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

James Lake* Santanu Roy†

Southern Methodist University, Dallas, TX

May 21, 2015

Abstract

We show that global trade negotiations can prevent global free trade. In a simple model where global tariff negotiations precede sequential Free Trade Agreement (FTA), we show FTA formation can expand all the way to global free trade in the absence of global tariff negotiations but global free trade never emerges when global tariff negotiations precede FTA formation. This result arises precisely because global tariff negotiations successfully elicit 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.

JEL codes: C73, F12, F13

Keywords: Free Trade Agreement, global free trade, multilateralism, tariff complementarity, binding overhang

*Department of Economics, Southern Methodist University, Dallas, TX 75275-0496. E-mail: jlake@smu.edu

†Corresponding author: Department of Economics, Southern Methodist University, Dallas, TX 75275-0496. E-mail: sroy@smu.edu.

1 Introduction

Two rules have profoundly shaped the evolution of global tariffs since the creation of the 1948 General Agreement on Tariffs and Trade (GATT 1948). First, the Most Favored Nation (MFN) Principle of GATT Article I outlaws discrimination among trading partners by dictating that a country must impose the same tariff on all trading partners. Second, GATT Article XXIV provides an escape clause from the MFN principle whereby groups of countries can form a Free Trade Agreement (FTA) and only reduce tariffs on each other if (i) tariffs are completely eliminated among members and (ii) members do not raise tariffs on non-members. Interestingly, the relative importance of these two rules in driving global tariff liberalization has varied over time.

By the conclusion of the Uruguay Round of global tariff negotiations in 1994, the MFN principle combined with country-by-country commitments to keep tariffs below specified tariff ceilings (i.e. tariff bindings) had generated significant tariff liberalization. Indeed, at that time, the various rounds of global tariff negotiations had been the dominant form of global tariff liberalization with FTAs being relatively few and far between. However, since then, global negotiations on further tariff reductions have stalled and the current Doha Round of global negotiations is essentially dead. Concurrently, the post-Uruguay Round world has seen an unprecedented surge of FTAs with FTAs thus becoming the dominant form of global tariff liberalization. Indeed, given *de facto* global free trade would arise if all pairs of nations were linked by FTAs, FTA expansion under Article XXIV has created new hope in an alternative route to global free trade.

This changing face of global tariff liberalization has also created interest in understanding the various political and economic factors that potentially affect the incentives for expansion of FTAs. Given the rapid proliferation of FTAs took place after the successful 1994 Uruguay Round of global negotiations, it is important to understand how prior global negotiations influence the incentives for subsequent FTA formation under GATT Article XXIV, and how the shadow of future FTA formation may, in turn, influence the initial outcome of

global negotiations. How would the extent of FTA formation observed today differ if the Uruguay Round had not taken place? That is, do commitments to tariff ceilings during prior global negotiations help or hinder the possibility that FTA proliferation proceeds all the way to global free trade? Could global negotiations actually be the cause of what *The Economist* recently referred to as a fragmented world of "gated globalization" where FTA expansion stops far short of global free trade?[1] These are the questions addressed in this paper.

We consider a world of three symmetric countries. For our underlying trade model, we adapt the competing exporters framework of Bagwell and Staiger (1999) to include an import competing sector and politically motivated governments. This framework has three goods with each country exporting two comparative advantage goods and importing one comparative disadvantage good. Each government has political economy motivations in that its 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 that differ only because of the presence or absence of an initial round of global tariff negotiations. In the first game, global negotiations over tariff *bindings* are followed by FTA negotiations.[2] In the second game, there are no global negotiations preceding FTA negotiations. Once FTA negotiations conclude in either game, countries choose their applied tariffs that, in turn, generate patterns of consumption and trade. Our protocol 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

[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.

they do not yet know the precise sequential order in which country pairs will engage in FTA formation.

Our main result is that, when political economy motivations are not too strong, multilateralism prevents global free trade. When global tariff negotiations precede FTA negotiations, a tariff ridden world emerges with globally negotiated tariff bindings above zero and no more than one pair of countries linked by an FTA. However, in the *absence* of global tariff negotiations, FTA formation continues until all pairs of countries are linked by FTAs and, thus, global free trade is attained. Further, when global negotiations precede FTA formation and political economy objectives are not too strong, a world of "gated globalization" emerges where members of the single FTA practice free trade between themselves but tariff barriers remain between these FTA "insiders" and the non-member "outsider" country.

The driving force behind 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 this creates incentives for the insiders to engage in subsequent FTA formation with the outsider in order to gain tariff concessions from the outsider. Thus, as long as government political economy motivations are not too strong, sequential FTA formation leads to global free trade. However, when 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. We show that these tariff concessions obtained through forward looking global negotiations are deep enough that once an FTA is formed, the insiders have no incentive to engage in subsequent FTA formation with the outsider and, thus, global free trade does not emerge. In this sense, the success of global tariff negotiations in lowering tariffs drives our result that global tariff negotiations prevent global free trade.

In our framework, the prospect of future FTA formation creates a "shadow of future regionalism" that affects the outcome of prior global negotiations. In particular, countries negotiate lower global tariff bindings than they would if

the shadow of regionalism was not looming over global negotiations. This is because of a "multilateral tariff complementarity effect", previously identified by Ornelas (2008), whereby the global tariff binding that maximizes the joint payoff of all governments is lower upon FTA formation.[3] It is important to distinguish this from the usual notion of tariff complementarity where FTA members reduce tariffs on non-members due to, among other things, weaker terms of trade motivations upon forming an FTA.[4] When anticipating formation of an FTA, global tariff negotiations aggregate the incentives of potential insiders and outsiders implying that terms of trade considerations bear no imprint on global tariff bindings. Thus, multilateral tariff complementarity reflects the forces other than terms of trade motivations that drive individual tariff complementarity.

The dependence of globally negotiated tariff bindings on subsequent FTA negotiations has significant practical implications. First, when government political economy motivations are not too strong, the globally negotiated tariff bindings actually bind the applied tariffs of FTA members and non-members, and thereby lead to zero "binding overhang". Indeed, there is a range of political economy motivations where this result emerges only because governments anticipate subsequent FTA formation. Thus, farsighted global tariff negotiations preceding FTA negotiations may help explain why essentially zero binding overhang is observed in the major 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; the usual tariff complementarity effect upon FTA formation is not observed on the equilibrium path. 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 applied tariffs may already be embed-

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

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

ded in multilateral tariff bindings negotiated prior to FTA formation. This is especially important given policy makers actually rely on observed trade flow changes upon FTA formation to infer the welfare effects of FTAs.[5]

The remainder of the paper proceeds as follows. After discussing the related literature in Section 2, Section 3 presents our modified version of the Bagwell and Staiger (1999) competing exporters model. Section 3.2 describes our game theoretic approach to modeling multilateralism and regionalism. Section 4 establishes that global tariff negotiations prevent global free trade. Section 5 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 7 concludes. Proofs are collected in the appendix.

2 Related Literature

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

[5] See, Bergstrand et al. (2014, p.3).

[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).

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 multilateral tariffs can make an arbitrarily chosen bilateral FTA self-enforcing (when it is not so otherwise).[8] However, Freund abstracts from issues surrounding the proliferation of FTAs. In order to focus on this issue of FTA proliferation, we abstract from issues related to whether or not trade agreements are self-enforcing and assume pairs of countries form FTAs whenever it is jointly optimal for the pair anticipating any subsequent proliferation of FTAs. Further, rather than take multilateral tariffs as exogenous, we endogenize multilateral negotiations (in addition to FTA formation). In doing so, we find that multilateralism is never necessary for FTA formation and, indeed, the success of multilateralism is actually the reason it may prevent sequential FTA formation from expanding to global free trade.

Another paper investigating the link from multilateralism to regionalism is 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 5.

Our paper also links with some other important papers in the broader trade agreements literature. In a three country setting, Bagwell and Staiger (2005b) analyze how rules, particularly non-discrimination and reciprocity, affect bilateral incentives to reduce tariffs after global negotiations. However, as the authors acknowledge, they abstract from the fact that these incentives really depend on whether the non-member to a bilateral agreement would form any

[8] Similarly, Ethier (1998) argues regionalism is a benign consequence emerging from the success of multilateralism; it allows small countries that do not participate in early rounds of multilateral negotiations to gain by forming FTAs with large countries and attracting new foreign direct investment.

subsequent agreements. We addresses this issue directly by modelling global negotiations among forward looking governments that correctly anticipate the extent of subsequent FTA formation. Indeed, as discussed above, globally negotiated tariff bindings not only affect the extent of FTA formation but the extent of FTA formation also affects the globally negotiated tariff bindings.[9] Our analysis also differs from Bagwell and Staiger (2005b) because our focus is isolating the role played by global negotiations in attaining global free trade by comparing the outcomes in the presence and absence of global negotiations.

Many papers in the literature emphasize a positive role for multilateral cooperation. In addition to Bagwell and Staiger (2005b), another example is Maggi (1999) who shows that multilateralism can play a positive role in the global trade system by monitoring and punishing defectors. However, in contrast to much of the literature, our model presents a mechanism where the presence of multilateral cooperation prior to bilateral cooperation actually results in a loss of world welfare.

Finally, our results relate to the literature on binding overhang (i.e. globally negotiated tariff bindings exceed applied tariffs). This literature has two main explanations for binding overhang in an optimal trade agreement. First, Horn et al. (2010) argue costly contracting prevents formation of a state contingent global trade agreement. Second, many authors (see Bagwell and Staiger (2005a), Amador and Bagwell (2013) and Beshkar et al. (2014)) argue 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.[10] Our explanation of binding overhang takes as given the practical observation that globally negotiated tariff bindings are not conditioned on subsequent FTA formation by a country or the number of FTAs it forms. However, the presence of multilateral tariff complementarity implies

[9] When comparing our results to Bagwell and Staiger (2005b), one should keep in mind that our analysis implicitly embodies three rules: (i) bilateral tariff reductions must be complete, (ii) given symmetry, changes in member trade flows are reciprocal, and (iii) as FTA members maintain tariffs on the non-member, bilateral tariff cuts are discriminatory.

[10] Private information over these motivations prevents a state contingent global trade agreement.

governments would like to condition tariff bindings in this way. Thus, the uncertainty in our model about which countries will subsequently form FTAs (a plausible situation at the time of the 1994 Uruguay Round) creates a veil of ignorance and produces global tariff bindings whereby binding overhang can emerge because FTA members may still practice tariff complementarity.

3 Model

3.1 Basic trade model

We consider a modified version of the Bagwell and Staiger (1999) competing exporters model. There are three symmetric countries denoted by $i = a, b, c$ and three non-numeraire goods denoted by $Z = A, B, C$. 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. In turn, 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".

Given consumption q_Z of each non-numeraire good Z and q_0 of a numeraire good, consumer preferences are represented by $q_0 + \sum_{Z=A,B,C} u(q_Z)$ with the quasi-linearity implying the numeraire sector absorbs all general equilibrium effects. We assume demand for good Z in country i is given by $q_Z = q\left(p_i^Z\right) = \alpha - p_i^Z$ 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

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

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

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

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 $x_{iz}^Z\left(t_{zi}, t_{zj}\right) > 0$ 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

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

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:

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

This ensures that the optimal tariffs imposed by governments are always lower

than the prohibitive tariff given by (2).

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

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

where $\tau \equiv (t_{ij}, t_{ik}, t_{ji}, t_{jk}, t_{ki}, t_{kj})$ 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 $W_i(\cdot)$. 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

$$G_i(\tau) = \sum_Z CS_i^Z(\tau) + \sum_{Z \neq I} PS_i^Z(\tau) + (1+b) PS_i^I(\tau) + TR_i(\tau) \qquad (4)$$

where $b > 0$ reflects the extent to which the government values protection of the import competing sector. Note, the actual wedge between national welfare $W_i(\cdot)$ and the government's payoff $G_i(\cdot)$ 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.

3.2 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, these two FTA formation games are identical.

Reflecting the global tariff negotiations that have actually taken place (e.g.

Uruguay round), we model global negotiations over the upper bound on tariffs (i.e. tariff bindings) rather than actual tariffs (i.e. applied tariffs).[11] Thus, in our model, "binding overhang" can emerge because countries may set applied tariffs below the tariff binding after FTA negotiations conclude. Moreover, when negotiating global tariff bindings, we assume governments anticipate how the negotiated tariff bindings 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: This stage of the game (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 the 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

[11] Although symmetry implies the constraint never binds, we assume the MFN principle applies to globally negotiated tariff bindings.

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.[12,13]

Stage 2: Governments of all countries choose their applied tariffs subject to the zero tariff constraint between FTA members (GATT Article XXIV), the MFN principle (GATT Article I) and any prior globally negotiated tariff bindings.

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

[12]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.

[13]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.

failure.[14]

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 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.

It is important to note here that all our results hold when FTA negotiations take place with certainty following global negotiations (i.e. $p = 1$). However, given FTA formation was relatively rare prior to the 1994 Uruguay Round of multilateral negotiations, it is not clear whether governments at the time perceived the subsequent flood of FTAs as likely or unlikely. Thus, introducing the parameter p is a simple way of capturing the potential uncertainty regarding subsequent FTA formation. In turn, we can perform comparative static exercises with p and thereby investigate how government perception regarding the likelihood of future FTA negotiations affects the globally negotiated tariffs and the eventual extent of FTA formation.

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). Hereafter, 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, $g = g^{FT}$. $G_i(g)$ denotes government i's payoff when the network is g.

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

Lemma 1 *If two FTAs have already formed, then* $G_i\left(g^{FT}\right) > G_i\left(g_j^H\right)$. *Thus, the spoke countries always find it optimal to form an FTA which yields global free trade. This is independent of whether global trade negotiations preceded FTA formation and any (non-zero) negotiated tariff bindings therein.*

While the net benefit that spokes obtain from FTA formation is proportional to the tariff they face in each others market, it is positive when a tariff barrier exists. Given the hub has tariff free access to each spoke market, three reasons drive the attractiveness of spoke-spoke FTAs. First, the benefit of market access gained is high because it eliminates the discrimination that spokes face when exporting to each other. Second, the cost of domestic market access given up is low because the protection received by the import competing sector has already been diluted by the FTA with the hub. Third, given the spokes already have an FTA with the hub, spoke-spoke FTAs are not accompanied by tariff complementarity which avoids the associated intra-FTA negative externality.

3.3 Optimal tariffs

3.3.1 Individually optimal tariffs

In this section, we describe the individually optimal (i.e. non-cooperative) tariffs that countries set if they are unconstrained by tariff bindings. They are all easily derived given the welfare expressions in Appendix A.[15] 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 individually optimal tariff of a country and, if so, the country sets an applied tariff below the tariff binding. Some tariff notation will only be used in the proofs with this notation explained at the beginning of Appendix B.

Given our weighted welfare expression for the government payoff $G_i(\cdot)$, the first order condition (FOC) for t_{ik} can be written as follows where x_{ii}^I denotes

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

output of good I supplied by country i to its domestic market:

$$\frac{\partial G_i(g)}{\partial t_{ik}} = \left[\left(1 - \frac{\partial p_i^I}{\partial t_{ik}}\right) x_{ki}^I - \frac{\partial p_i^I}{\partial t_{ik}} x_{ji}^I\right] + \left[t_{ik}\frac{\partial x_{ki}^I}{\partial t_{ik}} + t_{ij}\frac{\partial x_{ji}^I}{\partial t_{ik}}\right] + \left[b x_{ii}^I \frac{\partial p_i^I}{\partial t_{ik}}\right] \quad (5)$$

Following Ornelas (2005b), we refer to these terms in square brackets as, respectively, the (i) terms of trade effect, (ii) tariff revenue effect, and (iii) distributive effect.[16] In general, country i depresses the world price and increases the tariff inclusive domestic price of its imported good I by imposing tariffs. However, when only raising t_{ik}, country i's terms of trade improve vis a vis country k (i.e. $1 - \frac{\partial p_i^I}{\partial t_{ik}} > 0$) but deteriorate vis a vis country j (i.e. $-\frac{\partial p_i^I}{\partial t_{ik}} < 0$) because country j now receives the higher tariff inclusive domestic price when exporting to country i and faces an unchanged tariff t_{ij}. The tariff t_{ik} also affects tariff revenue by reducing imports and shifting the composition of imports away from country k and towards country j ($-\frac{\partial x_{ki}}{\partial t_{ik}} > \frac{\partial x_{ji}}{\partial t_{ik}} > 0$).[17] Finally, the distributive effect captures the redistribution of domestic surplus from consumers to producers which is valuable given the government's political motivations.

Absent FTAs, solving the FOCs for the tariffs imposed by country i's government on countries j and k, i.e. $t_{ij}(\varnothing)$ and $t_{ik}(\varnothing)$, yields:

$$t_{ij}(\varnothing) = t_{ik}(\varnothing) \equiv t_{Nash} = \frac{1}{4}(e - d) + \frac{3}{4}bd. \quad (6)$$

Country i chooses non-discriminatory tariffs because of symmetry with these tariffs consisting of two terms. The first term in (6) reflects the terms of trade and tariff revenue motives in the absence of political economy motivations. In particular, larger domestic import competing sectors (i.e. higher d) reduce world export volumes and, in turn, mitigate the terms of trade motive. The

[16] Ornelas' general setup also includes a fourth term $(1+b)\, p_i^I \frac{\partial x_{ii}^I}{\partial t_{ik}}$ which he labels the strategic effect. However, $\frac{\partial x_{ii}^I}{\partial t_{ik}} = 0$ in our model because of the endowment structure.

[17] In a completely symmetric setting, the terms of trade and distributive effects are positive while the tariff revenue effect is negative. This follows upon letting $t_{ik} = t_{ij}$ and $x_{ki}^I = x_{ji}^I$.

second term reflects the influence of government political economy motivations that emerge directly via the distributive effect and also indirectly via the affect that politically charged tariffs have on the terms of trade and tariff revenue effects. Naturally, the political economy influence strengthens with the extra weight placed on the import competing sector's producer surplus, b, and the size of the domestic import competing sector, d.[18] Figure 1, which is presented after Lemma 2, illustrates the Nash tariff and various other variables discussed in this section.

We now describe how FTA formation affects countries' optimal tariffs. First, FTA formation between countries i and j (insiders) leaves the optimal tariffs of country k (outsider) unchanged at the Nash tariff:

$$t_{ki}\left(g_{ij}\right) \equiv t_{OUT}^{*} = \frac{1}{4}\left(e-d\right) + \frac{3}{4}bd = t_{Nash}. \tag{7}$$

Underlying this result is the separability of goods markets which implies 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.

Second, FTA formation induces FTA insiders to lower their tariff on the non-member outsider which is a phenomena known as tariff complementarity. Hereafter we refer to it as "individual tariff complementarity". An insider, say country i, has an optimal tariff on the outsider country k of

$$t_{ik}\left(g_{ij}\right) \equiv \frac{1}{11}\left(e-d\right) + \frac{3}{11}bd \equiv t_{IN}^{*}. \tag{8}$$

Individual tariff complementarity is evident because $t_{IN}^{*} < t_{Nash} = t_{OUT}^{*}$. Intuitively, the FTA between countries i and j weakens the terms of trade and tariff revenue motivations for country i's external tariff on country k.

[18] Note that our assumption in equation (3) on the range of the parameter b implies that the Nash tariffs are below the prohibitive level t_{PRO} given in (2).

The underlying cause is that the FTA shifts the composition of i's imports towards country j. When raising t_{ik}, the importance of country i's terms of trade deterioration vis a vis country j is now higher while the importance of its terms of trade improvement vis a vis country k is now lower. Moreover, country i's ability to raise tariff revenue from the non-member k is now lower. Thus, the weaker terms of trade and tariff revenue motivations of country i explain the individual tariff complementarity effect.[19]

Finally, as above, formation of a second FTA 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:[20]

$$t_{kj}\left(g_i^H\right) = \frac{1}{11}\left(e-d\right) + \frac{3}{11}bd = t_{IN}^*. \tag{9}$$

3.3.2 Optimal globally negotiated tariff bindings

We now describe the jointly optimal tariff bindings that governments negotiate prior to FTA formation. Given the independence of markets, we merely focus on the jointly optimal tariff in the market of good I which is imported by country i. To begin, for the sake of exposition, we assume governments negotiate future applied tariffs imposed by countries and can condition these applied tariffs on whether a country has formed FTAs or not. Naturally, we relax these assumptions when determining the optimal tariff bindings.

Letting $G^I\left(g;\left(t_{ij},t_{ik}\right)\right) = \sum_{z=a,b,c} G_z^I\left(g;\left(t_{ij},t_{ik}\right)\right)$ denote the joint government payoff in market I when the network of FTAs is g, governments maximize their joint payoff by solving:

$$\max_{t_{ij},t_{ik}} G^I\left(g;\left(t_{ij},t_{ik}\right)\right). \tag{10}$$

[19] Note that the distributive effect, $bx_{ii}^I \frac{\partial p_i^I}{\partial t_{ik}}$, is independent of t_{ij} in our model and so the *only* reason tariff complementarity emerges is because of the effects of the FTA between i and j on the terms of trade and tariff revenue motives.

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

In our model, the FOC for t_{ik} is given by:

$$bx_{ii}^{I}\frac{\partial p_{i}^{I}}{\partial t_{ik}}+\left[t_{ik}\frac{\partial x_{ki}^{I}}{\partial t_{ik}}+t_{ij}\frac{\partial x_{ji}^{I}}{\partial t_{ik}}\right]=0. \tag{11}$$

When comparing this FOC for governments' jointly optimal t_{ik} and the FOC for the individually optimal t_{ik} in (5), three observations stand out. First, as is well known, the jointly optimal tariff bears no imprint of the terms of trade effects that enter country i's individually optimal tariff. Second, the two terms in (11) shaping the jointly optimal t_{ik} are the distributive and tariff revenue effects present in country i's individually optimal t_{ik}. These first two observations imply the only difference between the incentives underlying the jointly optimal and individually optimal t_{ik} is that the jointly optimal t_{ik} is not affected by terms of trade motivations. Moreover, this difference underlies the the third observation which is that the jointly optimal t_{ik} is more sensitive to a rising b than the individually optimal t_{ik}. In particular, the terms of trade motive weakens as b rises because the absolute level of tariffs rise on account of stronger politically economy motivations which depresses world export volumes and, thus, the terms of trade motive. As a result, the jointly optimal t_{ik} is more sensitive to a rising b than the individually optimal t_{ik}.

Absent FTAs, solving the FOC (11) for t_{ik} and an analogous FOC for t_{ij} reveals the jointly optimal tariffs. We refer to these as "politically efficient" tariffs and they are given by the non-discriminatory tariffs:

$$t_{ij}^{pe}\left(\varnothing\right)=t_{ik}^{pe}\left(\varnothing\right)=bd\equiv t^{pe}. \tag{12}$$

Given the independence of markets, these politically efficient tariffs in the absence of FTAs are also the politically efficient tariffs for an outsider:

$$t_{ij}^{pe}\left(g_{jk}\right)=t_{ik}^{pe}\left(g_{jk}\right)=t^{pe}. \tag{13}$$

However, FTA formation affects the politically efficient tariff for insiders. When countries i and j form an FTA then solving the FOC (11) after im-

posing $t_{ij} = 0$ reveals the politically efficient tariff is now

$$t_{ik}^{pe}(g_{ij}) = \frac{1}{2}bd = \frac{1}{2}t^{pe}. \tag{14}$$

The fact that the politically efficient tariff for an insider falls below the politically efficient tariff in the absence of FTAs, i.e. $t_{ik}^{pe}(g_{ij}) < t_{ik}^{pe}(\varnothing)$, indicates the presence of "multilateral tariff complementarity", which has been identified by Ornelas (2008). Given our discussion surrounding the FOC (11), multilateral tariff complementarity emerges because the tariff revenue effect still enters the jointly optimal tariff for an insider even though the terms of trade effect does not.

Our analysis above assumed that governments negotiate applied tariffs and they can condition future applied tariffs on whether a country has formed FTAs or not. In practice, governments negotiate tariff bindings rather than applied tariffs and they do not condition the future tariff bindings of a country on whether it forms future FTAs or not. Our model reflects these two realities. In particular, governments negotiate global tariff bindings anticipating that FTA formation could subsequently occur but without knowing who would form such FTAs. In this case, Lemma 2 characterizes the optimal tariff bindings when countries anticipate a single FTA will subsequently emerge and Figure 1 helps illustrate graphically.

Lemma 2 *Suppose that governments anticipate a single FTA will emerge if FTA negotiations take place. Then, there exists a critical value of b, denoted* $\bar{b}_{BND}$*, such that global negotiations lead to the following uniform optimal tariff binding* t_{MFN}^{fs}*:*

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

If FTA negotiations (subsequently) take place and a single FTA emerges, then (i) when $b < \bar{b}_{BND}$*, all applied tariffs are* t_{MFN}^{fs} *but (ii) when* $b \geq \bar{b}_{BND}$*, the applied tariffs for an insider and the outsider are, respectively,* t_{IN}^{*} *and* t_{MFN}^{fs}*.*

When governments anticipate subsequent formation of a single FTA but do

not know which countries will form the FTA, the jointly optimal tariff imposed by country i must take into account that country i could be an insider or an outsider (with respective probabilities $\frac{2}{3}$ and $\frac{1}{3}$). Thus, when setting a global tariff binding that will bind the insiders and the outsider, the optimal binding is the farsighted MFN tariff $t_{MFN}^{fs} = t^{pe}\left(1 - \frac{p}{3}\right)$ which is the weighted average of the jointly optimal tariff binding for country i as an insider, $t^{pe}\left(1 - \frac{p}{2}\right)$, and as an outsider, t^{pe}. Formally, the common tariff binding $t^{pe}\left(1 - \frac{p}{3}\right)$ is the solution to

$$\begin{aligned} \arg\max_{t_{ij}, t_{ik}} \quad & p\tfrac{1}{3}\left[G^I\left(g_{ij}; (t_{ij}, 0)\right) + G^I\left(g_{ik}; (0, t_{ik})\right) + G^I\left(g_{jk}; (t_{ik}, t_{jk})\right)\right] \\ & + (1-p)\, G^I\left(\varnothing; (t_{ij}, t_{ik})\right) \end{aligned} \tag{15}$$

where the objective function in (15) recognizes the uncertainty about subsequent FTA negotiations taking place and which countries would form an FTA. However, rather than setting a binding that binds the insiders and the outsider, governments could try and set a tariff binding that only binds the outsider upon FTA formation.[21] In this case, the optimal tariff binding for the outsider would be $t_{ik}^{pe}\left(g_{jk}\right) = t^{pe}$ while insiders would set their individually optimal tariff t_{IN}^{*}. The critical value $\bar{b}_{BND}$ determines whether governments find it optimal to bind the insiders and the outsider or only bind the outsider.[22]

In particular, as shown in Figure 1, the critical value $\bar{b}_{BND}$ highlights the tension between the cost and benefit of binding the insiders and the outsider versus only binding the outsider. Binding the insiders and the outsider via a tariff binding $t^{pe}\left(1 - \frac{p}{3}\right)$ is costly because the tariff imposed by the outsider falls below the politically efficient tariff for an outsider of $t_{ik}^{pe}\left(g_{jk}\right) = t^{pe}$. But, the benefit is that the tariff imposed by the insider falls from the individually optimal level t_{IN}^{*} towards the politically efficient tariff for an insider of $t_{ik}^{pe}\left(g_{ij}\right) = \frac{1}{2}t^{pe}$. Crucially, as discussed above and illustrated in Figure 1, in-

[21] Since tariff complementarity implies $t_{Nash} = t_{OUT}^{*} > t_{IN}^{*}$, it is not possible to set a tariff binding that only binds insiders. Moreover, setting a tariff binding that does not bind any country's applied tariff is not optimal.

[22] In the proof of Lemma 2 we establish that the farsighted MFN tariff actually binds the applied tariffs of the insiders and the outsider when $b < \bar{b}_{BND}$ but only binds the applied tariff of the outsider when $b \geq \bar{b}_{BND}$.

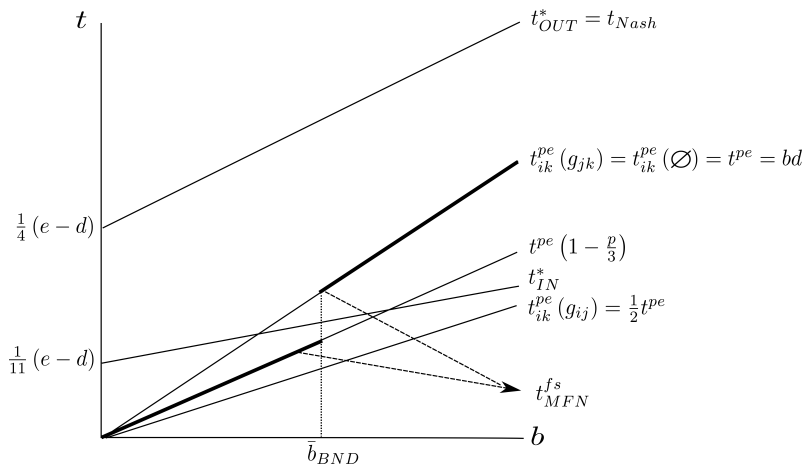

Figure 1: Individually optimal and jointly optimal tariffs

dividually optimal tariffs are less sensitive than politically efficient tariffs to a rising b (because the terms of trade motive weakens as b rises). When b is low, the benefit of binding the insiders and the outsider is high while the cost is proportional to b and, hence, small. But, as b rises, the benefit of binding the insiders and the outsider falls (i.e. $t^*_{IN} - t^{pe}\left(1-\frac{p}{3}\right)$ shrinks) while the cost, which is proportional to b, rises. The critical value $\bar{b}_{BND}$ exactly balances the benefit and cost with governments choosing to bind the insiders and the outsider when $b < \bar{b}_{BND}$ but only bind the outsider when $b > \bar{b}_{BND}$.[23]

Before moving on, we note an important result of our model is that the shadow of future FTA formation feeds into the initial globally negotiated tariff bindings as seen in Lemma 2 and (15). We expand upon this in Section 5.

4 Global tariff negotiations and global free trade

To assess the role played by global tariff negotiations in the attainment of global free trade, we first investigate the extent of FTA formation following global negotiations. In particular, our main priority in the current section is *whether* FTA expansion leads to global free trade when global negotiations

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

precede FTA formation. Characterizing exactly *how many* FTAs form is our main priority in Section 5.

Two results from the previous section provide the starting point for this investigation. First, Lemma 1 says a hub-spoke network cannot emerge in equilibrium. Thus, FTA formation must either stop at a single FTA or expand to global free trade. Second, Lemma 2 says that implementing the farsighted MFN tariff t^{fs}_{MFN} as the globally negotiated tariff binding maximizes the joint expected government payoff when, conditional on FTA negotiations taking place, a single FTA emerges in equilibrium. Thus, if governments anticipate that a single FTA will emerge in equilibrium then they will implement the farsighted MFN tariff as the global tariff binding. The key question now is the following: what is the equilibrium outcome when governments implement the farsighted MFN tariff as the globally negotiated tariff binding?

Lemma 3 states the answer.

Lemma 3 *Suppose governments set the farsighted MFN tariff t^{fs}_{MFN} as the global tariff binding. Then, at most a single FTA forms in equilibrium. Further, if $b < \bar{b}_{BND}$ then a single FTA forms in equilibrium when FTA negotiations take place. In any case, governments' joint expected payoff at the global negotiations stage exceeds that under global free trade.*

While Lemma 3 says a single FTA is not the only equilibrium outcome when governments implement the farsighted MFN tariff as the global tariff binding, it says the only other possible outcome is no FTAs. Moreover, regardless of the equilibrium outcome, governments have a higher expected joint payoff than under global free trade.

It is useful to understand who resists expansion of a single FTA to global free trade after negotiating the farsighted MFN tariff as the global tariff binding. Naturally, foreseeing that subsequent FTA formation eventually yields global free trade, an insider only engages 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 an insider receives from global free trade is elimination of the tariff barrier faced when exporting to the outsider. However,

this incentive is relatively weak given that the globally negotiated tariff binding t^{fs}_{MFN} significantly restrains the outsider's applied 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.

Indeed, a single FTA will emerge in equilibrium when $b < \bar{b}_{BND}$ and governments set the farsighted MFN tariff t^{fs}_{MFN} as the global tariff binding. Anticipating that a single FTA will not expand any further, the benefit a potential insider receives from *not* becoming an insider lies in the political benefit of maintaining protection for the import competing sector via the tariff imposed on the other potential insider. However, this political benefit is small when $b < \bar{b}_{BND}$ because the politically efficient tariff $t^{pe}\left(1 - \frac{p}{3}\right)$ is already placing considerable restraint on the applied tariff of each potential insider. Thus, upon setting t^{fs}_{MFN} as the global tariff binding, a single FTA emerges when $b < \bar{b}_{BND}$.

Regardless of whether a single FTA or no FTAs emerge, the joint expected government payoff at the global negotiations stage exceeds that under global free trade. This follows by construction when a single FTA emerges because the farsighted MFN tariff maximizes the joint expected government payoff conditional on a single FTA subsequently emerging. In particular, the joint expected government payoff exceeds that under global free trade as governments have the option of setting a zero tariff binding. Moreover, Lemma 3 says no FTAs can emerge only if $b > \bar{b}_{BND}$. But, in this case, the farsighted MFN tariff is the politically efficient tariff $t^{fs}_{MFN} = t^{pe}_{ik}(g_{jk}) = t^{pe}_{ik}(\varnothing)$ and, by definition, the maximum joint payoff that governments can ever attain is when no FTAs form and global applied tariffs are given by $t^{pe}_{ik}(\varnothing)$. This discussion now implies that global free trade never emerges because governments have the option of setting the farsighted MFN tariff knowing such a tariff binding would not lead to global free and would always deliver a higher joint expected payoff than global free trade. We state this important result in the following proposition.

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

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 where FTA members eliminate tariffs on each other but governments are not constrained by any pre-existing tariff bindings.

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, Lemma 1 says 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 3.3, individual 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 effects of tariff complementarity 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 result, 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 3.3, an outsider blocks global free trade only if political economy motivations exceed a threshold:

$$b \geq \bar{b}_{OUT} \equiv \frac{13}{137}\varphi. \tag{16}$$

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* (16)*).*

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 (through tariff bindings set by forward looking governments during global negotiations) 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.

5 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. Although Lemmas 1-3 established that

a single FTA or no FTAs must emerge in equilibrium following global tariff negotiations, we did not characterize when each possible outcome emerges in equilibrium. That is, we did not establish whether global negotiations lead to a single FTA and a fragmented world of globalization or whether they yield a world of no FTAs. In particular, while Lemma 3 established a threshold level of political economy motivations that ensures no FTAs emerge upon setting t^{fs}_{MFN} as the global tariff binding, is it possible that governments can and/or want to prevent FTA formation by not setting t^{fs}_{MFN} as the global tariff binding? And, if so, what are the equilibrium global tariff bindings?

To begin, we need to understand the tariff bindings that prevent FTA formation. 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 (4), 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 FTA formation regardless of the globally negotiated tariff binding.

However, $b \geq \frac{1}{8}\varphi$ is not a sufficient condition for preventing FTAs. Governments 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, governments opt against FTA formation only if the tariff binding exceeds a threshold $\underline{t}(b)$ in addition to $b \geq \frac{1}{8}\varphi$ (equation (23) in the Appendix gives the algebraic expression for $\underline{t}(b)$). Lemma 4 summarizes this discussion.

Lemma 4 *For $b < \frac{1}{8}\varphi$, there are no global tariff bindings that prevent all FTA formation. For $b \geq \frac{1}{8}\varphi$, there exits a threshold $\underline{t}(b)$ such that a global tariff binding t prevents all FTA formation only if $t \geq \underline{t}(b)$.*

Given Lemma 4 establishes FTA formation takes place when $b < \frac{1}{8}\varphi$ regardless of the global tariff binding, we suppose hereafter that $b \geq \frac{1}{8}\varphi$. Under what conditions would governments jointly prefer deviating from the tariff binding t^{fs}_{MFN} to some tariff binding above $\underline{t}(b)$ in order to prevent all FTAs?

If governments could pre-commit to not engage in FTA formation at the global negotiations stage then this would be jointly optimal. In doing so, they would set a tariff binding equal to the politically efficient tariff $t^{pe}_{ij}(\varnothing) = t^{pe}$ which would bind the applied tariffs of all countries. However, in reality and in our framework, governments cannot credibly make such commitments. Nevertheless, governments may be 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 $t^{pe}_{ij}(\varnothing) = t^{pe}$. Thus, if governments can prevent FTAs by choosing a tariff binding that is not too different from the politically efficient tariff $t^{pe}_{ij}(\varnothing) = t^{pe}$ then it is jointly optimal for 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 $t^{pe} + x(b)$ (the algebraic expression for $x(b) > 0$ is given by equation (25) in the Appendix). Conversely, governments 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:

$$t^{pe} + x(b) = \underline{t}(b) \text{ if and only if } b = \bar{b}_{\varnothing}. \tag{17}$$

The equilibrium characterization now follows easily in Proposition 3.

Proposition 3 *Global tariff negotiation leads to a fragmented world with a single FTA when $b < \bar{b}_{\varnothing}$ and a world with no FTAs when $b \geq \bar{b}_{\varnothing}$. Moreover,*

global negotiations produce a uniform tariff binding t^{fs}_{MFN} *where*

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

When $b < \bar{b}_{\varnothing}$*, then*

(a) if FTA negotiations do not occur, all applied tariffs are t^{fs}_{MFN}*;*

(b) if FTA negotiations occur, all applied tariffs are t^{fs}_{MFN} *when* $b < \bar{b}_{BND}$ *but the applied tariffs of the insiders and outsider, respectively, are* $t^{*}_{IN} < t^{fs}_{MFN}$ *and* t^{fs}_{MFN} *when* $b \in \left[\bar{b}_{BND}, \bar{b}_{\varnothing}\right)$*.*

Figure 2 illustrates Proposition 3 graphically. 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 of political efficiency needed to prevent FTA formation is too large (i.e. $\underline{t}\left(b\right) > t^{pe} + x\left(b\right)$). 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 binds the applied tariffs of the insiders and the outsider 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. However, governments prevent FTA formation once $b \geq \bar{b}_{\varnothing}$ by setting the tariff binding $\underline{t}\left(b\right)$ or, once b is sufficiently high, t^{pe}.[24] When setting $\underline{t}\left(b\right)$, the sacrifice in political efficiency is small enough that governments set the tariff bindings away from the politically efficient tariff $t^{pe}_{ij}\left(\varnothing\right) = t^{pe}$ to prevent FTA formation.

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 FTA formation. Crucially for

[24] Using Figure 2, we can see that governments set the tariff bindings equal to t^{pe} once b exceeds the value where the $\underline{t}\left(b\right)$ and $t^{pe}\left(b\right)$ curves intersect. In this case, governments prevent FTA formation without sacrificing any political efficiency.

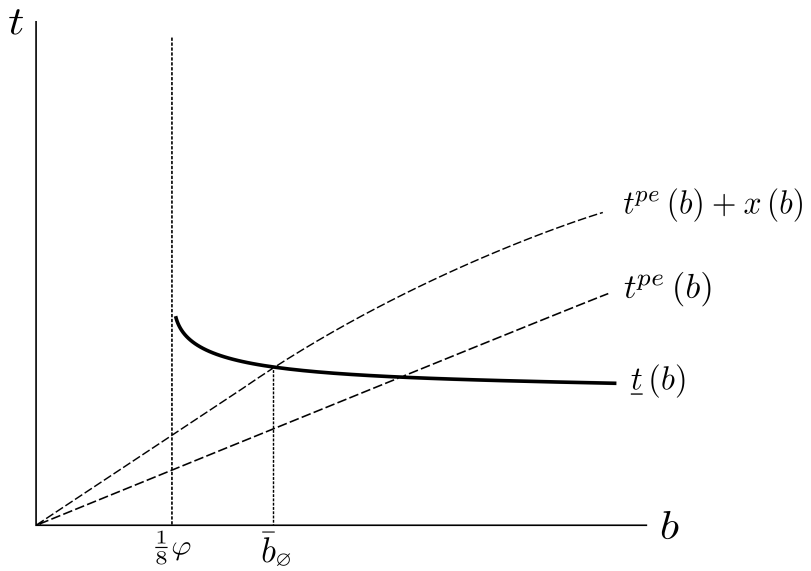

Figure 2: When does a single FTA arise in equilibrium?

Ornelas (2008), the outsider gains more than an insider from an FTA in the absence of global tariff negotiations (due to individual tariff complementarity). 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}. Moreover, the prospect of future FTA formation affects the farsighted MFN tariff when $b < \min\left\{\bar{b}_{BND}, \bar{b}_{\varnothing}\right\}$ but, as indicated in Proposition 3, jumps from $t^{fs}_{MFN} = t^{pe}\left(1 - \frac{p}{3}\right)$ to $t^{fs}_{MFN} = t^{pe}$ when $b \in \left[\bar{b}_{BND}, \bar{b}_{\varnothing}\right)$. Two sets of implications follow from this result; one set pertaining to the possibility of FTA formation itself and one set pertaining to the likelihood of subsequent FTA formation. While we recognize the stylized nature of our model (i.e. three symmetric countries), we believe this simple

model provides some new insights that may factor into the complex evolution of international trade negotiations.

To focus on the first set of implications (i.e. those stemming from the possibility of FTA formation), suppose FTA formation will certainly take place so that $p = 1$. The first implication is that the shadow of future regionalism has a positive effect on the success of multilateral negotiations: multilateral tariff complementarity pushes the farsighted MFN tariff $t_{MFN}^{fs} = \frac{2}{3}t^{pe}$ below the politically efficient tariff $t_{ij}^{pe}(\varnothing) = t^{pe}$. Thus, governments' anticipation of future FTA formation, and their understanding that they would prefer lower global tariffs upon FTA formation, leads governments to incorporate multilateral tariff complementarity into the globally negotiated tariff bindings.

The second implication is that, 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 individual 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 (relatively similar) 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 $b < \min\left\{\bar{b}_{BND}, \bar{b}_{\varnothing}\right\}$.

The third implication is that, for $\frac{1}{8}\varphi < b < \min\left\{\bar{b}_{\varnothing}, \bar{b}_{BND}\right\}$, the lack of binding overhang, and hence individual tariff complementarity, derives purely from the farsighted nature of globally negotiated tariff bindings. That is, "myopic" countries would negotiate a global tariff binding of t^{pe} but, given $b > \frac{1}{8}\varphi$, tariff complementarity would then arise because $t_{IN}^{*} < t^{pe}$ when

$b > \frac{1}{8}\varphi$. 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 fourth 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 individual 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 one allows the insider to lower its external tariffs, FTA formation would appear to harm world welfare. However, this emphasizes the important point that, even though individual tariff complementarity does not arise upon FTA formation, the effect of individual 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 individual 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.

The second set of implications emerge from investigating the effect of changes in the likelihood of subsequent FTA formation. First, the farsighted MFN tariff $t^{fs}_{MFN} = t^{pe}\left(1 - \frac{p}{3}\right)$ is decreasing in p. That is, the shadow of future regionalism has a greater effect on global tariff negotiations when governments view future FTA formation as more likely because, in this case, governments care more about the impact of multilateral tariff complementarity whereby FTA formation lowers the jointly optimal tariff bindings.

Second, the extent to which our gated globalization result of a single FTA emerges in equilibrium (as opposed to an equilibrium of no FTAs) depends on the likelihood of future FTA negotiations. Variation in p does not affect

the incentive of two countries to form a single FTA when presented with the opportunity; in Figure 2, the $\underline{t}(b)$ curve is independent of p. However, p does affect the political sacrifice governments are willing to suffer in order to prevent FTA formation. As p falls, the farsighted MFN tariff $t_{MFN}^{fs} = t^{pe}\left(1 - \frac{p}{3}\right)$ moves closer to the politically efficient tariff t^{pe}. In turn, governments are now less willing to sacrifice political efficiency in order to prevent FTAs which is depicted by the $\underline{t}(b) + x(b)$ curve shifting down as p falls in Figure 2. Thus, as Figure 2 shows, the threshold $\bar{b}_{\varnothing}$ rises meaning that stronger political economy motivations are now required to prevent FTA formation. In this sense, FTAs are more likely to emerge when governments view FTA negotiations as less likely because applied tariffs in a world of gated globalization are closer to the politically efficient tariff t^{pe}.

6 Discussion

Although the competing exporters model is a standard model in the trade agreements literature, it is also a stylized model. Nevertheless, our results offer insights that are more general than the competing exporters model because they rely on economic forces that should be present independent of the underlying trade model.

In a world where multilateralism and FTAs coexist and represent alternative pathways to global free trade, our main result is that multilateralism via global tariff negotiations can actually cause the world to get stuck short of global free trade. The basic economic intuition here is twofold. First, in a world where FTAs represent the only path towards global free trade, FTA formation represents an attractive way to reduce the high non-cooperative tariffs that would prevail in the absence of FTAs. Indeed, unless governments have sufficiently strong political economy motivations, this can propel FTA formation all the way to global free trade. Second, by reducing tariffs worldwide, multilateralism mitigates the need for countries to use FTA formation as a means to lower the tariffs of their trading partners. As such, multilateralism can be the reason that FTA formation stops short of global free trade. This

twofold logic is more general than the stylized setup of the competing exporters model.

Our result that a fragmented world of gated globalization with a single FTA can emerge highlights a tension that dates back to at least Bagwell and Staiger (2005b). In a general economic environment, Bagwell and Staiger (2005b) show the politically efficient tariff in the absence of FTAs, t^{pe}, could be vulnerable to reciprocal bilateral tariff reductions. However, our forward looking model highlights that countries may set tariff bindings different from t^{pe} in order to deter subsequent FTA formation. Of course, whether they are prepared to do so depends on how much political efficiency would be sacrificed. Moreover, if FTA formation can be deterred, it will be due to strong political economy motivations of governments which not only requires a sufficiently large b but also a sufficiently high tariff binding because this makes the import competing sector strong and thus valuable to protect. Again, the logic underlying our gated globalization result is not specific to the competing exporters model.

Finally, our result that the shadow of regionalism affects multilateral negotiations rests on the concept of multilateral tariff complementarity which was first identified by Ornelas (2008) who did so in a more general economic environment than ours. However, in contrast to Ornelas where multilateral tariff complementarity takes place after FTA formation, our results highlight that forward looking countries build multilateral tariff complementarity into global tariff negotiations prior to FTA formation taking place. Thus, multilateral tariff complementarity may play an important role in shaping global tariff bindings even though it will not be observed in practice following FTA formation.

7 Conclusion

Multilateralism can influence 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.

Not only do global tariff negotiations feed into the eventual extent of subsequent FTA formation, but the shadow of future FTA formation feeds into the outcome of the initial global tariff negotiations. This result emerges because of multilateral tariff complementarity whereby FTA formation lowers the politically efficient tariffs imposed by FTA members for reasons similar to the well known traditional notion of "individual" tariff complementarity. As such, the anticipation of subsequent FTA formation allows negotiating governments to set lower tariff bindings because they anticipate wanting lower future tariff bindings.

Our results can help shed light on 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: $CS_i = \frac{1}{18}\left(2e + d - \sum_{j\neq i} t_{ij}\right)^2 + \frac{1}{18}\sum_{j\neq i,k\neq i,j}\left(2e + d + 2t_{ji} - t_{jk}\right)^2$, $PS_i^I = \frac{1}{3}d\left[3\alpha - (2e+d) + \sum_{j\neq i} t_{ij}\right]$, $PS_i^Z = \frac{e}{3}\left[3\alpha - (2e+d) + t_{zj} - 2t_{zi}\right]$ for $Z \neq I$ and $z \neq i \neq j$ and $TR_i = \frac{1}{3}\sum_{j\neq i,k\neq i,j} t_{ij}\left(e - d + t_{ik} - 2t_{ij}\right)$.

B Proofs

Before presenting the proofs, we address two notation issues. The first issue relates to government payoffs. Specifically, $G_i(g)$ and $G(g)$ denote the respective payoffs received by the government of country i and the joint government payoff given a network of FTAs g with the possible networks described in Section 3.2.

The second issue relates to tariffs. We let t_{IN} and t_{OUT} denote arbitrary applied tariffs of, respectively, the insiders and outsider with t_{IN}^* (see (8)) and $t_{OUT}^* \equiv t_{Nash}$ (see (7)) denoting the respective optimal applied tariffs. Moreover, as described in Section 3, τ denotes the vector of tariffs. But, we let (i) $\tau(t)$ denote a tariff vector where all countries impose a common tariff t (i.e. $t_{ij} = t$ for all i, j), (ii) $\tau_{-ij}(t)$ denote the vector $\tau(t)$ *except that* countries i and j set zero tariffs on each other, and (iii) $\tau_{-ij}^{FTA}(t)$ denote the vector that (potentially) differs from $\tau_{-ij}(t)$ because $t_{ik} = t_{jk} = \min\{t_{IN}^*, t\}$ and $t_{ki} = t_{kj} = \min\{t_{OUT}^*, t\}$.

We now present three lemmas that will be used in the proofs of lemmas and propositions from the main text.

Lemma 5 *Suppose* $G_i\left(g^{FT}\right) > G_i\left(g_j^H\right)$. *Then, global free trade emerges in the equilibrium of the FTA formation game if (i)* $G_i\left(g^{FT}\right) > \max\left\{G_i\left(g_{jk}\right), G_i\left(g_{ij}\right)\right\}$ *and (ii)* $G_i\left(g_{ij}\right) > G_i\left(\varnothing\right)$.

Proof. Stage 1(c): $g = g_i^H$ for some country i at the beginning of stage 1(c). Symmetry and $G_i\left(g^{FT}\right) > G_i\left(g_j^H\right)$ implies $a_i = a_k = J$ 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, $G_i\left(g^{FT}\right) > \max\left\{G_i\left(g_{jk}\right), G_i\left(g_{ij}\right)\right\}$ implies $a_h = J$ for each country h 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 $G_i\left(g^{FT}\right) > G_i\left(g_{ij}\right) > G_i\left(\varnothing\right)$ implies $a_h = J$ for each country h 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 6 *Suppose* $G_i\left(g^{FT}\right) > G_i\left(g_j^H\right)$. *Then, a single FTA emerges in the equilibrium of the FTA formation game if (i)* $G_i\left(g^{FT}\right) < \max\left\{G_i\left(g_{jk}\right), G_i\left(g_{ij}\right)\right\}$ *and (ii)* $G_i\left(g_{ij}\right) > G_i\left(\varnothing\right)$. *The single FTA is between the first active pair if* $G_i\left(g_{ij}\right) > G_i\left(g_{jk}\right)$ *but between the last active pair if* $G_i\left(g_{ij}\right) < G_i\left(g_{jk}\right)$.

Proof. Stage 1(c): $g = g_i^H$ for some country i at the beginning of stage 1(c). Symmetry and $G_i\left(g^{FT}\right) > G_i\left(g_j^H\right)$ implies $a_i = a_k = J$ 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). 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 $a_h = NJ$ for some country h 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, $a_h = J$ for each country h in the last active pair. If $G_i\left(g_{ij}\right) <$

$G_i(g_{jk})$, then $a_h = NJ$ for each country h 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 $G_i(g_{ij}) > G_i(g_{jk})$ then $a_h = J$ for each country h 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 7 *Suppose* $G_i\left(g^{FT}\right) > G_i\left(g_j^H\right)$. *Then, no FTAs emerge in the equilibrium of the FTA formation game if* $G_i(\varnothing) > G_i(g_{ij})$ *and either (i)* $G(\varnothing) > G\left(g^{FT}\right)$ *or (ii)* $G_i\left(g^{FT}\right) < \max\{G_i(g_{jk}), G_i(g_{ij})\}$.

Proof. Note that symmetry and $G_i\left(g^{FT}\right) > G_i\left(g_j^H\right)$ implies $a_h = J$ for any spoke country h in stage 1(c). Thus, a hub-spoke network cannot emerge in equilibrium. There are now two cases to consider.

First, let $G(\varnothing) > G\left(g^{FT}\right)$. Then, $G_i(\varnothing) > \max\left\{G_i\left(g^{FT}\right), G_i(g_{ij})\right\}$ given symmetry and $G_i(\varnothing) > G_i(g_{ij})$. In turn, each country h of an active pair in stage 1(a) chooses $a_h = NJ$. Hence, no FTAs form. Second, let $G_i\left(g^{FT}\right) < \max\{G_i(g_{jk}), G_i(g_{ij})\}$. This implies $a_h = NJ$ for some player h in any active pair in stage 1(b) and, hence, g_{ij} remains after stage 1(b) and stage 1(c) is never attained. In turn, $G_i(\varnothing) > G_i(g_{ij})$ implies $a_h = NJ$ for each country h in any active pair in stage 1(a) and no FTAs form. ■

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 $b < \frac{1}{3}\varphi + \frac{7}{6}\frac{t_K}{d}$ and $t_K > 0$ where t_K is the common tariff that spokes impose on each other. This must hold given (2) defines the non-prohibitive tariff and (3) says such a tariff requires $b < \frac{1}{3}\varphi$ (see Section 3.3.1). Moreover, in our model, spokes always impose a common tariff on each other. In the absence of global negotiations, $t_K = t_{IN}^*$ (see (9)). In the presence of global negotiations, $t_K = \min\{t_{IN}^*, t\}$ where t is the global tariff binding.

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, the solution to (15) implies the optimal tariff bindings are given by $\tau\left(t^{pe}\left(1-\frac{p}{3}\right)\right)$. Note, $\tau\left(t^{pe}\left(1-\frac{p}{3}\right)\right)$ binds the applied tariffs of the insiders and the outsider if and only if $t^{pe}\left(1-\frac{p}{3}\right) \leq \min\left\{t^*_{IN}, t^*_{OUT}\right\} = t^*_{IN}$ which reduces to

$$b \leq \bar{b}_{TC} \equiv \frac{3}{24-11p}\varphi. \tag{18}$$

Second, suppose the tariff bindings τ do not bind insiders' applied tariffs. Then, (12)-(13) say the optimal tariff bindings are given by $\tau\left(t^{pe}\right)$. Equations (3), (7), (8) and (12) imply 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 non-prohibitive tariff. Thus, let $b \geq \frac{1}{8}\varphi$ hereafter.

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

$$\begin{aligned} & \left[pG\left(g_{ij}; \tau_{-ij}\left(t^{pe}\left(1-\frac{p}{3}\right)\right)\right) + (1-p)\,G\left(\varnothing; \tau\left(t^{pe}\left(1-\frac{p}{3}\right)\right)\right)\right] \\ & - \left[pG\left(g_{ij}; \tau^{FTA}_{-ij}\left(t^{pe}\right)\right) + (1-p)\,G\left(\varnothing; \tau^{FTA}_{-ij}\left(t^{pe}\right)\right)\right] \\ = \; & \frac{1}{1089}p\left[b^2d^2\left(144-121p\right) - 30bd\left(e-d\right) + 6\left(e-d\right)^2\right] \end{aligned} \tag{19}$$

with (19) being positive if and only if $b > \bar{b}_{BND}$ where

$$\bar{b}_{BND} \equiv \frac{11\sqrt{9-6p}-15}{144-121p}\varphi \tag{20}$$

with $\bar{b}_{BND} \in \left(\frac{1}{8}\varphi, \bar{b}_{TC}\right)$ for $p \in (0,1]$. For the optimal tariff bindings to be given by $\tau\left(t^{fs}_{MFN}\right)$, 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 $\bar{b}_{BND} \geq \frac{1}{8}\varphi$ and $p \in (0,1]$. First, $t^*_{IN} > t^{pe}\left(1-\frac{p}{3}\right)$ for $b < \bar{b}_{BND}$ follows because $\bar{b}_{TC} > \bar{b}_{BND}$ 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 $b \geq \frac{1}{8}\varphi$, which holds given $b \geq \bar{b}_{BND} > \frac{1}{8}\varphi$, and $t^*_{OUT} > t^{pe}$ holds for any $b < \frac{1}{3}\varphi$.

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

PROOF OF LEMMA 3

Consider the first part of the lemma. To begin, suppose a single FTA has formed. Given Lemma 1, a hub-spoke network cannot emerge in equilibrium. Thus, subsequent FTA formation must eventually yield g^{FT}. We now show $\Delta_1 \equiv G_i\left(g_{ij}; \tau^{FTA}_{-ij}\left(t^{fs}_{MFN}\right)\right) - G_i\left(g^{FT}\right) > 0$ and hence, conditional on g_{ij}, $a_h = NJ$ for some insider $h = i, j$ in stage 1(b) of the FTA formation game meaning the outcome at the end of stage 1(b) remains a single FTA and stage 1(c) is never attained. When $t^{fs}_{MFN} = t^{pe}\left(1 - \frac{p}{3}\right)$, $\Delta_1 > 0$ for $b < \frac{2}{3(1-p)}\varphi$ and hence $\Delta_1 > 0$ for any $b < \frac{1}{3}\varphi$. When $t^{fs}_{MFN} = t^{pe}$, $\frac{\partial \Delta_1}{\partial b} \leq 0$ for $b \leq \frac{52}{229}\varphi$ and $\frac{\partial \Delta_1}{\partial b} \geq 0$ for $b \geq \frac{52}{229}\varphi$. Hence, Δ_1 is minimized for $b = \frac{52}{229}\varphi$ in which case $\Delta_1 = \frac{7}{687}(e-d)^2 > 0$.

But, given g_{ij} does not expand further, will two countries form an FTA? Given Lemma 1 and the previous paragraph, Lemmas 6-7 (see beginning of Appendix B) say the answer is yes if and only if $G_i\left(g_{ij}; \tau^{FTA}_{-ij}\left(t^{fs}_{MFN}\right)\right) - G_i\left(\varnothing; \tau\left(t^{fs}_{MFN}\right)\right) > 0$ which represents an "insider participation constraint" (IPC). The general form of the IPC given arbitrary global tariff bindings $\tau(t)$ is

$$f\left(t^*_{IN}, t^*_{OUT}, t_{Nash}, t\right) \equiv G_i\left(g_{ij}; \tau^{FTA}_{-ij}(t)\right) - G_i\left(\varnothing; \tau\left(\min\left\{t, t_{Nash}\right\}\right)\right) > 0. \tag{21}$$

When $t < t^*_{IN}$ then $t_{IN} = t_{OUT} = t$ and $f(\cdot) > 0$ reduces to $t < \frac{2}{3}(e-d) - 2bd \equiv \underline{t}_1(b)$. Moreover, letting $b < \bar{b}_{BND}$ and $t \equiv t^{fs}_{MFN}$, we have $t = t^{pe}\left(1 - \frac{p}{3}\right) < t^*_{IN}$. In turn, $t = t^{fs}_{MFN} < \underline{t}_1(b)$ reduces to $b < \frac{2}{(9-p)}\varphi$ which holds given $\bar{b}_{BND} < \frac{2}{(9-p)}\varphi$. Thus, a single FTA emerges when $b < \bar{b}_{BND}$.

Now consider the second part of the lemma. First, let $b < \bar{b}_{BND}$. Then, a single FTA emerges when FTA negotiations occur and, by definition, t^{fs}_{MFN} maximizes governments' joint expected payoff. Second, let $b \geq \bar{b}_{BND}$. Then, $t^{fs}_{MFN} = t^{pe}$ and, if FTA negotiations occur, either a single FTA or no FTA emerges. Again, if a single FTA emerges, t^{fs}_{MFN} maximizes governments'

joint expected payoff by definition. Moreover, the joint government payoff is $G(\varnothing;\tau(t^{pe}))$ if no FTAs emerge which is, in fact, the highest joint payoff governments can achieve; in particular, $G(\varnothing;\tau(t^{pe})) > G\left(g^{FT}\right)$.■

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, Lemma 5 (see beginning of Appendix B) implies global free trade emerges when $b < \bar{b}_{OUT}$. Given Lemma 1, the conditions of Lemma 5 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) $G_i\left(g^{FT}\right) - G_i(g_{ij}) > 0$ iff $b < \bar{b}_{IN} \equiv \frac{101}{313}\varphi$ and (ii) $G_i(g_{ij}) - G_i(\varnothing) > 0$ iff $b < \bar{b}_{FTA} \equiv \frac{47}{299}\varphi$.■

PROOF OF LEMMA 4

Given Lemma 1, Lemmas 5-6 (see beginning of Appendix B) imply $G_i(g_{ij}) > G_i(\varnothing)$ is a sufficient condition for FTA formation. Thus, $G_i(g_{ij}) \leq G_i(\varnothing)$ is a necessary condition for preventing FTA formation. For arbitrary tariff bindings $\tau(t)$, the general form of this "insider participation constraint" (IPC) is

$$f\left(t^*_{IN}, t^*_{OUT}, t_{Nash}, t\right) \equiv G_i\left(g_{ij}; \tau^{FTA}_{-ij}(t)\right) - G_i\left(\varnothing; \tau\left(\min\left\{t, t_{Nash}\right\}\right)\right) \leq 0. \tag{22}$$

Two cases establish that a necessary condition for $f(\cdot) > 0$ is that t exceed a threshold $\underline{t}(b)$. First, as described in the proof of Lemma 3, $t < t^*_{IN}$ implies that $t_{IN} = t_{OUT} = t$ and that $f(\cdot) > 0$ reduces to $t < \frac{2}{3}(e-d) - 2bd \equiv \underline{t}_1(b)$. Second, let $t \in [t^*_{IN}, t^*_{OUT})$. Then, $t_{IN} = t^*_{IN}$ and $t_{OUT} = t$. $f(\cdot) > 0$ now reduces to $t \notin (\underline{t}_2(b), \bar{t}_2(b))$ where $\underline{t}_2(b) \equiv \hat{t}(b) - v(\theta)$ and $\bar{t}_2(b) \equiv \hat{t}(b) + v(\theta)$ with $\hat{t}(b) \equiv \frac{e-d}{7} + \frac{6}{7}bd$ and $v(\theta) \equiv \frac{3}{77}\left[bd\left(400bd + 54(e-d)\right) - 13(e-d)^2\right]^{1/2}$. 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

$$\underline{t}(b) \equiv \begin{cases} \underline{t}_1(b) = \frac{2}{3}(e-d) - 2bd & \text{if } t < t^*_{IN} \\ \underline{t}_2(b) = \frac{e-d}{7} + \frac{6}{7}bd - \frac{3}{77}\left[bd(400bd + 54(e-d)) - 13(e-d)^2\right]^{1/2} & \text{if } t \geq t^*_{IN} \end{cases}. \tag{23}$$

We now show that $f(\cdot) > 0$ when $b < \frac{1}{8}\varphi$. First, 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 $b < \frac{1}{8}\varphi$. Second, let $t \in [t^*_{IN}, t^*_{OUT}]$. Then, $f(\cdot) \leq 0$ if and only if $t \in [\underline{t}_2(b), \bar{t}_2(b)]$ but the interval $[\underline{t}_2(b), \bar{t}_2(b)]$ is non-empty if and only if $v(\theta) \geq 0$ which reduces to $b \geq \frac{1}{8}\varphi$. Thus, $f(\cdot) > 0$ if $b < \frac{1}{8}\varphi$. Finally, let $t > t^*_{OUT}$. 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 5-7 introduced at the beginning of Appendix B as well as the definition of $\underline{t}(b)$ from the proof of Lemma 4.

Define b^* such that $t^{pe}(b) \geq \underline{t}(b)$ 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 7 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 $b < b^*$. In turn, $t^{pe}(b) < \underline{t}(b)$ and, by definition of $\underline{t}(b)$, $G_i\left(g_{ij}; \tau^{FTA}_{-ij}(t^{pe})\right) > G_i(\varnothing; \tau(t^{pe}))$ for the remainder of the proof.

We now establish that a single FTA emerges in equilibrium when the tariff bindings are given by $\tau\left(t^{fs}_{MFN}\right)$ as described in Lemma 2. Lemma 3 established this for the case where $b < \bar{b}_{BND}$. Thus, we now let $b \geq \bar{b}_{BND}$ and verify the two conditions needed for Lemma 6. Note that $b \geq \bar{b}_{BND}$ implies $t^{fs}_{MFN} = t^{pe} > t^*_{IN}$. Thus, first, as noted above, $G_i\left(g_{ij}; \tau^{FTA}_{-ij}(t^{pe})\right) > G_i(\varnothing; \tau(t^{pe}))$ given $b < b^*$. Second, the proof of Lemma 3 established $G_i\left(g_{ij}; \tau^{FTA}_{-ij}(t^{pe})\right) > G_i\left(g^{FT}\right)$.

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 5 and 6 imply $G_i(\varnothing) \geq G_i(g_{ij})$ is a necessary condition for no FTAs in equilibrium. However, noting that $b^* < \frac{19}{75}\varphi$, the proof of Lemma 4 established that $G_i(g_{ij}) > G_i(\varnothing)$ when (i) $b < \frac{1}{8}\varphi$ and (ii) $b \in \left[\frac{1}{8}\varphi, b^*\right)$ 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

$$G(\varnothing; \tau(t)) - \left[p \cdot G\left(g_{ij}; \tau^{FTA}_{-ij}\left(t^{fs}_{MFN}\right)\right) + (1-p) \cdot G\left(\varnothing; \tau\left(t^{fs}_{MFN}\right)\right)\right] \geq 0. \tag{24}$$

Specifically, (24) reduces to $t \in [t^{pe} - x(b), t^{pe} + x(b)]$ where

$$x(b) = \begin{cases} \frac{1}{3}bd\left(-p^2 + 6p\right)^{1/2} > 0 & \text{if } b < \bar{b}_{BND} \\ \frac{(6p)^{1/2}}{33}\left[bd\left(97bd - 5(e-d)\right) + (e-d)^2\right]^{1/2} > 0 & \text{if } b \geq \bar{b}_{BND} \end{cases}. \tag{25}$$

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 (24) holds. Hence, the optimal tariff bindings are given by $\tau\left(t^{fs}_{MFN}\right)$ as described in Lemma 2 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 (24) holds. Given (24) implies $G(\varnothing; \tau(t)) > G\left(g^{FT}\right)$, Lemma 7 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 $t > t^{pe}$, $\tau\left(t^{fs}_{MFN}\right) = \tau(\underline{t}_2(b))$ are the optimal tariff bindings for $b \in [b_\phi, b^*)$. The proof is complete upon recognizing that, by definition, $t^{pe} = \underline{t}_2(b)$ for $b = b^*$.■

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

Bagwell, K., Staiger, R., 2005a. 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.

Bagwell, K., Staiger, R., 2005b. Multilateral trade negotiations, bilateral opportunism and the rules of GATT/WTO. Journal of International Economics 67 (2), 268–294.

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.