}\varphi<\bar{b}_{FTA}$ and, in turn, $f(\cdot)>0$ if $b<\frac{1}{8}\varphi$.■

Proof of Proposition 3

To begin, note that we use Lemmas 4-6 introduced at the beginning of Appendix B as well as the expressions $\underline{t}_{1}(b)$, $\underline{t}_{2}(b)$ and $\underline{t}(b)$ from the proof of Lemma 3. Define b^{*} such that $t^{pe}(b)\geq\underline{t}(b)$, and hence $G_{i}(\varnothing;\tau(t^{pe}))\geq G_{i}\left(g_{ij};\tau_{-ij}^{FTA}(t^{pe})\right)$, iff $b\geq b^{*}$. This yields $b^{*}\approx.177\varphi$ and, in turn, $b^{*}>\frac{1}{8}\varphi$. By definition of t^{pe}, we have $G(\varnothing;\tau(t^{pe}))\geq G(g;\tau)$ for any network of FTAs g and any tariff bindings τ. Thus, when $b\geq b^{*}$, Lemma 6 implies no FTAs emerge if the tariff bindings are $\tau(t^{pe})$. In turn, $\tau(t^{pe})$ are the optimal tariff bindings when $b\geq b^{*}$. Thus, hereafter, we only consider $b<b^{*}$.

By verifying the two conditions needed for Lemma 5, we now establish that a single FTA emerges in equilibrium when the tariff bindings are given by $\tau\left(t_{MFN}^{fs}\right)$. First, $G_{i}(g_{ij})>G_{i}\left(g^{FT}\right)$ because i) $G_{i}\left(g_{ij};\tau_{-ij}\left(t_{MFN}^{fs}\right)\right)-G_{i}\left(g^{FT}\right)=\frac{1}{9}b^{2}d^{2}(1+p)(3-p)>0$ for any b and ii) $G_{i}\left(g_{ij};\tau_{-ij}^{FTA}\left(t_{MFN}^{fs}\right)\right)-G_{i}\left(g^{FT}\right)>0$ iff $b\gtrsim.08\varphi$ when $t_{MFN}^{fs}=t^{pe}$. Note, $b\gtrsim.08\varphi$ when $t_{MFN}^{fs}=t^{pe}$ must hold because Lemma 2 established $t_{MFN}^{fs}=t^{pe}$ only if $b\geq\bar{b}_{BND}$ and that $\bar{b}_{BND}\geq\frac{1}{8}\varphi$. Second, using (17) and (18) from the proof of Lemma 3, we have $G_{i}(g_{ij})>G_{i}(\varnothing)$ because i) $t_{MFN}^{fs}\leq t^{pe}<\underline{t}_{2}(b)$ when $t_{MFN}^{fs}\in[t_{IN}^{*},t_{OUT}^{*}]$, ii) $t_{MFN}^{fs}\leq t_{IN}^{*}<\underline{t}_{1}(b)$ when $b<\frac{19}{75}\varphi$ and $t_{MFN}^{fs}<t_{IN}^{*}$, and iii) $t_{MFN}^{fs}\leq t^{pe}<t_{OUT}^{*}$ for any

$b < \frac{1}{3}\varphi$.

By construction, $\tau\left(t^{fs}_{MFN}\right)$ maximizes the expected joint government payoff conditional on a single FTA; in particular, governments achieve a higher joint expected payoff than by choosing $\tau(0)$ which corresponds with global free trade. Further, Lemma 1 rules out a hub-spoke network in equilibrium. Thus, the only possible equilibrium outcome apart from a single FTA is an outcome with no FTAs.

Lemmas 4 and 5 imply $G_i(\varnothing) \geq G_i(g_{ij})$ is a necessary condition for no FTAs in equilibrium. However, the proof of Lemma 3 established that $G_i(g_{ij}) > G_i(\varnothing)$ when i) $b < \frac{1}{8}\varphi$ and ii) $b \geq \frac{1}{8}\varphi$ and the tariff bindings are $\tau(t)$ where $t < t^*_{IN}$. Thus, we hereafter restrict attention to $b \in \left[\frac{1}{8}\varphi, b^*\right)$ and $t \geq t^*_{IN}$. We can now see that a single FTA emerges iff $b < \bar{b}_{\varnothing}$ noting that $x(b)$ emerges from solving

$$G(\varnothing; \tau(t)) - \left[p \cdot G\left(g_{ij}; \tau^{FTA}_{-ij}\left(t^{fs}_{MFN}\right)\right) + (1-p) \cdot G\left(\varnothing; \tau\left(t^{fs}_{MFN}\right)\right)\right] \geq 0. \tag{19}$$

Specifically, (19) reduces to $t \in [t^{pe} - x(b), t^{pe} + x(b)]$ where

$$x(b) = \begin{cases} \frac{1}{3}bd\left(-p^2+6p\right)^{1/2} > 0 & \text{if } b < \bar{b}_{BND} \\ \frac{(6p)^{1/2}}{33}\left[bd\left(97bd - 5(e-d)\right) + (e-d)^2\right]^{1/2} > 0 & \text{if } b \geq \bar{b}_{BND} \end{cases}. \tag{20}$$

Let $b < \bar{b}_{\varnothing}$ noting that $z(b) \equiv t^{pe} + x(b) - \underline{t}(b)$ is a strictly increasing function of b with $z\left(\bar{b}_{\varnothing}\right) = 0$. Then, $t^{pe} + x(b) < \underline{t}(b)$ and, in turn, there is no $\tau(t)$ such that $G_i(\varnothing) \geq G_i(g_{ij})$ and (19) holds. Hence, the optimal tariff bindings are given by $\tau\left(t^{fs}_{MFN}\right)$ and a single FTA emerges in equilibrium. Lemma 2 implies $\tau\left(t^{fs}_{MFN}\right)$ binds all applied tariffs except those of insiders when $b \in \left(\bar{b}_{BND}, \bar{b}_{\varnothing}\right)$ in which case $t_{IN} = t^*_{IN} < t^{pe}$.

Finally, let $b \geq \bar{b}_{\varnothing}$. Then, given $z(b)$ is strictly increasing in b, $t^{pe} + x(b) > \underline{t}(b)$. Thus, the tariff bindings $\tau(t)$ with $t = \underline{t}_2(b) > t^{pe}$ imply that $G_i(\varnothing) \geq G_i(g_{ij})$ and that (19) holds. Given (19) implies $G(\varnothing; \tau(t)) > G\left(g^{FT}\right)$, Lemma 6 implies no FTAs emerge in equilibrium if the tariff bindings are $\tau(\underline{t}_2(b))$. In turn, given $G(\varnothing; \tau(t))$ is decreasing in t for $t > t^{pe}$, $\tau(\underline{t}_2(b))$ are the optimal tariff bindings.■

References

Aghion, P., Antrās, P., Helpman, E., 2007. Negotiating free trade. Journal of International Economics 73 (1), 1–30.

Amador, M., Bagwell, K., 2013. The theory of optimal delegation with an application to tariff caps. Econometrica 81 (4), 1541–1599.

Bagwell, K., Staiger, R., 1997a. Multilateral tariff cooperation during the formation of Customs Unions. Journal of International Economics 42 (1), 91–123.

Bagwell, K., Staiger, R., 1997b. Multilateral tariff cooperation during the formation of free trade areas. International Economic Review 38 (2), 291–320.

Bagwell, K., Staiger, R., 1999a. An economic theory of GATT. American Economic Review 89 (1), 215–248.

Bagwell, K., Staiger, R., 1999b. Regionalism and multilateral tariff cooperation. In: Pigott, J., Woodland, A. (Eds.), International trade policy and the Pacific rim. Macmillan.

Bagwell, K., Staiger, R., 2005. Enforcement, private political pressure, and the general agreement on tariffs and trade/world trade organization escape clause. The Journal of Legal Studies 34 (2), 471–513.

Bergstrand, J. H., Larch, M., Yotov, Y., 2014. Economic integration agreements, border effects, and distance elasticities in the gravity equation. Mimeo.

Beshkar, M., Bond, E., Rho, Y., 2014. Tariff binding and overhang: theory and evidence. Mimeo.

Bhagwati, J., 1991. The world trading system at risk. Princeton University Press.

Bhagwati, J., 1993. Regionalism and multilateralism: an overview. In: Panagriya, A., de Melo, J. (Eds.), New dimensions in regional integration. World Bank.

Ethier, W. J., 1998. Regionalism in a multilateral world. Journal of Political Economy 106 (6), 1214–1245.

Freund, C., 2000. Multilateralism and the endogenous formation of preferential trade agreements. Journal of International Economics 52 (2), 359–376.

Freund, C., Ornelas, E., 2010. Regional trade agreements. Annual Review of Economics 2 (1), 139–166.

Gawande, K., Krishna, P., Olarreaga, M., 2012. Lobbying competition over trade policy. International Economic Review 53 (1), 115–132.

Horn, H., Maggi, G., Staiger, R., 2010. Trade agreements as endogenously incomplete contracts. The American Economic Review 100 (1), 394–419.

Krishna, P., 1998. Regionalism and multilateralism: A political economy approach. Quarterly Journal of Economics 113 (1), 227–251.

Lake, J., 2014. Free trade agreements as dynamic farsighted networks. Mimeo.

Levy, P., 1997. A political-economic analysis of free-trade agreements. The American Economic Review 87 (4), 506–519.

Limão, N., 2007. Are preferential trade agreements with non-trade objectives a stumbling block for multilateral liberalization? The Review of Economic Studies 74 (3), 821–855.

Maggi, G., 1999. The role of multilateral institutions in international trade cooperation. American Economic Review 89, 190–214.

Nicita, A., Olarreaga, M., Silva, P., 2013. Cooperation in WTO's tariff waters. Mimeo.

Ornelas, E., 2005a. Endogenous free trade agreements and the multilateral trading system. Journal of International Economics 67 (2), 471–497.

Ornelas, E., 2005b. Trade creating free trade areas and the undermining of multilateralism. European Economic Review 49 (7), 1717–1735.

Ornelas, E., 2008. Feasible multilateralism and the effects of regionalism. Journal of International Economics 74 (1), 202–224.

Richardson, M., 1993. Endogenous protection and trade diversion. Journal of International Economics 34 (3), 309–324.

Riezman, R., 1999. Can bilateral trade agreements help to induce free trade? Canadian Journal of Economics 32 (3), 751–766.

Saggi, K., Yildiz, H., 2010. Bilateralism, multilateralism, and the quest for global free trade. Journal of International Economics 81 (1), 26–37.