Contesting an International Trade Agreement*

Matthew T. Cole†, *California Polytechnic State University*
James Lake‡, *Southern Methodist University*
Ben Zissimos§, *University of Exeter Business School*

July 24, 2018

Abstract

We develop a new theoretical political economy framework, called a 'parallel contest', that emphasizes the political fight over trade agreement (TA) ratification within countries. TA ratification is inherently uncertain in each country, where anti- and pro-trade interest groups contest each other to influence their own governments' ratification decision. Unlike prior literature, the protection embodied in negotiated TA tariffs reflects a balance between the liberalizing force of lobbying and inherently protectionist government preferences. Moreover, new international political externalities emerge that are not internalized by governments that just internalize terms of trade externalities.

*For useful comments and conversations about earlier drafts we thank Toke Aidt, Andrea Ariu, Scott Baier, Tibor Besedeš, Rick Bond, Paola Conconi, Meredith Crowley, David DeRemer, Axel Dreher, Giovanni Facchini, Philipp Harms, Carsten Hefeker, Arye Hillman, Benjamin Ho, Dan Kovenock, Peter Neary, Emanuel Ornelas, Alejandro Riaño, Ray Riezman, Joel Rodrigue, Kamal Saggi, Tim Salmon, Bob Staiger, and Adam Szeidl, as well as seminar and conference participants at ETH Zürich, Florida International University, Georgia Tech, Kings College London, LMU Munich, London School of Economics, Indiana University, Southern Methodist University, Texas A&M Ag Econ, University of Exeter, University of Nottingham, and a Cal Poly Trade workshop, European Trade Study Group meeting, INFER workshop, Silvaplana Workshop in Political Economy, KU Leuven Workshop on International Trade Agreements, SAET conference, UECE Lisbon Meetings in Game Theory and Applications, Southern Economics Association conference, Midwest Trade meetings, InsTED workshop, and AEA Meetings.

†Department of Economics, California Polytechnic State University, CA 93407, USA. Email: mtcole@calpoly.edu.

‡Department of Economics, Southern Methodist University, Dallas, TX 75275, USA. Email: jlake@smu.edu

§Corresponding author: Department of Economics, University of Exeter Business School, Streatham Campus, Exeter EX4 4ST, UK. Email: b.zissimos@exeter.ac.uk.

1 Introduction

In practice, implementing an international trade agreement (TA) requires that each member government ratifies the TA after it has been signed. Moreover, anecdotal evidence suggests these ratification decisions are uncertain and influenced by conflicting lobbying interests. However, existing models ignore the ratification uncertainty that plagues all member governments. We develop a new political economy framework, called a "parallel contest", that endogenizes the ratification decision of member governments and shows how lobbying outcomes in each country endogenously depend on the ratification uncertainty in other member countries. Our new framework opens the door to insights in the TA literature that cannot be rationalized by existing models, and also applies to a much broader class of economic settings than TA formation.

Multilateral TAs, the historical cornerstone of the TA landscape where countries negotiate non-discriminatory MFN tariffs, feature conflicting lobbying interests and ratification uncertainty.[1] The Uruguay Round of multilateral negotiations was essentially settled in December 1993. Yet Strange (2013, p.121) describes the conflicting lobbying interests between anti-trade US small businesses and labor unions, via the 'US Business and Industrial Council', and pro-trade major US corporations, via the 'Alliance for GATT Now'. This conflict persisted until ratification by the United States (US) Congress in December 1994 (also, see Dam 2001, p.14).[2] And even after the affirmative US House of Representatives vote in November 1994, ratification by the US Senate remained uncertain with last-minute cajoling of wavering Senators by President Clinton.[3] These descriptions emphasize that conflicting lobbying interests and inherent ratification uncertainty characterize multilateral TAs.

Preferential Trade Agreements (PTAs), which have proliferated since the Uruguay Round, are also characterized by conflicting lobbying interests and ratification uncertainty.[4] The Trans-Pacific Partnership (TPP) serves as a recent example. Motivated by increased export market access, US agricultural groups (e.g. National Pork Producers Council, National Chicken Council, National Council of Farmer Cooperatives, American Farm Bureau and the National Corn Growers Association) and dairy producers (e.g. Land O'Lakes, Kraft-Heinz and the National Milk Producers Federation) lobbied for the TPP. So too did beneficiaries of tariff-free intermediate inputs (e.g. Nike, Walmart and the Outdoor Industry Associ-

[1] GATT Article I articulates the fundamental non-discrimination principle of the world trading system: a country must impose its MFN (Most Favored Nation) tariff on imports from *all* other trade partners.

[2] See `https://www.wto.org/english/thewto_e/whatis_e/tif_e/fact5_e.htm`.

[3] See Sanger (1994) from the New York Times.

[4] Like multilateral TAs, substantial time elapses between the start of PTA negotiations and their implementation, with the literature suggesting 3-4 years and half of this time being taken up by the negotiations themselves. See Mölders (2012, 2015) and Freund and McDaniel (2016).

ation). Lobbying against the TPP were automakers (largely because the TPP failed to address currency manipulation issues), labor unions (e.g. AFL-CIO, Teamsters and United Steelworkers) and environmental groups (e.g. Sierra Club).[5] Against this backdrop of conflicting lobbying interests, TPP negotiations concluded in October 2015 yet, despite news reports optimistic about passage during the Obama-Trump transition period, the Trump administration abandoned the TPP in early 2017.[6]

Rodrik (2008) and Baldwin (2016) argue that conflicting lobbying interest is integral to the process of TA formation. Rodrik (2008, pp.233-234) describes this by saying "Traditionally, the agenda of multilateral trade negotiations has been shaped in response to a tug-of-war between exporters ... and import competing interests." Similarly, Baldwin (2016, pp.69-70) explains how "Domestic firms that compete with imports tend to like high domestic tariffs since these restrict imports, raise local prices, and thus boost their profits (or at least minimize their losses). Domestic firms that export, by contrast, dislike high tariffs as these reduce their exports and profits." Baldwin and Rodrik also explain the resulting political tension and contest-like setting.

Importantly, this political tension relies on the reciprocity principle linking exporter interests in foreign tariff reductions to domestic tariff reductions. As Baldwin says: "These two sets of tariffs (domestic and foreign) are not intrinsically linked. ... But the two sets become linked during GATT/WTO rounds due to the reciprocity principle. That is, foreign tariffs will fall only if domestic tariffs also fall. This then sets up a political fight within each nation. Exporters - who care little about domestic tariffs per se - know they must fight import-competing firms in their own nation if they are to win lower tariffs abroad." And as Rodrik says, the outcomes of TAs "are all the results of this *political* process." (Emphasis in the original.) Although Baldwin and Rodrik refer to multilateral TA formation under the GATT/WTO, arguably the same driving force underpins PTA formation as well.

In our new parallel contest framework, the political fight over TA ratification within each country lies at center stage. The existing contest literature considers a *single* 'decision maker' deciding a contest outcome, where interested parties contest each other to influence this decision.[7] Here, interested parties move the decision maker's decision in their

[5]See Ho (2015) in the Washington Post Washington Post for an official Ford statement recommending Congress not approve the TPP after release of the TPP text. See Pearson (2017) from the Cato Institute Cato Institute and Leggett (2017) from Just Auto Just Auto for reports quoting Ford CEO Mark Fields' strong support of President Trump's executive order withdrawing the US from the TPP.

[6]Ratification uncertainty is not a characteristic particular to the TPP. The US House of Representatives vote on CAFTA-DR, a PTA between the US and Central America, lay on a knife edge before eventually passing by only two votes. Despite being signed in 2007, similar votes for individual US PTAs with Korea, Colombia and Panama appeared to be dead, but were later resuscitated by the Obama administration in 2010 and eventually passed by Congress in 2011.

[7]Van Long (2013) reviews the contest literature pioneered by the 'Tullock contest' of Tullock (1980).

favor probabilistically by exerting more influence.[8] In our TA setting, exporter and import-competing interest groups contest each other in their own country through contributions that, probabilistically, influence their government's ratification decision. That is, like the existing contest literature, interest groups lobby before the ratification outcome is realized and, hence, cannot condition their lobbying on the ratification outcome. However, unlike the existing contest literature, our TA setting features *multiple* decision makers and, hence, the two national governments decide over contests occurring *in parallel* in each country. Crucially, because TA implementation requires ratification by both countries, these parallel contests are intrinsically linked: the lobbying contributions by each interest group in one country depend on the probability of TA ratification in the other country.[9]

A key contribution of our parallel contest is that it provides a novel and general political economy framework of TA formation. The framework is agnostic about the underlying trade model and, hence, the specific factors, Melitz, and oligopoly models are special cases. The same is true for the specific factors model of Matschke and Sherlund (2006) that features labor unions as interest groups. It is also agnostic about government preferences and, hence, governments motivated by national welfare, tariff revenue, or employment in import-competing sectors are special cases. Making particular choices microfounds lobby support and opposition for a TA and the determinants of government ratification decisions. Additionally, our framework can model lobbying between interest groups or within interest groups and along the intensive or extensive margin of lobbying.

Our framework opens the door to new insights that are not available from the existing TA literature. First, we show that protection in equilibrium reflects a balance between the liberalizing force of lobbying and governments who have inherently protectionist preferences. Indeed, when lobbying influences have sufficient sway over government TA ratification decisions then, in the spirit of Rodrik (2008) and Baldwin (2016), the lobbying process delivers the most liberal possible TA in equilibrium.[10] This contrasts starkly with the prior TA literature (e.g. Mayer 1981, Dixit 1987, Grossman and Helpman 1995b and Bagwell and Staiger 1999) where protection reflects a balance between the protectionist force of lobbying and a preference for openness by governments based on national welfare considerations.

The literature often assumes that governments have a national welfare based preference

[8]For example, an employee exerts more effort to win a promotion, or a lobby gives more political contributions.

[9]Appendix C shows that our results hold in an 'all-pay contest' where the lobby group making the highest contribution sways their government's TA ratification decision with certainty. Despite certainty over government TA ratification decisions conditional on contributions, equilibrium contribution strategies in all-pay contests are mixed strategies. Thus, ex-ante, TA ratification decisions remain uncertain.

[10]In our framework, TA negotiations abide by a reciprocity rule, as described above by Baldwin (2016). And, in general, the reciprocity rule may not permit free trade.

for openness. However, there is broad acceptance that governments may be inherently protectionist. Corden (1974, p.74) motivates inherently protectionist government preferences through a 'conservative social welfare function' whereby the government values avoiding "any significant absolute reductions in real incomes of any significant section of the community". Freund and Ozden (2008) provide explicit micro-foundations for this idea by incorporating loss aversion into consumer utility. Bagwell and Staiger (1999) argue that protectionism may arise in the equilibrium TA because governments have distributional concerns, such as the preferences discussed by Corden (1974) and Freund and Ozden (2008).

Recent empirical evidence supports the idea that governments have inherently protectionist motives. Conconi et al. (2014) present compelling empirical evidence that governments in general, and politicians in particular, have inherently protectionist preferences motivated by re-election motives. Further, Lake and Millimet (2016) show that PTA voting behavior by the US House of Representatives becomes less protectionist as their constituents receive more trade related redistribution, especially when the representative faces non-trivial re-election risk. These empirical findings are consistent with the view of governments having inherently protectionist preferences.

This view sheds light on a puzzle in the literature that uses data to evaluate the extent that governments value lobby contributions when setting trade policy. The traditional framework says protection arises because of lobbying pressures and despite inherently welfare-minded government preferences. So relatively low real world tariffs occur when governments are largely unswayed by lobbying pressures (see, e.g., Goldberg and Maggi 1999 and Gawande and Bandyopadhyay 2000) despite acknowledgments by Gawande et al. (2012, p.116) that "This finding sits poorly with casual observations" of anecdotal evidence regarding the pervasiveness of lobbying. As a reconciling perspective, Gawande et al. (2012) show how governments strongly influenced by lobbying may choose low tariffs based on lobbying competition between import-competing intermediate input firms and downstream firms. Yet, while mitigating the degree of protectionism, they show that lobbying remains a protectionist force. Our contest-based framework offers an alternative reconciling perspective that explains why governments strongly influenced by lobbying pressures may choose low tariffs: the lobbying process is a liberalizing force.

As a further insight, our framework reveals two novel international political externalities that operate outside the traditional terms-of-trade channel. In the 'terms-of-trade' theory of TAs, developed by Bagwell and Staiger (1999), governments manipulate their terms-of-trade in the absence of a TA and thereby impose negative externalities on each other. Thus, crucially, governments internalize these externalities through a TA that holds the terms-of-trade constant. However, our two international political externalities emerge for *given* terms-of-

trade through a lower foreign TA tariff increasing the probability of foreign TA ratification. First, as a positive externality of liberalization, this higher foreign TA ratification probability intensifies home lobbying competition and, in turn, home lobbying contributions. Second, as a negative externality of liberalization given inherently protectionist government preferences, the expected degree of trade liberalization increases with the probability of foreign TA ratification. Because these externalities operate for given terms of trade, our parallel contest framework showcases new international political externalities that are not internalized by governments who just internalize their terms-of-trade externalities.

Indeed, Bagwell and Staiger (2016, p.474) argue that "it is not a simple matter to generate models of trade agreements that fall outside the terms-of-trade class" and thus confer a purpose on TAs beyond internalizing terms-of-trade externalities. They put models that accomplish this into three groups. The first group model the 'domestic commitment theory' of TAs (e.g. Maggi and Rodriguez-Clare 1998, 2007). Here, by generating long-run resource misallocation, government-lobby interaction generates a domestic political externality. The second group model imperfect competition in a 'missing instrument' setting that omits export subsidies. Here, delocation externalities (see, e.g., Venables 1985 and Ossa 2011) and profit shifting externalities (see, e.g., Mrázová 2011 and Ossa 2012) generate international economic externalities.[11] The third group model international firm-to-firm bargaining externalities (e.g. Antras and Staiger 2012). By influencing the international bargaining outcome, trade policy can generate international bargaining externalities that do not travel through world prices. Bagwell and Staiger's conclusion (p.474) that "There may well be other possibilities, but thus far they have not been identified in the literature" emphasizes the insight of our novel international political externalities.[12]

Our framework delivers two further insights. First, unlike prior literature, both anti-trade and pro-trade groups lobby over TA ratification. Focusing on the benchmark Protection For Sale (PFS) framework of Grossman and Helpman (1994, 1995a,b), which is based on a menu auction, Grossman and Helpman (1995a) is the closest set-up to ours. Here, interest groups

[11]Note, Bagwell and Staiger (2012a,b) show that, while omitting export policies is realistic given WTO constraints on their use, internalizing terms-of-trade externalities remains the sole purpose of a TA in such settings when export policies are allowed, relaxing the 'missing instrument' assumption. Despite our focus on import tariffs, our international political externalities emerge using the Bagwell and Staiger (1999) general equilibrium model of trade that features Lerner symmetry. Thus, our framework does not fall into the 'missing instrument' class of models.

[12]Hillman and Moser (1996) and Krishna and Mitra (2005) emphasize international political externalities operating through the terms-of-trade. Hillman and Moser (1996) model governments who maximize their 'political support'. Political support depends on the real income of the import-competing and export sectors that, in turn, depend on the other country's trade policy through the world price. In a 'Protection for Sale model', Krishna and Mitra (2005) show that, through its impact on the world price, unilateral liberalization by a large country has implications for the optimal tariff of a small country.

can lobby their government over TA ratification but do so *after* observing the ratification decision and, as such, *only* the successful group actually makes a contribution. However, as borne out in the data, *both* groups contribute *prior* to the ratification decision in our parallel contest framework. According to the Center for Responsive Politics, lobbying reports mentioning the TPP in the 'negotiation phase' of January 2014-September 2015 totaled \$7.74m annualized for a mix of pro- and anti-trade interests: the AFL-CIO, Land O'Lakes, National Pork Producers Council, Nike and Sierra Club. Moreover, this number actually increased during the 'ratification phase' of January-December 2016 to \$8.34m. Our parallel contest framework rationalizes this pervasive feature of the TA lobbying data.

Second, focusing on a special case of our parallel contest framework where anti-trade interest groups do not lobby, Blanga-Gubbay et al. (2018) extend our framework by modeling firm-level lobbying decisions of pro-trade firms. As Section 5 discusses further, they find empirical evidence that firm-level lobbying expenditures conform with the parallel contest predictions. We take their empirical results as affirmation of our parallel contest framework.

While our paper focuses on ratification uncertainty resulting from the interdependence of member government ratification decisions, prior literature has analyzed trade policy uncertainty.[13] Handley (2014) and Handley and Limão (2015, 2017) show PTAs can increase welfare by reducing trade policy uncertainty.[14] But, theoretically, Limão and Maggi (2015) show countries may benefit from a TA with *higher* uncertainty. In contrast to these papers, our paper highlights implications regarding the tensions underlying protection and new international political externalities that emerge from TA ratification uncertainty.

Finally, many real-world settings have the two defining features of our parallel contest framework. First, two or more entities can collaborate but undertaking collaboration requires 'ratification' by the decision maker of each entity. Second, interested parties within each entity contest each other to influence the collaboration decision of their own entity's decision maker. As in our TA setting, these 'parallel' contests are intrinsically linked because the influence exerted by the interested parties in one entity depend on their beliefs about ratification by the other entity. Section 5 discusses examples spanning international negotiations as well as between-firm and within-firm situations.[15]

Our paper proceeds as follows. Section 2 introduces the basic model, formalizing the TA

[13]Buzard (2017) models TA ratification uncertainty where only the anti-trade interest group lobbies in each country. Moreover, unlike our parallel contest framework, she assumes each interest group treats their own government's ratification decision as pivotal for TA implementation.

[14]Reduced policy uncertainty in these papers stems from WTO tariff bindings placing a cap on applied tariffs, or Portuguese EU accession and Chinese WTO accession guaranteeing their firms non-discriminatory access to, respectively, the EU common market and the US market.

[15]Also see Section 5 for discussion on the ability of pro-collaboration (and anti-collaboration) agents across the parallel contests to coordinate and pool resources.

formation process. Section 3 investigates the parallel contest framework when government TA ratification decisions only depend on lobbying contributions. Section 4 allows government ratification decisions to depend on additional factors (e.g. national welfare) and highlights our international political externalities. Section 5 describes extensions and illustrates our results using classic underlying trade models which allows sharp comparisons between the PFS menu auction framework and our parallel contest framework. Section 6 concludes.

2 Model

2.1 Structure of a Trade Agreement

We model a two-country trade agreement (TA). National governments in the Home and Foreign countries levy non-negative import tariffs τ and τ^* respectively (hereafter, the superscript "*" denotes Foreign variables).[16] Prior to the TA, the 'status quo tariffs' $\boldsymbol{\tau}_{SQ} = \left(\tau_{SQ}, \tau^*_{SQ}\right)$ are exogenously given. Through the TA, governments engage in reciprocal tariff liberalization to $\boldsymbol{\tau}_{TA} = (\tau_{TA}, \tau^*_{TA}) \leq \boldsymbol{\tau}_{SQ}$.

We assume $\boldsymbol{\tau}_{TA}$ respects an exogenous 'reciprocity rule' that fixes the rate that τ_{TA} changes relative to τ^*_{TA}. The literature suggests various possible interpretations.[17] For Bagwell and Staiger (1999), it reflects a requirement that, measured at the status quo world prices, tariff liberalization induces equal changes in import volumes across countries. They show this is equivalent to tariff liberalization preserving the terms-of-trade prevailing at $\boldsymbol{\tau}_{SQ}$ in a multi-sector model. Our general approach merely represents the reciprocity rule by the unit vector $\mathbf{u}\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) = \left(u_{TA}\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right), u^*_{TA}\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)\right)$, where $u^*_{TA}\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) / u_{TA}\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$ gives the required rate at which τ^*_{TA} must change relative to τ_{TA}. Given the status quo tariffs $\boldsymbol{\tau}_{SQ}$ are in place before the TA, we suppress the dependence of $\mathbf{u}(\cdot)$ on $\boldsymbol{\tau}_{SQ}$ hereafter (and will often do so for other variables throughout the paper).

Given $\boldsymbol{\tau}_{SQ}$, Figure 1 illustrates our approach through three examples. In Figure 1(a), the slope of the dashed curve is $u^*_{TA}\left(\boldsymbol{\tau}_{TA}\right) / u_{TA}\left(\boldsymbol{\tau}_{TA}\right) = 1$ for all $\boldsymbol{\tau}_{TA} \leq \boldsymbol{\tau}_{SQ}$ and depicts, for example, two symmetric countries where reciprocity requires one-to-one reductions in τ^*_{TA} and τ_{TA} with the most liberal TA being free trade. In Figure 1(b), $u^*_{TA}\left(\boldsymbol{\tau}_{TA}\right) / u_{TA}\left(\boldsymbol{\tau}_{TA}\right)$ is again constant for all $\boldsymbol{\tau}_{TA} \leq \boldsymbol{\tau}_{SQ}$ but depicts, for example, asymmetric countries whereby reciprocity requires larger reductions in τ^*_{TA} than τ_{TA}.[18] Here, tariff liberalization that

[16] Our general model does not depend on whether tariffs are ad valorem or specific. In the particular trade models of Section 5, we make clear our choice of ad valorem or specific tariffs. The non-negativity assumption simplifies our analysis but, as we discuss later, does not qualitatively affect our results.

[17] See DeRemer (2016) for a general discussion and treatment of reciprocity.

[18] For example, suppose reciprocity requires that τ^*_{TA} must be reduced four times as quickly as τ_{TA}. Then $\mathbf{u}\left(\boldsymbol{\tau}_{TA}\right) = \left(\frac{1}{17^{1/2}}, \frac{4}{17^{1/2}}\right)$, where Pythagoras' theorem gives the length of the vector $(1, 4)$ as $17^{1/2}$ and

respects reciprocity cannot lead to free trade for both countries. Figure 1(c) illustrates the possibility that $u_{TA}^{*}(\boldsymbol{\tau}_{TA})/u_{TA}(\boldsymbol{\tau}_{TA})$ is not constant as the TA becomes more liberal. In any case, the most liberal TA entails at least one country levying a zero tariff.

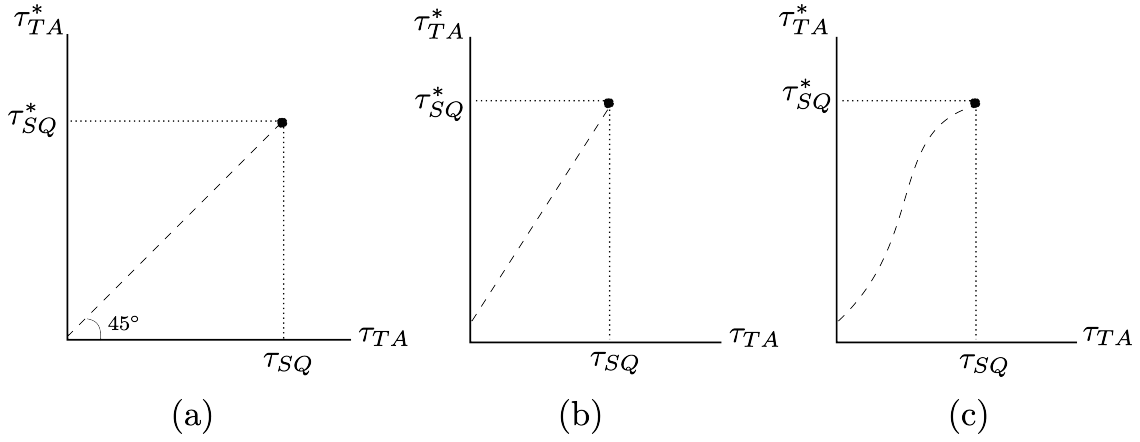

Figure 1: Reciprocity and TA tariffs

Throughout the paper, we will often want to describe how the value of a variable changes as the TA becomes more liberal through mutual reductions in τ_{TA} and τ_{TA}^{*} that respect the reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA})$. For a variable $x(\boldsymbol{\tau}_{TA})$ and the standard notation $\nabla x = \left(\frac{\partial x(\boldsymbol{\tau}_{TA})}{\partial \tau_{TA}}, \frac{\partial x(\boldsymbol{\tau}_{TA})}{\partial \tau_{TA}^{*}}\right)$, we define

$$-\frac{\partial x(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} \equiv -\mathbf{u}(\boldsymbol{\tau}_{TA}) \cdot \nabla x = \; -u_{TA}(\boldsymbol{\tau}_{TA}) \frac{\partial x(\boldsymbol{\tau}_{TA})}{\partial \tau_{TA}} - u_{TA}^{*}(\boldsymbol{\tau}_{TA}) \frac{\partial x(\boldsymbol{\tau}_{TA})}{\partial \tau_{TA}^{*}}.$$

That is, $-\frac{\partial x(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}}$ describes the change in x for a marginal increase in the degree of TA tariff *liberalization* that respects the reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA})$.

2.2 Contesting a TA

We use backward induction to analyze the following three-stage game throughout the paper:

Stage 1. Given status quo tariffs $\boldsymbol{\tau}_{SQ}$, governments announce TA tariffs $\boldsymbol{\tau}_{TA} \leq \boldsymbol{\tau}_{SQ}$ that respect the reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ})$.

Stage 2. In each country, an anti-trade lobby (L_A or L_A^{*}) and a pro-trade lobby (L_T or L_T^{*}) simultaneously make non-negative contributions to their own government.

Stage 3. Each government decides whether to ratify the TA according to a contest success function (defined by (1) below). If both governments ratify, the TA tariffs $\boldsymbol{\tau}_{TA}$ are implemented. Otherwise, the status quo tariffs $\boldsymbol{\tau}_{SQ}$ prevail.

dividing through by this factor ensures that $\mathbf{u}(\boldsymbol{\tau}_{TA})$ has unit length.

In principle, the TA tariffs $\boldsymbol{\tau}_{TA}$ emerge in Stage 1 through a bargaining process. However, apart from imposing that TA tariffs respect the reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})$, we merely assume the bargaining process is efficient in that there are no TA tariffs $\boldsymbol{\tau}'_{TA} \neq \boldsymbol{\tau}_{TA}$ that increase the expected payoff of both governments.

Given the TA tariffs announced in Stage 1, local lobby groups can make contributions in Stage 2 to their own national government either in support of or opposition to the TA. Focusing on Home, each lobby L_i, $i \in \{A,T\}$, has a valuation $v_i(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}) \geq 0$. These valuations represent the value of the TA going ahead for L_T and the value of the TA *not* going ahead for L_A. Thus, L_A contributes $l_A \geq 0$ in opposition to the TA while L_T contributes $l_T \geq 0$ in support of the TA.[19] At the same time, Foreign lobbies make contributions to the Foreign government. Given lobbies make contributions before government TA ratification decisions, lobbies *cannot* condition their contributions on the TA ratification outcome.

After receiving lobbying contributions, each government simultaneously decides whether to ratify the TA in Stage 3. A typical contest success function (CSF) would say the probability of TA ratification increases with the amount of pro-trade contributions l_T relative to anti-trade contributions l_A. However, in addition to contributions, we assume 'additional factors' may enter the CSF and, hence, the government's ratification decision.

We capture these additional factors by $h(\tau,\tau^*)$. Following the trade literature, we let $a \geq 0$ capture the government's valuation of these additional factors $h(\cdot)$ relative to contributions. Following the all-pay contest literature, $ah(\boldsymbol{\tau}_{SQ}) \equiv ah_A(\boldsymbol{\tau}_{SQ})$ and $ah(\boldsymbol{\tau}_{TA}) \equiv ah_T(\boldsymbol{\tau}_{TA})$ represent 'head starts' to, respectively, the anti-trade and pro-trade lobbies.[20] That is, $ah_A(\boldsymbol{\tau}_{SQ})$ captures additional factors that boost the government's payoff, and hence the chance of the government not ratifying the TA, when the status quo prevails. Similarly, $ah_T(\boldsymbol{\tau}_{TA})$ captures additional factors that boost the government's payoff, and hence the chance of the government ratifying the TA, upon implementation of the TA tariffs. Further, we say there are pro-trade head starts if $a\Delta h(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}) \equiv ah_T(\boldsymbol{\tau}_{TA}) - ah_A(\boldsymbol{\tau}_{SQ}) > 0$ and $-\frac{\partial h_T(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$ but there are anti-trade head starts if $a\Delta h(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}) < 0$ and $-\frac{\partial h_T(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} < 0$.

The additional factors $h(\tau,\tau^*)$ could capture various government motivations including domestic employment, tariff revenue, firm profits, or national welfare.[21] In the Melitz model,

[19] The numeraire of a particular trade model that microfounds $v_i(\cdot)$ determines the units of measurement for $v_i(\cdot)$ and l_i. The contributions l_i could also have the interpretation of effort and/or information provision with an appropriate modification to our baseline government payoff function. In this case, we could measure effort/information provision in units of labor and normalize units of effort so that one unit of effort equates to one unit of labor.

[20] Naturally, we assume the head starts $ah_i(\cdot)$ and the valuations $v_i(\cdot)$, and their first derivatives, are real valued functions.

[21] The government may have distributional or politically motivated concerns for a particular group and hence value their profits independently of contributions made out of profits.

$h(\cdot)$ could represent a government preference for employment in smaller firms that only serve the domestic market, so that $-\frac{\partial h(\cdot)}{\partial \tau} < 0$. For a small country in a textbook neoclassical trade model, $h(\cdot)$ could represent tariff revenue or national welfare with the former initially increasing in τ and concave but the latter decreasing in τ. Among large countries in a wide class of trade models with $h(\cdot)$ representing national welfare, $h(\cdot)$ would initially be increasing in τ and concave but, due to standard terms-of-trade effects, decreasing in τ^*. Nevertheless, in a wide class of trade models where $h(\boldsymbol{\tau}_{TA})$ represents national welfare we would have $-\frac{\partial h(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$ given our reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA})$ because, absent terms-of-trade effects, mutual tariff liberalization generally increases national welfare via more efficient resource allocation.

Given the potential existence of these head starts, the government weighs the 'augmented contribution' $s_i = l_i + ah_i(\cdot)$ of each lobby L_i, $i \in \{A, T\}$, when deciding on TA ratification. Specifically, the Home government ratifies the TA with probability

$$\rho_T(s_A, s_T) = \frac{s_T^r}{s_A^r + s_T^r} \tag{1}$$

where $r > 0$ is a sensitivity parameter. Here, ρ_T is the probability that L_T 'wins' the contest by successfully swaying the government to ratify the TA. Alternatively, $1 - \rho_T$ is the probability that L_A 'wins' the contest by successfully swaying the government against ratifying the TA.[22] Note that (1) is the generalized CSF and Appendix B provides a microfoundation for this CSF. Our 'augmented contributions' correspond to the 'effective investments' of Rai and Sarin (2009) who axiomatize the generalized CSF with 'effective investments'.[23]

The contest literature deals with two standard cases. First, the 'simple Tullock contest' assumes $r = 1$ so that ρ_T only depends on the relative size of augmented contributions.[24] An appealing property of this formulation is that the probability of lobbying success rises with a lobby's augmented contribution without guaranteeing success. Second, the all-pay contest lets $r \to \infty$, thereby guaranteeing success for the strictly highest contribution: $\rho_T = 0$ if $s_A > s_T$ but $\rho_T = 1$ if $s_T > s_A$.[25] Our analysis in the main text assumes $r = 1$, starting with the case where only lobbying matters (i.e. $a = 0$) before bringing in additional factors $h(\cdot)$ (i.e. $a > 0$). We relegate the parallel all-pay contest analysis to Appendix C.

[22] As we make explicit later, we assume that $\rho_T > 0$ if $s_A = s_T = 0$. This nests the typical assumption that $\rho_T = \frac{1}{2}$ if $s_A = s_T = 0$.

[23] Skaperdas (1996) axiomatizes the basic contest success function.

[24] The 'general Tullock contest' allows $0 < r < \infty$.

[25] Following the literature, all-pay auctions view each player's 'cost' of bidding as the bid itself. All-pay contests allow more general 'cost' specifications, including the possibility that players have different head starts. Our model with $r \to \infty$ is a parallel all-pay contest because of the head starts.

Turning to expected payoffs, L_A's expected payoff is

$$\begin{aligned}&(1-\rho_T^*)\,v_A(\boldsymbol{\tau}_{TA})+\rho_T^*(1-\rho_T)\,v_A(\boldsymbol{\tau}_{TA})-l_A\\&\equiv\mu_A+(1-\rho_T)\,\tilde{v}_A(\boldsymbol{\tau}_{TA})-l_A\end{aligned}\tag{2}$$

where $\mu_A\equiv(1-\rho_T^*)\,v_A(\boldsymbol{\tau}_{TA})$ and $\tilde{v}_A(\boldsymbol{\tau}_{TA})\equiv\rho_T^*v_A(\boldsymbol{\tau}_{TA})$. L_A's payoff is $v_A(\boldsymbol{\tau}_{TA})$ if the TA stalls but 0 if the TA goes ahead. Moreover, the TA stalls (i) with probability $1-\rho_T^*$ because Foreign does not ratify the TA and (ii) with probability $\rho_T^*(1-\rho_T)$ because Foreign ratifies the TA but Home does not ratify. Similarly, L_T's expected payoff is

$$\begin{aligned}&(1-\rho_T^*)\cdot 0+\rho_T^*\rho_T v_T(\boldsymbol{\tau}_{TA})-l_T\\&\equiv\mu_T+\rho_T\tilde{v}_T(\boldsymbol{\tau}_{TA})-l_T\end{aligned}\tag{3}$$

where $\mu_T\equiv(1-\rho_T^*)\cdot 0$ and $\tilde{v}_T(\boldsymbol{\tau}_{TA})\equiv\rho_T^*v_T(\boldsymbol{\tau}_{TA})$. L_T's payoff is 0 if the TA stalls but $v_T(\boldsymbol{\tau}_{TA})$ if the TA goes ahead. Moreover, the TA goes ahead if and only if both governments ratify the TA which happens with probability $\rho_T\rho_T^*$. Finally, the Home government's expected payoff consists of two components:

$$G(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})=l_A+l_T+a\left[\rho_T\rho_T^*h_T(\boldsymbol{\tau}_{TA})+(1-\rho_T\rho_T^*)\,h_A(\boldsymbol{\tau}_{SQ})\right].\tag{4}$$

First, prior to the TA ratification decision, L_i makes contributions l_i. Second, the government's valuation of the additional factors $h(\cdot)$ depends on whether the TA goes ahead.[26]

These expected payoffs display the parallel contest structure and its differences from the regular contest structure. Setting $\rho_T^*=1$, Home's ratification decision is pivotal because Foreign ratifies the TA with certainty. In turn, our parallel contest structure collapses to a regular contest: Home country lobbies know their local contest is pivotal to whether the TA goes ahead. But, Home's ratification decision may not be pivotal when $\rho_T^*<1$ because Foreign may not ratify the TA. Two implications emerge given Foreign fails to ratify with probability $1-\rho_T^*$. First, L_A's expected payoff is $\mu_A=(1-\rho_T^*)\,v_A(\boldsymbol{\tau}_{TA})>0$ when, in the absence of head starts, it contributes *nothing*. Second, even *conditional* on Home ratifying the TA (which only happens with probability ρ_T), L_T's expected payoff is only $\tilde{v}_T(\boldsymbol{\tau}_{TA})-l_T=\rho_T^*v_T(\boldsymbol{\tau}_{TA})-l_T$ and its realized payoff is $-l_T$ if Foreign fails to ratify the TA. These dependencies across the contests in Home and Foreign (e.g. Home lobby expected payoffs depend on ρ_T^*) are not present in the prior contest literature and generate

[26]If one interprets l_i as L_i's cost of effort/information provision, one may want to model government valuation of l_i as $\kappa_i l_i$ where the parameter κ_i transforms the lobby's cost of effort/information provision into the government's valuation of such action.

our 'parallel contest' structure.

The expected payoff functions presented above also reveal how standard solution techniques from the Tullock (and all-pay) contest literature apply in our parallel contest setting. First, Home lobby expected payoffs depend on the probability of 'winning' their Home contest multiplied by their 'effective' valuation $\tilde{v}_i(\boldsymbol{\tau}_{TA}) = \rho_T^* v_i(\boldsymbol{\tau}_{TA})$ that, in turn, depends on the probability of Home's ratification decision being pivotal. Indeed, these novel 'effective' valuations provide the crucial link between our parallel contest setup and the standard contest (and all-pay contest) setup. In particular, Home lobbies perceive these effective valuations as exogenous because, when deciding on their contributions, they take other lobbies' contributions as given (including Foreign lobby contributions). Hence, they take ρ_T^* as given. Thus, the $(1-\rho_T)\tilde{v}_A(\boldsymbol{\tau}_{TA})$ and $\rho_T\tilde{v}_T(\boldsymbol{\tau}_{TA})$ terms effectively mirror those found in prior literature. Second, the parallel nature of the contest implies Home's ratification decision may not be pivotal and, thus, generates the μ_i terms. But, these are exogenous intercept shifters of the expected payoff functions. In turn, they do not affect lobby group preferences over strategy profiles. This implies that the preferences embodied in the expected payoff functions above mirror those of a standard Tullock (or all pay) contest with effective valuations $\tilde{v}_i(\boldsymbol{\tau}_{TA})$ and, thus, standard solution techniques apply.

2.3 How TAs affect Interest Group Payoffs

Given the generality of our lobby group payoff structure, we impose some properties to help characterize the equilibrium. By definition, $v_i(\boldsymbol{\tau}_{TA} = \boldsymbol{\tau}_{SQ}; \boldsymbol{\tau}_{SQ}) = 0$: absent tariff liberalization, L_T gains nothing and L_A loses nothing. However, we impose that tariff liberalization 'polarizes' the lobby groups. Specifically, focusing on Home lobbies,

$$-\frac{\partial v_i(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} \equiv -\mathbf{u}(\boldsymbol{\tau}_{TA}) \cdot \nabla v_i > 0 \text{ for } i \in \{A, T\} \tag{5}$$

so that tariff liberalization respecting the reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA})$ generates stronger TA support by L_T and stronger TA opposition by L_A. Thus, given our focus on tariffs, polarization of the lobby groups is maximized by the most liberal possible TA that respects $\mathbf{u}(\boldsymbol{\tau}_{TA})$.

In the Melitz model, relatively productive firms not only serve the domestic market but also export, while relatively unproductive firms only serve the domestic market. While Foreign liberalization increases export profits, Home liberalization hurts domestic profits. Thus, the nature of the reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA})$ matters for exporters by defining the relative magnitude of liberalization by Home versus Foreign. Nevertheless, intuitively, the most productive firms naturally constitute L_T and should profit more from a TA that involves more liberalization, $-\frac{\partial v_T(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$, under the reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA})$. Conversely, rela-

tively unproductive exporters together with the low productivity firms that only serve the domestic market naturally constitute L_A and should suffer more from a TA that involves more liberalization, $-\frac{\partial v_A(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$. Further, this intuition can also apply for simple oligopoly models. Indeed, Section 5 shows how the reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA})$ ensures that reciprocal tariff liberalization polarizes L_A and L_T as defined by (5) in the Melitz and oligopoly models.

In the canonical textbook specific factors model, land is specific to agricultural production, capital is specific to manufacturing production, and labor is perfectly mobile. Suppose Home and Foreign are two small countries in a multi-country world, with Home (Foreign) having a comparative advantage in manufacturing (agriculture). Home capital owners profit from falling Home tariffs via the tariff-induced contraction of the import competing sector, which reallocates labor to manufacturing and increases returns to capital. Thus, capital owners naturally constitute L_T and $-\frac{\partial v_T(\boldsymbol{\tau}_{TA})}{\partial \tau_{TA}} > 0$. Conversely, the reallocation of labor away from agriculture reduces returns to land, implying land owners naturally constitute L_A and $-\frac{\partial v_A(\boldsymbol{\tau}_{TA})}{\partial \tau_{TA}} > 0$. Further, given Home and Foreign are small, $-\frac{\partial v_i(\boldsymbol{\tau}_{TA})}{\partial \tau^*_{TA}} = 0$ for $i \in \{A, T\}$. Thus, the TA polarizes the lobby groups regardless of the reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA})$.

Now suppose Home and Foreign are both large countries. Holding world prices fixed, the qualitative impacts of tariff liberalization mirror those in the small country case. However, by reducing their terms-of-trade, tariff liberalization by Home partially reverses the labor market reallocation effects described above and, thus, partially offsets the polarizing impact on Home specific factor owners described above. But, assuming away the Metzler paradox, as is common in the literature, the qualitative impact of Home liberalization mirrors the small country case. Because Foreign tariff liberalization improves Home terms-of-trade, the labor reallocation effects follow those of Home tariff liberalization and, thus, reinforce the qualitative impact on Home specific factor incomes. Thus, the TA polarizes Home lobby groups for any reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA})$ that avoids the Metzler paradox.

3 Contesting a TA when Only Lobbying Matters

We now focus on the role of lobbying over TA ratification by imposing $a = 0$ (and $r = 1$) and thereby removing the additional factors $h(\cdot)$. In turn, we consider contributions l_i rather than augmented contributions $l_i + ah_i(\cdot)$.

In Stage 3, no strategic interaction takes place. Given lobbying contributions, each government's ratification decision is determined solely by its CSF in (1):

$$\rho_T(l_A, l_T) = \begin{cases} \frac{l_T}{l_A + l_T} & \text{if } l_T > 0 \text{ or } l_A > 0 \\ \rho \in (0, 1] & \text{if } l_T = l_A = 0 \end{cases} \tag{6}$$

where ρ is an exogenous, known and deterministic tie breaking rule.

In Stage 2, lobbies interact strategically. Focusing on Home lobbies, L_A chooses l_A to maximize its expected payoff (2) given the proposed TA tariffs $\boldsymbol{\tau}_{TA}$ from Stage 1 and taking l_T and ρ_T^* as given. Analogously, L_T chooses l_T to maximize (3). The first order conditions (FOCs) are

$$l_i = \left[l_j \rho_T^* v_i\left(\boldsymbol{\tau}_{TA}\right)\right]^{\frac{1}{2}} - l_j \text{ for } i \in \{A, T\} \text{ and } j \neq i. \tag{7}$$

Solving the FOCs given ρ_T^* and $\boldsymbol{\tau}_{TA}$ reveals that in a pure strategy Nash equilibrium

$$l_i = \hat{l}_i\left(\rho_T^*, \boldsymbol{\tau}_{TA}\right) \equiv \rho_T^* \frac{1}{2} \frac{1}{\left(1 + \frac{v_j(\boldsymbol{\tau}_{TA})}{v_i(\boldsymbol{\tau}_{TA})}\right)} \bar{v}\left(\boldsymbol{\tau}_{TA}\right) \text{ for } i \in \{A, T\} \text{ and } j \neq i \tag{8}$$

where $\bar{v}\left(\boldsymbol{\tau}_{TA}\right) = \left[\frac{1}{2}\left(\frac{1}{v_A(\boldsymbol{\tau}_{TA})} + \frac{1}{v_T(\boldsymbol{\tau}_{TA})}\right)\right]^{-1}$ denotes the harmonic mean of the valuations. An interesting tension emerges here between the 'average' valuation, captured by the harmonic mean $\bar{v}\left(\boldsymbol{\tau}_{TA}\right)$, and the relative valuation of the opposing lobby, captured by $\frac{v_j(\boldsymbol{\tau}_{TA})}{v_i(\boldsymbol{\tau}_{TA})}$. All else equal, contributions of *both* lobbies rise with the average valuation $\bar{v}\left(\boldsymbol{\tau}_{TA}\right)$: high valuations amplify lobbying intensity. But, all else equal, a given lobby shades its contribution downwards as the relative valuation of the opposing lobby group rises.

In equilibrium, the parallel contest nature of our analysis emerges through the proportionality of Home lobby contributions to ρ_T^*. If $\rho_T^* = 1$, Home's TA ratification decision is pivotal and we have the well known solution in the contest literature. Conversely, $\rho_T^* = 0$ implies Home's ratification decision is inconsequential because Home lobbies know Foreign will not ratify the TA and, in turn, Home lobbies will not contribute. Nevertheless, $\boldsymbol{\tau}_{TA} < \boldsymbol{\tau}_{SQ}$ implies $\rho_T^* > 0$ and $v_i\left(\boldsymbol{\tau}_{TA}\right) > 0$ for $i \in \{A, T\}$. Hence, (8) says Home lobby contributions are positive in equilibrium.[27,28]

In Stage 1, governments set the TA tariffs $\boldsymbol{\tau}_{TA}$ anticipating the Stage 2 lobbying process and Stage 3 TA ratification process. Given $a = 0$, governments are purely motivated by contributions and, using (8), equilibrium aggregate contributions are

$$\hat{l}\left(\rho_T^*, \boldsymbol{\tau}_{TA}\right) = \hat{l}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}\right) + \hat{l}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}\right) = \rho_T^* \frac{1}{2} \bar{v}\left(\boldsymbol{\tau}_{TA}\right). \tag{9}$$

[27] $\rho_T^* > 0$ can be seen by contradiction. Suppose that $l_T^* = 0$ and $l_A^* > 0$ so that $\rho_T^* = 0$ which, given (6), is the only way that $\rho_T^* = 0$. Then, for any $l_A^* = \tilde{l}_A^* > 0$, L_A^* can increase its expected payoff, given by the analogy of (2), through reducing l_A^* to $\tilde{l}_A^* - \varepsilon$ for some arbitrarily small $\varepsilon > 0$. Thus, $\tilde{l}_A^*$ is not a best response to $l_T^* = 0$. In turn, $\rho_T^* = 0$ cannot happen in equilibrium.

[28] The importance of the tie breaking rule $\rho > 0$ can be seen as follows. Suppose $\rho_T^* = 0$ if $l_A^*\left(\cdot\right) = l_T^*\left(\cdot\right) = 0$. Then, $\hat{l}_A\left(\cdot\right) = \hat{l}_T\left(\cdot\right) = \hat{l}_A^*\left(\cdot\right) = \hat{l}_T^*\left(\cdot\right) = 0$ constitutes a 'no-contribution' pure strategy Nash equilibrium (in addition to the one that we characterized above with positive contributions). Further, given $l_i\left(\cdot\right) > 0$ and $\rho > 0$, the second order condition $-2\frac{l_j}{\left(l_i + l_j\right)^3}\rho_T^* v_i < 0$ holds. Thus, the tie breaking rule $\rho > 0$ implies that (8) characterizes the unique equilibrium for any $\boldsymbol{\tau}_{TA} < \boldsymbol{\tau}_{SQ}$.

In the aggregate, the relative valuation effects underlying each lobby's individual contributions cancel out and leave aggregate lobbying proportional to the average valuation $\bar{v}(\boldsymbol{\tau}_{TA})$. Thus, aggregate contributions are increasing in each lobby's valuation $v_i(\boldsymbol{\tau}_{TA})$. In turn, for a given $\rho_T^* > 0$, the polarization property implies aggregate contributions are maximized under the most liberal TA possible since trade liberalization strengthens both the support by L_T for the TA and the opposition by L_A against the TA. This suggests both governments have an incentive to propose the most liberal possible TA to maximize aggregate equilibrium lobbying contributions $\hat{l}(\rho_T^*, \boldsymbol{\tau}_{TA})$.

However, the Home government must also consider how the chosen TA tariffs $\boldsymbol{\tau}_{TA}$ affect the probability of Foreign ratification ρ_T^*. Thus, we now solve for ρ_T and ρ_T^*. This not only helps further characterize aggregate contributions, $\hat{l}(\rho_T^*, \boldsymbol{\tau}_{TA})$ and $\hat{l}^*(\rho_T, \boldsymbol{\tau}_{TA})$, but also the equilibrium probability that the TA goes ahead. Noting that the equilibrium relative contributions by lobby groups match their relative valuations, $\frac{\hat{l}_T}{\hat{l}_A} = \frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$, the equilibrium TA ratification probabilities in Home and Foreign are

$$\hat{\rho}_T(\boldsymbol{\tau}_{TA}) = \rho_T\left(\hat{l}_A(\rho_T^*, \boldsymbol{\tau}_{TA}), \hat{l}_T(\rho_T^*, \boldsymbol{\tau}_{TA})\right) = \left[1 + \frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\right]^{-1} \tag{10}$$

$$\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}) = \rho_T^*\left(\hat{l}_A^*(\rho_T, \boldsymbol{\tau}_{TA}), \hat{l}_T^*(\rho_T, \boldsymbol{\tau}_{TA})\right) = \left[1 + \frac{v_A^*(\boldsymbol{\tau}_{TA})}{v_T^*(\boldsymbol{\tau}_{TA})}\right]^{-1}. \tag{11}$$

In turn, the equilibrium probability that the TA goes ahead is

$$\hat{\rho}_T(\boldsymbol{\tau}_{TA})\,\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}) = \left[1 + \frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\right]^{-1} \cdot \left[1 + \frac{v_A^*(\boldsymbol{\tau}_{TA})}{v_T^*(\boldsymbol{\tau}_{TA})}\right]^{-1}.$$

Hence, anything that increases the relative valuations $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$ and/or $\frac{v_T^*(\boldsymbol{\tau}_{TA})}{v_A^*(\boldsymbol{\tau}_{TA})}$ also increases the probability that the TA goes ahead. Indeed, $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$ and $\frac{v_T^*(\boldsymbol{\tau}_{TA})}{v_A^*(\boldsymbol{\tau}_{TA})}$ are sufficient statistics for, respectively, the likelihood of Home and Foreign TA ratification.

Thus, to help characterize the equilibrium TA tariffs, we need some structure on how a more liberal TA affects relative valuations. We have already assumed that a more liberal TA polarizes lobby groups: $-\frac{\partial v_i(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$ for $i \in \{A, T\}$. We now say, given a reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA})$, that there is 'pro-trade biased polarization' from a more liberal TA if the relative valuation $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$ rises as the TA becomes more liberal:

$$-\frac{\partial \frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}}{\partial \boldsymbol{\tau}_{TA}} \equiv -\mathbf{u}(\boldsymbol{\tau}_{TA}) \cdot \nabla \frac{v_T}{v_A} > 0.$$

Naturally, the analogous definition applies to Foreign lobbies.

To what extent does pro-trade biased polarization hold in standard models of international trade? Our above discussion established that polarization holds in the Melitz, oligopoly, and specific factors models. In Section 5, we also show that pro-trade biased polarization holds in these same models. Intuitively, in the Melitz and oligopoly models, a more liberal TA delivers profits to the pro-trade high productivity export firms that exceed the losses suffered by the less productive remaining firms. Additionally, for the specific factors model, as trade liberalization reallocates labor, the value of the marginal product for the specific factor in the exporting sector rises faster than it falls in the import-competing sector. Thus, while one may view pro-trade biased polarization as a strong assumption, it actually holds under a fairly general and well-defined set of conditions in (at least) three standard models of international trade.

It should now be clear that the most liberal TA maximizes aggregate lobbying contributions received by each government. For Home, by polarizing the lobby groups, a more liberal TA increases the average contribution $\bar{v}(\boldsymbol{\tau}_{TA})$. In turn, conditional on ρ_T^*, the most liberal TA maximizes aggregate lobbying contributions $\hat{l}(\rho_T^*, \boldsymbol{\tau}_{TA})$. Further, pro-trade biased polarization implies that a more liberal TA also increases the relative valuation $\frac{v_T^*(\boldsymbol{\tau}_{TA})}{v_A^*(\boldsymbol{\tau}_{TA})}$ and, in turn, $\rho_T^*(\boldsymbol{\tau}_{TA})$. Thus, all else equal, the most liberal TA maximizes ρ_T^*. Hence, the most liberal TA maximizes both $\bar{v}(\boldsymbol{\tau}_{TA})$ and ρ_T^* and, therefore, maximizes Home aggregate lobbying contributions $\hat{l}(\rho_T^*, \boldsymbol{\tau}_{TA})$. Proposition 1 describes this discussion where $\hat{\boldsymbol{\tau}}_{TA}$ denotes the equilibrium TA tariffs.[29]

Proposition 1 *Assume (i) $a = 0$, and (ii) a reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA})$ that ensures a more liberal TA polarizes the lobby groups and generates pro-trade biased polarization. In equilibrium, (i) Home and Foreign governments propose the most liberal TA possible, implying at least one country proposes free trade and (ii) the equilibrium probability of TA formation is*

$$\hat{\rho}_T(\hat{\boldsymbol{\tau}}_{TA})\,\hat{\rho}_T^*(\hat{\boldsymbol{\tau}}_{TA}) = \left[1 + \frac{v_T(\hat{\boldsymbol{\tau}}_{TA})}{v_A(\hat{\boldsymbol{\tau}}_{TA})}\right]^{-1} \cdot \left[1 + \frac{v_T^*(\hat{\boldsymbol{\tau}}_{TA})}{v_A^*(\hat{\boldsymbol{\tau}}_{TA})}\right]^{-1}. \tag{12}$$

Proposition 1 highlights an important insight of our framework. The lobbying process *itself* can drive governments to propose the most liberal TA possible: even without regard to consumer interests (i.e. $a = 0$), governments can propose the most liberal TA possible.[30] In contrast, consumer interests tend to drive trade liberalization in the prior literature.

[29] See Appendix A for the proof.

[30] If we allowed negative tariffs, governments would set import subsidies to further polarize interest groups and, thus, increase aggregate contributions. A trade off between additional aggregate contributions and raising revenue to pay import subsidies would pin down the equilibrium import subsidy. Our non-negativity constraint abstracts from this issue because, ultimately, our main focus is understanding the tensions that balance the positive tariffs observed in the real world. These tensions emerge in our model when $a > 0$.

For example, free trade emerges in an 'organized sector' in Grossman and Helpman (1994) only if the consumer interests of *all* agents in the economy are represented by organized lobbies. The idea that the lobbying process itself as opposed to consumer interests drives trade liberalization squares well with a common theme in the popular press that corporate lobbying drives government decisions over TAs.

Proposition 1 also highlights that the relative valuation of the pro-trade lobby drives the likelihood of TA formation. Relative contributions of lobby groups match their relative valuations, $\frac{\hat{l}_T\left(\rho_T^*,\boldsymbol{\tau}_{TA}\right)}{\hat{l}_A\left(\rho_T^*,\boldsymbol{\tau}_{TA}\right)} = \frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$, and the probability of TA formation is increasing in the relative valuation of the pro-trade lobby in each country. Thus, changes in relative valuations impact the intensive margin of lobbying and, in turn, the probability of TA formation.

4 Bringing in Additional Factors

While we have shown that lobbying acts as a liberalizing force in driving the most liberal TA as the equilibrium TA, we ignored additional factors beyond lobbying that motivate governments. We now consider governments motivated by such additional factors. Formally, $a > 0$ now allows the head starts to enter each government's payoff function. Conceptually, we focus on understanding the circumstances where the most liberal TA is not the equilibrium TA and, in turn, the tensions underlying such a TA.

In Stage 3, a government's TA ratification decision now balances contributions and head starts, where the pro-trade head start $ah_T\left(\boldsymbol{\tau}_{TA}\right)$ depends on TA tariffs and the anti-trade head start $ah_A\left(\boldsymbol{\tau}_{SQ}\right)$ depends on status quo tariffs. Using (1), the probability of Home TA ratification now depends on the relative magnitude of augmented contributions $s_i = l_i + ah_i$:

$$\rho_T\left(s_A, s_T\right) = \frac{s_T}{s_T + s_A} \text{ for all } l_T \geq 0 \text{ and } l_A \geq 0. \tag{13}$$

In Stage 2, the FOCs for maximizing lobby group expected payoffs in (2)-(3) are:

$$l_A = \left(s_T \rho_T^* v_A\left(\boldsymbol{\tau}_{TA}\right)\right)^{\frac{1}{2}} - \left(s_T + ah_A\left(\boldsymbol{\tau}_{SQ}\right)\right) \tag{14}$$

$$l_T = \left(s_A \rho_T^* v_T\left(\boldsymbol{\tau}_{TA}\right)\right)^{\frac{1}{2}} - \left(s_A + ah_T\left(\boldsymbol{\tau}_{TA}\right)\right). \tag{15}$$

Given ρ_T^* and $\boldsymbol{\tau}_{TA}$, equilibrium contributions when both groups lobby are:

$$\hat{l}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) = \rho_T^* \frac{1}{2\left(1 + \frac{v_T(\boldsymbol{\tau}_{TA})}{vA(\boldsymbol{\tau}_{TA})}\right)} \bar{v}\left(\boldsymbol{\tau}_{TA}\right) - a h_A\left(\boldsymbol{\tau}_{SQ}\right) \tag{16}$$

$$\hat{l}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}\right) = \rho_T^* \frac{1}{2\left(1 + \frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\right)} \bar{v}\left(\boldsymbol{\tau}_{TA}\right) - a h_T\left(\boldsymbol{\tau}_{TA}\right). \tag{17}$$

Three observations stand out.[31] First, comparing (16)-(17) with (8), head starts create what we call 'lobbying leakage': the pro-trade (anti-trade) lobby merely drops their contributions by the amount of their head start because this reflects the government's inherent value for the TA going ahead (not going ahead). Second, participation constraints emerge because contributions are decreasing in head starts. For comparability with the $a = 0$ case, we hereafter assume a is sufficiently small to ensure positive contributions for both groups. However, (14) and (15) show that, for example, the pro-trade lobby may still lobby when the participation constraint binds for the anti-trade lobby:

$$\hat{l}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) = \left[a h_A\left(\boldsymbol{\tau}_{SQ}\right) \rho_T^* v_T\left(\boldsymbol{\tau}_{TA}\right)\right]^{\frac{1}{2}} - a\left(h_A\left(\boldsymbol{\tau}_{SQ}\right) + h_T\left(\boldsymbol{\tau}_{TA}\right)\right) \text{ when } l_A = 0. \tag{18}$$

Thus, our framework models the extensive and intensive lobbying margins.[32] Third, like our earlier analysis where only lobbying matters, the relative valuation $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$ remains a sufficient statistic for Home TA ratification:

$$\hat{\rho}_T\left(\boldsymbol{\tau}_{TA}\right) = \rho_T\left(\hat{l}_A\left(\cdot\right), \hat{l}_T\left(\cdot\right), h_T\left(\boldsymbol{\tau}_{TA}\right), h_A\left(\boldsymbol{\tau}_{SQ}\right)\right) = \left(1 + \frac{v_A\left(\boldsymbol{\tau}_{TA}\right)}{v_T\left(\boldsymbol{\tau}_{TA}\right)}\right)^{-1}.$$

Intuitively, head starts leave the equilibrium TA ratification probability unchanged because lobbying leakages exactly offset the head starts that now enter augmented contributions s_i.

In Stage 1, government payoffs from TA tariffs $\boldsymbol{\tau}_{TA}$ now depend on lobbying contributions and head starts $a h_i\left(\cdot\right)$. Indeed, equilibrium aggregate lobbying contributions are now

$$\hat{l}\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) = \hat{l}_A\left(\cdot\right) + \hat{l}_T\left(\cdot\right) = \hat{l}_0\left(\rho_T^*, \boldsymbol{\tau}_{TA}\right) - a\left[h_A\left(\boldsymbol{\tau}_{SQ}\right) + h_T\left(\boldsymbol{\tau}_{TA}\right)\right] \tag{19}$$

where $\hat{l}_0\left(\rho_T^*, \boldsymbol{\tau}_{TA}\right) \equiv \hat{l}\left(\rho_T^*, \boldsymbol{\tau}_{TA}; a = 0\right)$ is given by (9). In turn, as expected from our above discussion, lobbying leakage reduces aggregate contributions by the head starts.

[31] The second order condition (SOC) is $-2\rho_T^* v_i\left(\boldsymbol{\tau}_{TA}\right) \frac{s_j}{\left(s_i + s_j\right)^3}$. Given $\boldsymbol{\tau}_{TA} < \boldsymbol{\tau}_{SQ}$ implies $v_i\left(\boldsymbol{\tau}_{TA}\right) > 0$ for $i \in \{A, T\}$ and (13) implies $\rho_T^* > 0$ for any $l_A^* \geq 0$ and $l_T^* \geq 0$, the SOC holds for $\boldsymbol{\tau}_{TA} < \boldsymbol{\tau}_{SQ}$.

[32] Appendix C shows an alternative approach to modeling the extensive margin of lobbying. There, we model a parallel all-pay contest and show that interest groups may choose not to lobby with a strictly positive probability.

Thus, noting $h_A(\boldsymbol{\tau}_{SQ})$ is independent of $\boldsymbol{\tau}_{TA}$, the Home government's expected payoff is

$$\begin{aligned} G(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}) &= \hat{l}\left(\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}),\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right) + a\mathbb{E}\left[h(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})\right] \\ &= \hat{l}_0\left(\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}),\boldsymbol{\tau}_{TA}\right) - \Phi(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}) - ah_A(\boldsymbol{\tau}_{SQ}) \end{aligned} \tag{20}$$

where $a\mathbb{E}\left[h(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})\right] \equiv a\left[\hat{\rho}_T(\boldsymbol{\tau}_{TA})\hat{\rho}_T^*(\boldsymbol{\tau}_{TA})h_T(\boldsymbol{\tau}_{TA}) + (1-\hat{\rho}_T(\boldsymbol{\tau}_{TA})\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}))h_A(\boldsymbol{\tau}_{SQ})\right]$ > 0 is the expected head start. Moreover, given $\Delta h(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}) \equiv h_T(\boldsymbol{\tau}_{TA}) - h_A(\boldsymbol{\tau}_{SQ})$,

$$\Phi(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}) \equiv a\left[1-\hat{\rho}_T(\boldsymbol{\tau}_{TA})\hat{\rho}_T^*(\boldsymbol{\tau}_{TA})\right]\Delta h(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}) \tag{21}$$

combines two effects. First, $\Phi(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})$ contains the "lobbying leakage" from the pro-trade lobby given by $\hat{l}_T(\rho_T^*,\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}) - \hat{l}_T(\rho_T^*,\boldsymbol{\tau}_{TA};a=0) = -ah_T(\boldsymbol{\tau}_{TA})$. Second, $\Phi(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})$ contains the expected head start $a\mathbb{E}\left[h(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})\right]$. Thus, $\Phi(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})$ mediates the impact of TA tariffs on the government's expected payoff via the head starts.

Specifically, the impact of more liberal TA tariffs on the Home government's expected payoff is

$$-\frac{\partial G(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})}{\partial \boldsymbol{\tau}_{TA}} = -\frac{\partial \hat{l}_0\left(\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}),\boldsymbol{\tau}_{TA}\right)}{\partial \boldsymbol{\tau}_{TA}} + \frac{\partial \Phi(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})}{\partial \boldsymbol{\tau}_{TA}}. \tag{22}$$

Our earlier analysis established that a more liberal TA increases aggregate lobbying in the absence of head starts, $-\frac{\partial \hat{l}_0\left(\rho_T^*,\boldsymbol{\tau}_{TA}\right)}{\partial \boldsymbol{\tau}_{TA}} > 0$. Thus, given $\Phi(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})$ is proportional to a, the results of Proposition 1 hold for sufficiently small $a > 0$ because $-\frac{\partial G\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)}{\partial \boldsymbol{\tau}_{TA}} > 0$ holds for sufficiently small $a > 0$.[33] To analyze the more general case when a is not sufficiently small, we now proceed by imposing more structure on the impact of TA tariffs on head starts.

4.1 Pro-trade and Anti-trade head starts

More liberal TA tariffs $\boldsymbol{\tau}_{TA}$ impact the Home government's expected payoff, via (22), through aggregate lobbying contributions $\hat{l}_0(\rho_T^*,\boldsymbol{\tau}_{TA})$ and $\Phi(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})$. However, given the most liberal TA maximizes aggregate lobbying contributions $\hat{l}_0(\rho_T^*,\boldsymbol{\tau}_{TA})$ in the absence of head starts, a necessary condition for something other than the most liberal TA to emerge as the equilibrium TA is $-\frac{\partial \Phi\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)}{\partial \boldsymbol{\tau}_{TA}} > 0$ when evaluated at the most liberal TA.

As described above, $\Phi(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})$ consists of lobbying leakage by the pro-trade lobby and the government's expected head start. How do more liberal TA tariffs impact lobbying leakage by the pro-trade lobby? The answer depends on the nature of head starts. First, consider pro-trade head starts: $a\Delta h(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}) > 0$ and $-\frac{\partial h_T(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$. That is, the pro-trade lobby enjoys a higher head start than the anti-trade lobby and a more liberal TA

[33] We state, and prove, this formally as Proposition 2 in Appendix A.

increases the pro-trade lobby's head start (as in, e.g., the standard trade model). Then, $-\frac{\partial h_T(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$ implies a higher head start for the pro-trade lobby which reduces the government's expected payoff through higher lobbying leakage. Second, consider anti-trade head starts: $a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right) < 0$ and $-\frac{\partial h_T(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} < 0$. That is, the anti-trade lobby enjoys higher head starts than the pro-trade lobby and a more liberal TA increases this net head start. Then, $-\frac{\partial h_T(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} < 0$ implies a lower head start for the pro-trade lobby which increases the government's expected payoff through lower lobbying leakage. Thus, from the perspective of the lobbying leakage effect, more liberal TA tariffs decrease (increase) the government's expected payoff under pro-trade (anti-trade) head starts.

The lobbying leakage effects work through changing the head starts $ah_A\left(\boldsymbol{\tau}_{SQ}\right)$ and $ah_T\left(\boldsymbol{\tau}_{TA}\right)$. But, for given head starts, how do more liberal TA tariffs impact the government's expected head start $a\mathbb{E}\left[h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)\right]$? Regardless of pro-trade or anti-trade head starts, a more liberal TA increases the probability of TA implementation via pro-trade biased polarization: $-\frac{\partial \hat{\rho}_T^*(\boldsymbol{\tau}_{TA})\hat{\rho}_T(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$. Thus, a more liberal TA increases the likelihood of realizing $h_T\left(\boldsymbol{\tau}_{TA}\right)$ and decreases the likelihood of realizing $h_A\left(\boldsymbol{\tau}_{SQ}\right)$. In the case of pro-trade head starts, i.e. $h_T\left(\boldsymbol{\tau}_{TA}\right) > h_A\left(\boldsymbol{\tau}_{SQ}\right)$, the expected head start and, in turn, the government's expected payoff increase. However, in the case of anti-trade head starts, i.e. $h_T\left(\boldsymbol{\tau}_{TA}\right) < h_A\left(\boldsymbol{\tau}_{SQ}\right)$, the expected head start and, in turn, the government's expected payoff fall. Thus, from the perspective of the expected head start, more liberal TA tariffs increase (decrease) the government's expected payoff under pro-trade (anti-trade) head starts.

Important implications emerge from the different tensions underlying the impact of more liberal TA tariffs across the anti-trade and pro-trade head start cases. Specifically, our framework suggests two alternative explanations for the fact that positive tariffs characterize real world TAs. One explanation revolves around pro-trade head starts and lobbying leakage. On one hand, two forces push towards liberalization: (i) pro-trade head starts and (ii) aggregate lobbying contributions *absent* lobbying leakage. On the other hand, lobbying leakage pushes towards protection because the pro-trade lobby shades their contributions as the TA becomes more liberal given their understanding of the government's inherent desire for liberalization. Thus, one explanation provided by our framework for observing real world TAs with positive tariffs is the lobbying leakage effect. That is, governments set positive tariffs because more liberal TA tariffs would *depress* pro-trade lobby contributions by enough to outweigh the liberalizing forces of lower TA tariffs on aggregate lobby contributions and the pro-trade head start.

Our framework has a second, and perhaps more plausible, explanation for observing positive tariffs as the outcome of real world TAs. This revolves around the inherently protectionist government preferences of anti-trade head starts. On one hand, aggregate lobbying

contributions, both those *absent* lobbying leakage and the lobbying leakage itself, push towards further liberalization. Here, a more liberal TA shrinks the extent that the pro-trade lobby shades their contributions given the inherent government preference for protection. On the other hand, the anti-trade head start itself pushes towards protection. Thus, inherently protectionist government preferences represent an alternative, and perhaps more plausible, rationale for the fact that we observe positive tariffs in real world TAs.

As we explained in the Introduction, the idea that protectionism emerges as a balance between the liberalizing force of lobbying and the protectionist force of inherent government preferences stands in stark contrast to the typical view of the TA literature where the opposite is true. Nevertheless, consistent with the idea of inherent government preferences for protection is the motivation provided by Corden (1974) and Freund and Ozden (2008), and recent empirical work of Conconi et al. (2014) who find compelling evidence that electoral motivations underpin politicians' protectionist preferences. Additionally, Lake and Millimet (2016) find that, empirically, trade-related redistribution towards a politician's constituents can mitigate this inherent protectionist tendency. Thus, our alternative perspective squares with the theory and recent empirical evidence supportive of inherently protectionist government preferences.

4.2 International Political Externalities

The fundamental observation of Bagwell and Staiger (1999) is that, in a two country world, the sole purpose of a TA is to internalize terms-of-trade externalities. Intuitively, despite a large class of political motivations governments may hold, one country is completely unaffected by the other country's tariff *if* world prices remain unchanged. That is, governments have nothing else to negotiate about once their TA internalizes terms-of-trade externalities. However, the political motivations that governments hold in our framework fall outside those considered by Bagwell and Staiger (1999). Specifically, for *given* world prices, Home is affected by Foreign's tariff in our framework because Foreign's tariff changes Foreign's local prices and, in turn, the probability of Foreign TA ratification. Changes in the probability of Foreign TA ratification impact Home through Home aggregate lobbying contributions and the Home government's expected head start. Thus, our new political economy framework showcases new international political externalities that are not internalized by governments who just internalize their terms-of-trade externalities.

To investigate this issue, we recast our analysis with anti-trade head starts (i.e. our preferred explanation for an equilibrium TA with protection) in the general framework of Bagwell and Staiger (1999). This framework features two countries and two goods but im-

poses little further structure on technology, consumer preferences or government preferences. Specifically, Home imports good x and Foreign imports good y. Further, dropping the TA subscripts hereafter, Home's local relative price is $p \equiv \frac{p_x}{p_y} = \frac{\tau p_x^*}{p_y} \equiv \tau p^w(\tau, \tau^*)$ where Home (Foreign) imposes an ad valorem tariff τ (τ^*) and p^w is the world relative price. Analogously, Foreign's local relative price is $p^* \equiv \frac{p_x^*}{p_y^*} = \frac{p_x^*}{\tau^* p_y} = \frac{1}{\tau^*} p^w(\tau, \tau^*)$. Note that p^w ($\frac{1}{p^w}$) represents Foreign (Home) terms-of-trade. Where relevant, we hereafter focus on the Home country and leave implicit that the analogous concept applies for the Foreign country.

Balanced trade between Home and Foreign delivers the equilibrium world relative price $p^w(\tau, \tau^*)$. In the background, increasing opportunity costs govern production. Home production of good i given by $Q_i(p)$ such that the marginal rate of transformation equals p. Further, consumers view goods as normal goods. Home demand for good i given by $D_i(p, R)$ where $R(p, p^w)$ is Home tariff revenue measured in terms of the local export good at local prices. Assuming away the Lerner Paradox, $\frac{\partial p^w(\tau,\tau^*)}{\partial \tau} < 0 < \frac{\partial p^w(\tau,\tau^*)}{\partial \tau^*}$ so each country's tariff improves their terms-of-trade. Assuming away the Metzler Paradox, $\frac{dp(\tau,p^w)}{d\tau} > 0 > \frac{dp^*(\tau^*,p^w)}{d\tau^*}$ so that each country's tariff increases the relative price of its imported good.

Bagwell and Staiger (1999) consider a large class of government preferences. Specifically, they consider the class of preferences where the Home government's payoff $G(\tau, \tau^*)$ can be re-written as $G(p, p^w) = G(p(\tau, p^w(\tau, \tau^*)), p^w(\tau, \tau^*))$. This includes, but is not limited to, the case where $G(\cdot)$ represents national welfare. For example, $G(\cdot)$ could represent the setup in Grossman and Helpman (1995b) featuring a specific factors model and a government who cares about both national welfare and, through a menu auction, lobbying contributions. As a fairly unrestrictive condition, Bagwell and Staiger (1999) impose that each country benefits from increases in their own terms-of-trade: $\frac{\partial G(p,p^w)}{\partial p^w} < 0 < \frac{\partial G^*(p^*,p^w)}{\partial p^w}$. Crucially, notice that the preferences of each government do not depend on the local relative price in the other country and, in turn, only depend on the other country's tariff through its impact on the world relative price.

Relative to the structure in Bagwell and Staiger (1999), the key observation in our framework is that each government's preferences do depend on the local relative price in the other country. Thus, government preferences in our framework are given by $G(\tau, \tau^*) = G(p, p^w, p^*)$ and $G^*(\tau^*, \tau) = G^*(p^*, p^w, p)$. In turn, Foreign's tariff τ^* imposes externalities on Home not only via Home's terms-of-trade $\frac{1}{p^w}$ but also, for *given* terms-of-trade, via Foreign's local relative price $p^*(\tau^*, p^w)$. The broad intuition is straightforward: Foreign tariffs impact the probability of Foreign TA ratification and, for *given* terms-of-trade, this impacts the degree of lobbying in Home (given by (19)) and also the expected head start (i.e. $a\mathbb{E}[h(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ})]$) for the Home government.

More specifically, there are two particular international political externalities in our

framework that extend beyond terms-of-trade externalities. Letting $\boldsymbol{\tau} = (\tau, \tau^*)$, our Home government preferences (given by (20)) can be written as

$$\begin{aligned} G(\tau, \tau^*) &= \hat{l}_0\left(\hat{\rho}_T^*(\boldsymbol{\tau}), \boldsymbol{\tau}\right) - a\left[1 - \hat{\rho}_T(\boldsymbol{\tau})\,\hat{\rho}_T^*(\boldsymbol{\tau})\right]\Delta h(\boldsymbol{\tau}) \\ &= G\left(\hat{l}_0\left(p, p^w, p^*\right), \hat{\rho}_T^*\left(p^*, p^w\right), \hat{\rho}_T\left(p, p^w\right), \Delta h\left(p, p^w\right)\right) \\ &= G\left(p, p^w, p^*\right). \end{aligned}$$

These two externalities can be seen, holding p^w fixed, from

$$-\frac{\partial G(\tau, \tau^*)}{\partial \tau^*}\Big|_{\bar{p}^w} = -\frac{\partial G(\cdot)}{\partial \hat{l}_0(\cdot)}\frac{\partial \hat{l}_0(\cdot)}{\partial \hat{\rho}_T^*(\cdot)}\frac{\partial \hat{\rho}_T^*(\cdot)}{\partial \frac{v_T^*(p^*, p^w)}{v_A^*(p^*, p^w)}}\frac{\partial \frac{v_T^*(p^*, p^w)}{v_A^*(p^*, p^w)}}{\partial p^*(\cdot)}\frac{\partial p^*(\cdot)}{\partial \tau^*(\cdot)} - \frac{\partial G(\cdot)}{\partial \hat{\rho}_T^*(\cdot)}\Big|_{\bar{l}_0(\cdot)}\frac{\partial \hat{\rho}_T^*(\cdot)}{\partial p^*(\cdot)}\frac{\partial p^*(\cdot)}{\partial \tau^*(\cdot)}. \tag{23}$$

Foreign liberalization imposes externalities on Home through the Foreign TA ratification probability. The first term on the right hand side says this happens through the relative strength of Foreign interest group TA support: pro-trade biased polarization implies Foreign tariff liberalization increases the probability of Foreign TA ratification. In turn, by increasing the likelihood that Home's TA ratification decision is pivotal for TA implementation, the higher $\rho_T^*(\cdot)$ intensifies Home lobbying competition and contributions rise. Thus, Foreign tariff liberalization imposes a positive "aggregate contributions" externality on Home.

The second term on the right hand side of (23) says Foreign liberalization also imposes an externality on the Home government by decreasing its expected net head start. Holding Home lobbying contributions $l_0(\cdot)$ fixed, the higher probability of TA implementation increases the probability of the Home government realizing $h_T(\cdot)$ and decreases the probability of realizing $h_A(\cdot)$. Thus, given $h_A(\cdot) > h_T(\cdot)$ by anti-trade head starts, the Home government's expected net head start falls: $\frac{\partial G(\cdot)}{\partial \rho_T^*(\cdot)}|_{\bar{l}_0(\cdot)} = \rho_T(\cdot)\,\Delta h(\cdot) < 0$. That is, Foreign tariff liberalization imposes a negative "net head start" externality on Home. Given the aggregate contribution and expected net head start externalities have opposite signs, the sign of our net international political externality is ambiguous.

To reach their fundamental observation that the sole purpose of a TA is internalizing terms-of-trade externalities, Bagwell and Staiger (1999) define two types of tariffs. First, *politically optimal* tariffs are those that would be chosen by individual governments if they did not value the terms-of-trade gains from their individual tariffs. Second, *efficient* tariffs are those where no other set of tariffs make both governments better off. Bagwell and Staiger then propose the following 'test' for whether the terms-of-trade externality is the only problem for a TA to solve: are politically optimal tariffs also efficient? If so, the test is passed because there is no scope for mutually beneficial tariff changes once a TA internalizes

terms-of-trade externalities.[34]

Figure 2 illustrates their formal argument. In general, the slope of the Home ($\bar{G}_{BS}$) and Foreign ($\bar{G}^*_{BS}$) government iso-payoff curves are, respectively,

$$\frac{d\tau}{d\tau^*}|_{dG=0} = -\frac{\partial G(\cdot)/\partial\tau^*}{\partial G(\cdot)/\partial\tau} = -\frac{\partial p^w/\partial\tau^*}{\partial p^w/\partial\tau}\left[\frac{\tau G_p + G_{p^w}}{\frac{1}{\lambda}G_p + G_{p^w}}\right] > 0 \tag{24}$$

$$\frac{d\tau}{d\tau^*}|_{dG^*=0} = -\frac{\partial G^*(\cdot)/\partial\tau^*}{\partial G^*(\cdot)/\partial\tau} = -\frac{\partial p^w/\partial\tau^*}{\partial p^w/\partial\tau}\left[\frac{\frac{1}{\lambda^*}G^*_{p^*} + G^*_{p^w}}{\frac{1}{\tau^*}G^*_p + G^*_{p^w}}\right] > 0 \tag{25}$$

where the subscripts on G and G^* indicate partial derivatives, $\lambda \equiv \frac{\partial p^w/\partial\tau}{dp/d\tau} < 0$ and $\lambda^* \equiv \frac{\partial p^w/\partial\tau^*}{dp/d\tau^*} < 0$. Moreover, the EE locus is the locus of efficient tariffs whereby the iso-payoff curves are tangent. The key step in Bagwell and Staiger's logic is that when each government acts as if it ignores the impact of its tariff on its terms on trade then the resulting "politically optimal" tariffs must satisfy $G_p = G^*_{p^*} = 0$.[35] This delivers the fundamental result, illustrated by Figure 2, that the politically optimal tariffs are efficient because the iso-payoff curves are tangent at the politically optimal tariffs $\boldsymbol{\tau}_{PO} = (\tau_{PO}, \tau^*_{PO})$:

$$\frac{d\tau}{d\tau^*}|_{dG=0} = \frac{d\tau}{d\tau^*}|_{dG^*=0} = -\frac{\partial p^w/\partial\tau^*}{\partial p^w/\partial\tau}. \tag{26}$$

Hence, governments cannot negotiate mutually beneficial tariff changes once the TA internalizes their terms-of-trade externalities.

However, our international political externalities are not internalized by governments who just internalize their terms-of-trade externalities. Figure 3 illustrates the formal argument. Given our government preferences $G(p, p^w, p^*)$ and $G^*(p^*, p^w, p)$, the slopes of the Home ($\bar{G}$)

[34]Bagwell and Staiger (2016) explain the test can fail if governments cannot levy import taxes/subsidies and export taxes/subsidies. As discussed in footnote 16, our qualitative results hold when allowing import subsidies; we ignore them merely for presentation purposes. Further, Lerner symmetry holds in the general equilibrium model of the current section. Hence, import tariffs (subsidies) are analytically equivalent to export taxes (subsidies). Thus, our analysis in this section does not suffer from an 'incomplete instruments' problem.

[35]Note that Home's FOC for its individually optimal tariff is $G_p\frac{dp}{d\tau} + G_{p^w}\frac{\partial p^w}{\partial\tau} = G_p \cdot \left(p^w + \tau\frac{\partial p^w}{\partial\tau}\right) + G_{p^w}\frac{\partial p^w}{\partial\tau} = 0$. If Home acts as if it ignores the impact of its tariff on its terms of trade, then it acts as if $\frac{\partial p^w}{\partial\tau} = 0$. In this case, the FOC reduces to $G_p \cdot p^w = 0$ and, in turn, $G_p = 0$ given $p^w \neq 0$.

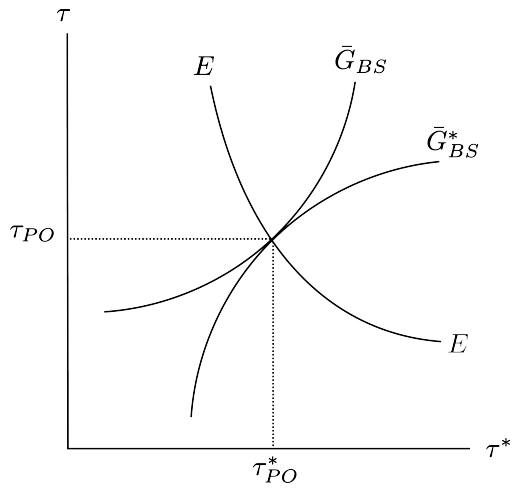

Figure 2: Politically optimal and efficient tariffs in absence of international political externalities

and Foreign ($\bar{G}^*$) government iso-payoff curves are, respectively,

$$\frac{d\tau}{d\tau^*}|_{dG=0} = -\frac{\partial G(\cdot)/\partial\tau^*}{\partial G(\cdot)/\partial\tau} = -\frac{\partial p^w/\partial\tau^*}{\partial p^w/\partial\tau}\left[\frac{\tau G_p + G_{p^w} + \frac{1}{\lambda^*}G_{p^*}}{\frac{1}{\lambda}G_p + G_{p^w} + \frac{1}{\tau^*}G_{p^*}}\right] \tag{27}$$

$$\frac{d\tau}{d\tau^*}|_{dG^*=0} = -\frac{\partial G^*(\cdot)/\partial\tau^*}{\partial G^*(\cdot)/\partial\tau} = -\frac{\partial p^w/\partial\tau^*}{\partial p^w/\partial\tau}\left[\frac{\frac{1}{\lambda^*}G^*_{p^*} + G^*_{p^w} + \tau G^*_p}{\frac{1}{\tau^*}G^*_p + G^*_{p^w} + \frac{1}{\lambda}G^*_p}\right]. \tag{28}$$

Naturally, these slopes reduce to those in (24)-(25) when $G_{p^*} = G^*_p \equiv 0$, so that the international political economy externalities that we introduce in our framework disappear. If each government acts as if it ignores the impact of its tariff on its terms on trade in the presence of these international political externalities (i.e. $G_{p^*} \neq 0, G^*_p \neq 0$), the resulting politically optimal tariffs must again satisfy $G_p = G^*_{p^*} = 0$.[36] Hence, the iso-payoff curve slopes at the politically optimal tariffs are

$$\frac{d\tau}{d\tau^*}|_{dG=0} = -\frac{\partial G(\cdot)/\partial\tau^*}{\partial G(\cdot)/\partial\tau} = -\frac{\partial p^w/\partial\tau^*}{\partial p^w/\partial\tau}\left[\frac{1 + \frac{1}{\lambda^*}\frac{G_{p^*}}{G_{p^w}}}{1 + \frac{1}{\tau^*}\frac{G_{p^*}}{G_{p^w}}}\right] \tag{29}$$

$$\frac{d\tau}{d\tau^*}|_{dG^*=0} = -\frac{\partial G^*(\cdot)/\partial\tau^*}{\partial G^*(\cdot)/\partial\tau} = -\frac{\partial p^w/\partial\tau^*}{\partial p^w/\partial\tau}\left[\frac{1 + \tau\frac{G^*_p}{G^*_{p^w}}}{1 + \frac{1}{\lambda}\frac{G^*_p}{G^*_{p^w}}}\right]. \tag{30}$$

[36]Note that Home's FOC for its individually optimal tariff is $G_p\frac{dp}{d\tau} + G_{p^w}\frac{\partial p^w}{\partial\tau} + G_{p^*}\frac{dp^*}{d\tau} = G_p \cdot \left(p^w + \tau\frac{\partial p^w}{\partial\tau}\right) + G_{p^w}\frac{\partial p^w}{\partial\tau} + G_{p^*}\frac{1}{\tau^*}\frac{\partial p^w}{\partial\tau} = 0$. If Home acts as if it ignores the impact of its tariff on its terms of trade, then it acts as if $\frac{\partial p^w}{\partial\tau} = 0$. In this case, the FOC reduces to $G_p \cdot p^w = 0$ and, in turn, $G_p = 0$ given $p^w \neq 0$.

Indeed, contrary to the fundamental observation in Bagwell and Staiger (1999), we can now show that the politically optimal tariffs are inefficient.

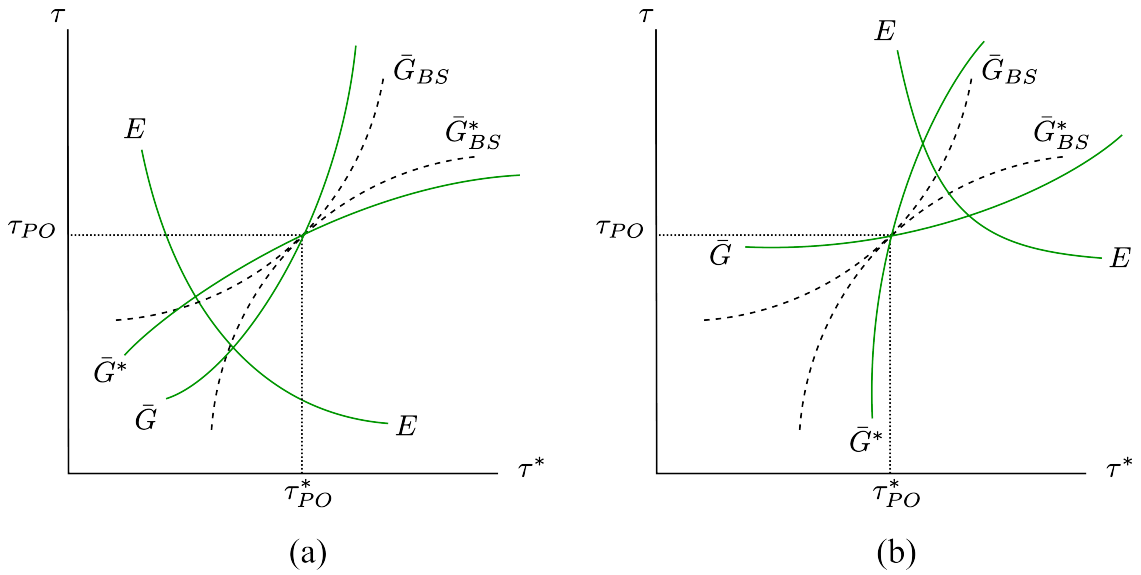

Figure 3: Politically optimal and efficient tariffs in presence of international political externalities

In seeing why the politically optimal tariffs are inefficient, we can also see whether the efficient TA in our framework embodies more or less liberalization than that embodied by the politically optimal tariffs $\boldsymbol{\tau}_{PO}$ whereby governments just internalize the terms-of-trade externalities.[37] Above, we described that the net sign of our international political externalities is ambiguous. Thus, first suppose that liberalization by one country imposes a net positive externality on the other country, i.e. $G_{p^*} > 0$ and $G^*_p < 0$. Then, using (29)-(30), $0 < \frac{d\tau}{d\tau^*}|_{dG^*=0} < -\frac{\partial p^w/\partial \tau^*}{\partial p^w/\partial \tau} < \frac{d\tau}{d\tau^*}|_{dG=0}$. Thus, as illustrated by Figure 3(a), relative to the efficient outcome absent our international political externalities, Home's iso-payoff curve has steepened and Foreign's iso-payoff curve has flattened. In turn, the politically optimal tariffs $\boldsymbol{\tau}_{PO}$ no longer lie on the efficiency locus EE. Indeed, Figure 3(a) also shows that, starting at $\boldsymbol{\tau}_{PO}$, our international political externalities imply the efficient TA embodies more liberalization than when governments just internalize terms-of-trade externalities.

However, when our international political externalities are, on net, negative then the efficient TA embodies less liberalization than the politically optimal tariffs. Formally, the net negative international political externality implies $G_{p^*} < 0$ and $G^*_p > 0$ so that, using (29)-(30), $0 < \frac{d\tau}{d\tau^*}|_{dG=0} < -\frac{\partial p^w/\partial \tau^*}{\partial p^w/\partial \tau} < \frac{d\tau}{d\tau^*}|_{dG^*=0}$. Thus, relative to the efficient outcome in

[37] We ignore the knife edge case where the aggregate contribution externality and expected net head start externality exactly offset one another, and leave a net zero international political externality. In this knife edge case, the classic result of Bagwell and Staiger (1999) again applies: the sole purpose of a TA is internalizing terms of trade externalities.

the absence of our international political externalities, Home's iso-payoff curve has flattened and Foreign's iso-payoff curve has steepened. Figure 3(b) shows the politically optimal tariffs are again inefficient. Further, Figure 3(b) also shows our international political externalities imply that, starting at $\boldsymbol{\tau}_{PO}$, the efficient TA embodies less liberalization than when governments just internalize terms-of-trade externalities.[38]

Given our international political externalities are new to the literature, we should emphasize an important point: uncertainty over Foreign TA ratification is not sufficient to generate our international political externalities. Rather, these externalities emerge because uncertainty over Foreign TA ratification is endogenous and depends on Foreign trade policy. Formally, this can be seen via (23) where the Foreign tariff τ^* impacts the Home government's expected payoff through changing the Foreign TA ratification probability ρ_T^*. Thus, the emergence of our international political externalities stems from our explicit modeling of the political process governing TA formation.

5 Examples and Extensions

5.1 Examples with particular underlying trade models

5.1.1 Partial equilibrium specific factors model

To concretely relate our results to existing literature, we now explore two and three-country versions of the Grossman and Helpman (1995a) specific factors model. From the specific factors model in the Protection for Sale framework of Grossman and Helpman (1994, 1995a,b), important features have permeated the subsequent trade policy literature. Specifically, utility is (i) quasi-linear in non-numeraire goods produced using sector-specific factors and labor and (ii) linear in a numeraire good that is freely traded and produced one-for-one with labor. This eliminates substitution effects between non-numeraire goods and implies the numeraire good absorbs all income effects. Moreover, production of the numeraire good pins wages to 1, making labor income independent of trade policy. Thus, effectively, a general equilibrium setup becomes a partial equilibrium setup.

Grossman and Helpman (1995a) simplify further. They impose (i) inelastic domestic supply and (ii) quadratic utility and, hence, linear demand for non-numeraire goods. In a two-country world, the essential structure (see Appendix D.1 for further details) is two non-numeraire goods where Home and Foreign have comparative advantage in different goods.

[38]Figure 3 illustrates positive equilibrium tariffs that balance the anti-trade head starts and the liberalizing force of lobbying. If we allowed negative tariffs, i.e. import subsidies, this would merely allow the possibility that the tension balancing the anti-trade head starts and the liberalizing force of lobbying produces equilibrium import subsidies. Thus, focusing on non-negative tariffs is not restrictive.

Further, (i) each country has endowments e (d) of their comparative advantage (disadvantage) good and (ii) the intercepts on each country's linear inverse demand curves are α (θ) for their comparative advantage (disadvantage) good. Like earlier, we assume governments only negotiate over import policies rather than export policies. While Grossman and Helpman do not make this restriction, we describe below why it is without loss of generality. Additionally, we assume specific tariffs.[39]

In a two-country world, negotiating a TA over trade liberalization serves a clear purpose in Grossman and Helpman (1995b). Given the menu auction framework, the Home government chooses their status quo tariff τ_{SQ} to maximize $G^{GH} = PS(\tau_{SQ};\cdot) + aW(\tau_{SQ};\cdot)$ where $PS(\cdot)$ denotes producer surplus (of both sectors) and $W(\cdot)$ denotes national welfare. Under a TA, the unique efficient outcome is given by the symmetric TA tariff τ_{TA}^{GH} that maximizes the joint payoff $G^{GH} + G^{*,GH}$. Thus,

$$\tau_{SQ}^{GH} = \frac{1}{3}\left[(\theta-\alpha)+(e-d)+2\frac{d}{a}\right] = \underbrace{\frac{1}{3}\left[(\theta-\alpha)+(e-d)-\frac{d}{a}\right]}_{\text{Terms of trade effect}} + \underbrace{\frac{d}{a}}_{\text{Politics effect}}$$

$$\tau_{TA}^{GH} = \underbrace{\frac{d}{a}}_{\text{Home politics effect}} - \underbrace{\frac{e}{a}}_{\text{Foreign politics effect}}$$

The status quo tariff τ_{SQ}^{GH} combines a terms-of-trade effect and a politics effect with the politics effect dissipating with the welfare mindedness of governments as governed by a. Imposing $d > e$, the TA tariff $\tau_{TA}^{GH} > 0$ just combines the politics effects and, in doing so, removes the terms-of-trade effect from τ_{SQ}^{GH}.[40] That is, the sole purpose of the TA is removing the negative externality associated with the terms-of-trade effect.[41] Bagwell and Staiger (1999) emphasize this point in a much broader class of economic environments and government preferences that embeds Grossman and Helpman (1995b) as an example.

While a TA cannot eliminate the politics component of the status quo tariffs in a menu auction, a TA eliminates these effects in our framework. Given $v_T(\boldsymbol{\tau}_{TA}) = \frac{1}{2}e(\tau_{SQ} - \tau_{TA})$ and $v_A(\boldsymbol{\tau}_{TA}) = \frac{1}{2}d(\tau_{SQ} - \tau_{TA})$, our polarization property holds ($-\frac{\partial v_i(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$) and our pro-trade biased polarization property holds ($-\partial\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}/\partial\boldsymbol{\tau}_{TA} = 0$). Thus, as discussed earlier, free trade is the equilibrium TA for sufficiently small a.[42]

[39] As mentioned earlier, the assumption of ad valorem or specific tariff is irrelevant for our general model.

[40] In general, the terms of trade effect is the inverse export supply elasticity (in absolute value). In our linear setup, it is merely equilibrium Foreign exports of $\frac{1}{2}\left[(e+\theta)-(\alpha+d)-\tau_{SQ}^{GH}\right]$. Hence, $\tau_{SQ}^{GH} > 0$ given positive foreign exports.

[41] Here, the TA also brings in the Foreign politics effect but that would show up as part of a status quo Foreign export subsidy if we also allowed export policy.

[42] If a is large enough, the equilibrium TA can shift from having a symmetric TA tariff of $\tau_{TA} = 0$ to

The greater degree of liberalization that emerges in our framework stems from our new international political externalities. As we discussed above, (23) shows the presence of an "aggregate contributions externality" whereby, for given terms-of-trade, a lower Foreign tariff confers a positive externality on Home. This positive externality of liberalization arises because the higher probability of Foreign TA ratification increases the intensity of Home lobbying and, in turn, aggregate Home lobbying contributions. Equation (23) also shows the presence of an "expected net head start externality". In Section 4.2, this was a negative externality of liberalization because governments had anti-trade head starts. But, with the pro-trade head starts of national welfare in the current discussion, this is another positive externality of liberalization whereby the higher probability of Foreign TA ratification increases the probability of realizing national welfare evaluated at the TA tariffs. Together, these international political externalities create positive externalities of liberalization and generate greater liberalization than a standard model without these externalities.

By extending the above example to a three-country setting, we now illustrate how our results differ from a menu-auction over a bilateral Free Trade Agreement (FTA). Perhaps the most prominent exception to the overarching non-discrimination principle in the GATT/WTO is that bilateral FTA members eliminate their *bilateral* tariffs. Formally, we now consider three non-numeraire goods where each country has an endowment e of its comparative advantage good and endowments d of its two comparative disadvantage goods (each country has a different comparative advantage good).

To focus attention on the differences between the menu auction framework and our contest framework, let $a = 0$ so that governments simply maximize lobby welfare. In our simple symmetric economic environment, the FTA-induced change in lobby welfare is the change in producer surplus $\frac{1}{3}\tau_{SQ}(e - 2d)$. Thus, governments oppose the FTA in a menu auction framework when $d > \frac{1}{2}e$.[43] Faced with the choice of preserving the status quo tariffs or proposing a bilateral FTA with zero bilateral tariffs in our contest framework, our earlier discussion implies a pair of governments propose the bilateral FTA when a is sufficiently small and our polarization and pro-trade biased polarization properties hold. Indeed, they hold given $v_T(\boldsymbol{\tau}_{TA}) = \frac{1}{3}e\tau_{SQ}$, $v_A(\boldsymbol{\tau}_{TA}) = \frac{2}{3}d\tau_{SQ}$ and $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})} = \frac{1}{2}\frac{e}{d}$. Thus, we have a concrete example where lobby pressure leads governments to not form the FTA in a menu auction setting (like Grossman and Helpman 1995a) but governments do propose FTA formation in our contest framework. Given head starts play no role because $a = 0$, the intuition described above regarding the aggregate contribution externality drives this result.

$\tau_{TA} = \frac{2d}{a}\left(\frac{e}{e+d}\right)^2$. This shift not only requires a large enough but also $\tau_{TA} \leq \tau_{SQ}$ and $l_i \geq 0$ for $i \in \{A, T\}$.

[43] Note that this condition is weaker than the condition required for a tariff to maximize the three-country joint government payoff.

5.1.2 Oligopoly model

Intra-industry conflicts over trade liberalization could naturally emerge. To this end, we now illustrate how our contest framework differs from the menu auction framework using a simple oligopoly model (we relegate a detailed presentation to Appendix D.2).

Two symmetric countries each have two firms. They apply symmetric status quo specific tariffs $\boldsymbol{\tau}_{SQ} = \left(\tau_{SQ}, \tau^*_{SQ} = \tau_{SQ}\right)$ with $\tau_{SQ} < \bar{\tau}$ where $\tau > \bar{\tau}$ would prohibit trade. In each country, one firm has zero marginal cost (i.e. $c = 0$) and the other has constant marginal cost $c = \bar{c} > 0$. Exporting requires a fixed cost $f_X > 0$; thus, in equilibrium, inefficient firms may only serve their domestic market. A linear inverse demand curve, with an intercept normalized to 1, governs demand for the oligopolistic good. We make the standard assumptions outlined in Section 5.1.1 that reduces a general equilibrium to a partial equilibrium setup.

The fixed export cost f_X generates intra-industry conflict over trade liberalization. Once f_X exceeds a threshold $\underline{f}_X(c)$, exporting is unprofitable for the inefficient firms for all $\tau \leq \tau_{SQ}$. Thus, as Figure 4(a) shows, liberalization hurts the inefficient domestic firm via increased competition in the domestic market with the efficient Foreign firm: $-\frac{\partial \pi(\bar{c})}{\partial \boldsymbol{\tau}_{TA}} < 0$ where $\pi(c)$ denotes profits of a Home firm. In turn, the inefficient firm constitutes L_A and, fixing τ_{SQ}, Figure 4(b) shows that $-\frac{\partial v_A\left(\boldsymbol{\tau}_{TA}, \boldsymbol{\tau}_{SQ}\right)}{\partial \boldsymbol{\tau}_{TA}} < 0$. Unlike the inefficient firm, trade liberalization benefits the efficient firm via higher export profits. However, as Figure 4(a) shows, the convexity of $\pi(0)$ implies that a sufficiently high τ_{SQ} actually requires a sufficiently liberal τ_{TA} for the benefit of higher exports profits to outweigh lost domestic profits. In turn, the efficient firm constitutes L_T when the benefit of additional Foreign market access outweighs lost domestic profits. In this case, $v_T(\boldsymbol{\tau}_{TA}, \boldsymbol{\tau}_{SQ}) > 0$ and, as Figure 4(b) shows, $-\frac{\partial v_T\left(\boldsymbol{\tau}_{TA}, \boldsymbol{\tau}_{SQ}\right)}{\partial \boldsymbol{\tau}_{TA}} > 0$. Thus, once $v_T(\boldsymbol{\tau}_{TA}, \boldsymbol{\tau}_{SQ}) > 0$, our polarization property holds and, in turn, Figure 4(c) illustrates that our pro-trade biased polarization property also holds.

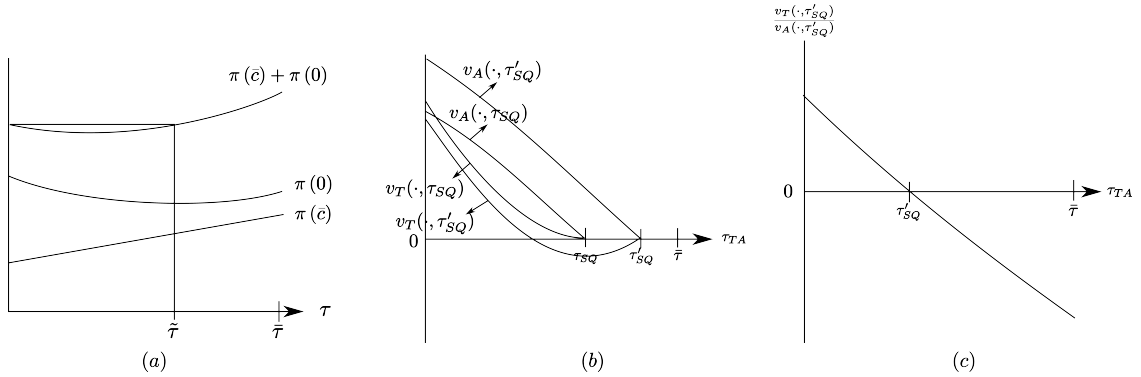

Figure 4: Oligopoly model: contest vs menu auction frameworks

Given the polarization and pro-trade biased polarization properties hold, our earlier

results apply. In particular, for any τ_{SQ}, free trade maximizes each country's aggregate contributions and, hence, free trade is the equilibrium TA when governments only care about contributions. What would the equilibrium TA look like in a menu auction noting that, in the equilibrium of a menu auction, governments simply maximize lobby welfare when $a = 0$? To highlight differences with our results, focus on $\tau_{SQ} > \tilde{\tau}$ so that any liberalization reduces aggregate profits of Home firms (see Figure 4(a)). Thus, in a setup like Grossman and Helpman (1995b) where negotiation is over the TA tariffs given the TA is going ahead, liberalization would not arise in equilibrium. Further, in a setup like Grossman and Helpman (1995b) where negotiation is over whether to form a TA that involves zero tariffs, the TA would fail. Thus, the oligopoly setup clearly illustrates the different implications stemming from the menu auction setting versus the contest setting. As described in the previous section, these differences stem from our new international political externalities.

5.1.3 Melitz model

We now illustrate our framework in a symmetric two-country Melitz model, focusing on the essential structure in the Home country (Appendix D.3 contains a more formal presentation).

A representative agent obtains per-period utility $U = \omega \ln(X) + Y$. Here, ω parameterizes expenditure on the composite differentiated good $X = \left(\int_{i\in\Omega} x(i)^\theta di\right)^{\frac{1}{\theta}}$ that aggregates over a set Ω of possible varieties with an elasticity of substitution $\varepsilon = \frac{1}{1-\theta} > 1$ where $\theta \in (0, 1)$. In contrast, Y is a freely traded homogenous good produced one-to-one using labor.

Sector X firms face three forms of fixed costs. First, firms pay a market entry fixed cost f_E. Once paid, firm i draws a constant marginal cost c_i (labor is the only input) from the Pareto distribution $G(c) = \left(\frac{c}{c_U}\right)^k$ with $0 < c < c_U$ and shape parameter $k > (\varepsilon - 1)$. Thus, a competitive fringe of potential entrants awaits favorable market conditions to make entry profitable. Second, after observing c_i, firm i decides whether to produce knowing production incurs a fixed cost f_D. Thus, in response to adverse changes in market conditions, relatively unproductive firms exit the market. Third, firm i pays an additional fixed cost $f_X = \gamma f_D$ if it serves the Foreign market. Because $\gamma > 1$, any firm that produces will serve the domestic market and only the most productive firms export. Summarizing, the three key parameters in the model are (i) the elasticity of substitution between differentiated varieties $\varepsilon = \frac{1}{1-\theta} > 1$, (ii) $\gamma = \frac{f_X}{f_D}$, capturing the additional cost of exporting relative to domestic production and (iii) the Pareto shape parameter k, governing the dispersion of firm productivity.

Zero profit conditions and a free entry condition allow closing the model and the Pareto distribution for marginal cost allows closed form solutions. Conditional on a set of firms having paid the fixed market entry cost f_E, zero profit conditions pin down the marginal cost cutoffs that define firm production choices. Given the status quo ad valorem tariffs $\boldsymbol{\tau}_{SQ}$, (i)

firms with $c_i \leq c_{X,SQ}$ serve the domestic market and export, (ii) firms with $c_i \in (c_{X,SQ}, c_{D,SQ}]$ only serve the domestic market, and (iii) firms with $c_i > c_{D,SQ}$ exit without producing. Importantly, these zero profit conditions are zero 'operating' profit which do not take into account the fixed market entry cost f_E. The free entry condition determines the mass of firms $N_{E,SQ}$ that enter and force a potential entrant's expected operating profit to equal the fixed market entry cost f_E. Appendix D.3 presents derivations and closed form solutions for $c_{X,SQ}$, $c_{D,SQ}$ and $N_{E,SQ}$ and the associated profits for the different types of firms.

Upon implementation of the TA tariffs $\boldsymbol{\tau}_{TA}$, we can solve for new marginal cost cutoffs $c_{X,TA}$ and $c_{D,TA}$. In doing so, one must take a stand on how the mass of firms, N_E, adjusts. First, one could take a 'short-run' view that holds $N_{E,SQ}$ fixed. Second, one could take a 'long-run' view that allows N_E to adjust given the new market conditions. In this latter case, we assume that only the mass of firms $N_{E,SQ}$ lobby over the TA. To do otherwise would allow the seemingly unrealistic possibility that 'potential' firms, i.e. those who are not yet producing anything, lobby over the TA. Having solved for the endogenous marginal cost cutoffs, as well as other endogenous variables, we again obtain closed form solutions for the profits of the different types of firms.

To define lobby group valuations, let $\bar{c}$ denote the threshold marginal cost for a firm indifferent between the TA tariffs $\boldsymbol{\tau}_{TA}$ and the status quo tariffs $\boldsymbol{\tau}_{SQ}$. Further, let $\pi(c, (\tau, \tau^*))$ denote a firm's operating profit with marginal cost c and tariffs (τ, τ^*). Then, L_A (L_T) constitutes firms with marginal cost above (below) $\bar{c}$ and their valuations are

$$v_A = N_E \int_{\bar{c}}^{c_{D,SQ}} \left(\pi\left(c, \boldsymbol{\tau}_{SQ}\right) - \pi\left(c, \boldsymbol{\tau}_{TA}\right)\right) dG\left(c\right) \tag{31}$$

$$v_T = N_E \int_{0}^{\bar{c}} \left(\pi\left(c, \boldsymbol{\tau}_{TA}\right) - \pi\left(c, \boldsymbol{\tau}_{SQ}\right)\right) dG\left(c\right). \tag{32}$$

To ensure that $v_T\left(\boldsymbol{\tau}_{TA}\right) > v_A\left(\boldsymbol{\tau}_{TA}\right)$, we impose $\tau_{SQ} < \frac{k}{k-\theta}$.

Given this assumption, we numerically investigate the properties imposed in our earlier analysis: (i) a more liberal TA polarizes the lobby groups, $-\partial v_i\left(\boldsymbol{\tau}_{TA}\right)/\partial \boldsymbol{\tau}_{TA} > 0$, and (ii) a more liberal TA generates pro-trade biased polarization, $-\partial \frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}/\partial \boldsymbol{\tau}_{TA} \geq 0$.[44] In the 'long-run', these properties hold without any restrictions.[45] In the short-run case, the former property fails for the anti-trade lobby as the equilibrium mass of non-exporting firms vanishes. Intuitively, we need a non-trivial mass of 'import-competing' firms for a more liberal TA to strengthen the anti-trade lobby's TA opposition.[46] Thus, this condition appears

[44]Note, the reciprocity rule of equal changes in imports requires symmetric tariff reductions.

[45]Indeed, free entry implies aggregate profits are fixed and thus $v_T(\cdot) = v_A(\cdot)$ and $-\partial \frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}/\partial \boldsymbol{\tau}_{TA} = 0$.

[46]The anti-trade lobby in the Melitz model consists of low productivity exporting firms and non-exporting firms. The latter set of firms constitutes what one would normally think of as 'import-competing' firms.

rather unrestrictive. Given this condition, our earlier discussion implies that the equilibrium TA is free trade in the symmetric Melitz model as long as a is sufficiently small and TA tariffs respect the reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ})$.

While free trade is the equilibrium TA, the TA ratification probability depends on the relative valuations $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$ in Home and $\frac{v_T^*(\boldsymbol{\tau}_{TA})}{v_A^*(\boldsymbol{\tau}_{TA})}$ in Foreign. For the 'short-run' cases, we can numerically show that (i) $d\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}/d\gamma < 0$, so that larger barriers to exporting decrease the probability of TA formation, (ii) $d\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}/dk < 0$, so that more dispersion in firm productivity decreases the probability of TA formation, and (iii) $d\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}/d\varepsilon > 0$, so that a higher willingness to substitute between varieties increases the probability of TA formation.[47] Intuitively, these results work through the marginal cost cutoff for an exporter relative to a non-exporter and, in turn, firm composition across the anti- and pro-trade lobbies.[48] By reducing exporter profits, larger barriers for becoming an exporter (i.e. higher γ) shifts firm composition towards non-exporters and lowers $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$. A higher k skews firm composition towards low productivity firms, also making it less profitable to be an exporter and lowering $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$. With consumers more willing to substitute between varieties (i.e. higher ε), markups fall which disproportionately hurt low productivity firms and induces exit. In turn, firm composition shifts towards high productivity export firms and raises $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$. These comparative statics illustrate the link between theory and data.

5.2 Extensions and Future Directions

5.2.1 Within interest group lobbying by pro-trade firms

Our analysis has focused on lobbying between anti-trade and pro-trade interest groups. However, Section 4 explained how only one of these interest groups may lobby in equilibrium. In this sense, Blanga-Gubbay et al. (2018) pursue a special case of our parallel contest framework by exploring a setting where they assume that only pro-trade interests lobby.[49] However, they also develop an important extension of our parallel contest framework by modeling the within-interest group lobbying decisions and, given their assumption that firms represent the pro-trade interest group, they model firm-level lobbying decisions. This contrasts with our approach of assuming away any free riding problem within interest groups and opens the door to link the parallel contest framework with lobbying data. In particular,

[47] For the 'long-run' cases, $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})} = 1$ and is independent of the parameters.

[48] The relative cutoff and mass of exporter to non-exporter firms is $\frac{c_X}{c_D} = \left[\gamma^{\frac{1}{\varepsilon-1}}\tau^{\frac{1}{\theta}}\right]^{-1}$ and $\frac{N_X}{N_D} = \left(\frac{c_X}{c_D}\right)^k$.

[49] As we described above, this can happen in the parallel contest framework because the participation constraint is violated for one interest group. However, it happens in Blanga-Gubbay et al. (2018) because their assumed underlying trade model implies that there are no anti-trade firms who choose to lobby.

their theoretical extension of our parallel contest framework delivers the estimating equation that $\frac{\ell_i}{\ell_j} = \frac{v_i}{v_j}$ for two pro-trade firms i and j. That is, the relative lobbying of two pro-trade firms is equivalent to their relative valuation.

The oligopolistic underlying trade model used by Blanga-Gubbay et al. (2018) allows them to microfound the relative valuations of two pro-trade firms. They find that this relative valuation of firm i should be higher, and hence relative lobbying by firm i should be higher, when firm i is larger, receives a larger tariff cut on its final good or faces a larger market in the FTA partner for its final good. Indeed, they find strong empirical evidence in favor of these predictions from their extension of our parallel contest framework. Thus, we take their results as affirmation of the way our parallel contest framework can shed light on real world issues and provide a link between theory and data.

5.2.2 Further extensions in a TA setting

We focus on lobbying during the TA ratification process that takes place after governments have negotiated the details of the TA. In practice, lobbying also takes place while countries are negotiating details of the TA, including the degree of tariff concessions by each country. While these negotiated tariffs may, in practice, bear the imprint of lobbying during the negotiation phase, our results hold as long as these tariffs satisfy our polarization properties. Thus, our key insights regarding the role of lobbying during the TA ratification process and our novel international political externalities remain if a lobbying process also drives the TA tariff negotiation phase. Nevertheless, the interaction between the distinct lobbying processes over TA tariffs during the negotiation and ratification phases remains an interesting avenue for future research. For example, our analysis suggests governments may value contributions from export interests more than import-competing interests during the negotiations phase because greater TA liberalization intensifies lobbying competition and, in turn, increases contributions in the ratification phase.

Our framework has implications for the empirical economic determinants of FTA literature spawned by Baier and Bergstrand (2004). Empirically, our framework predicts that the probability of TA formation increases in the strength of pro-trade interest group support relative to the strength of anti-trade interest group opposition. This property could drive empirical investigation through the lens of our microfounded political economy model of FTA formation.

Adding more countries to our framework represents another direction for future research. In our TA context, a TA with more countries would polarize the anti-trade and pro-trade lobbies further by increasing the export market access gained and increasing the degree of import competition. All else equal, this would increase lobbying contributions. However, on

the other hand, by decreasing the likelihood of each country's TA ratification decision being pivotal, adding more countries would reduce lobbying contributions. Our framework could be used to analyze the balance between these tensions.

5.2.3 Moving beyond a TA setting

While we assumed that TA implementation requires unanimous ratification by member countries, this is not always true in international agreements. For example, members that ratified the TPP were bound by their TPP commitments if the ratifying members accounted for 80% of GDP among TPP signatory countries. Similarly, implementation of the Kyoto Protocol only required a two-thirds majority rather than unanimity and, given the international environmental externalities involved, created large free riding incentives. Indeed, despite being implemented, the US, the largest CO_2 emitter, did not ratify the Kyoto Protocol. Our framework is well suited to analyze these free riding issues in international negotiations.

Our parallel contest framework has broad applicability. International agreements over the environment (e.g. the Kyoto Protocol) and safety (e.g. the The Limited Nuclear Test Ban Treaty) share the basic features of our setup: local interest groups contest each other to influence their government's ratification decision knowing implementation of the agreement requires mutual ratification. A between-firm example is the collaboration between British Aerospace, MBB of West Germany, and Aeritalia of Italy to produce the Panavia Tornado fighter jet. One could imagine within-firm divergent views over the balance between collaboration among Europe's best military aircraft producers and concerns over proprietary knowledge and/or national security. A within-firm example is the collaboration of architectural and engineering departments of the London-based firm Arup who built The Shard. One could imagine conflicting interests within each department over whether to proceed with The Shard, while moving ahead with The Shard required agreement of both department heads. Interest groups contesting to influence their own decision maker and collaboration requiring approval of both decision makers ties these examples into a 'parallel contest'.

Our parallel contest insights inform the nature of strategic interaction between interest groups who cannot perfectly coordinate whereas the well-known Colonel Blotto game does so in an environment of perfect coordination. However, an ideal framework would allow flexibility in the degree of imperfect coordination. For example, in a between-firm collaboration setting, interest groups of one firm may not be able to lobby the other firm's decision maker but could perhaps undertake actions that make it easier for their aligned interest group in the other firm to lobby their own decision maker. An interesting question becomes whether, as the scope for 'cross-subsidization' rises, the predictions move from those of a parallel contest towards those of the Colonel Blotto game.

6 Conclusion

Once governments sign a TA, the ratification process in each country is often lengthy and uncertain. Illustrative examples include the 1994 Uruguay Round and FTAs ranging from the TPP to US FTAs with Korea and Central America. Motivated by these stylized facts, we develop a new two-country political economy framework with two key features. First, pro-trade and anti-trade interest groups make contributions to influence their own government's subsequent ratification decision. Second, these interest groups recognize that the TA's ultimate fate depends on the uncertain ratification decisions of both governments. The former feature distinguishes our contest framework from the standard approach in the trade and political economy literature where the ratification process is ignored and interest groups condition their contributions on their government's policy decision. The latter feature distinguishes our framework from the prior contest literature by linking the outcome in one contest to the outcome in a different 'parallel' contest and gives rise to the new class of contests that we call 'parallel contests'.

Regarding the level of negotiated TA tariffs, the key new insight that arises from our paper is that the lobbying process itself drives governments towards proposing the most liberal TA possible. In turn, our framework suggests that inherent government protectionist tendencies, perhaps driven by electoral motivations as in Conconi et al. (2014), drive real world protection levels. While our view of lobbying echoes the typical non-academic view that corporate lobbying drives liberal trade policy, our view contrasts starkly with the typical view in the literature that real world protection levels balance protectionist lobbying forces against inherent government desires for national welfare improving liberalization. Nevertheless, in doing so, our alternative perspective suggests that the relatively low tariff levels observed across many countries reflects governments that place relatively large value on lobbying contributions. This offers a reconciling perspective on the empirical 'puzzle' whereby matching data with the benchmark Protection for Sale framework requires that governments have, arguably, implausibly high degrees of welfare-mindedness.

Our explicit modeling of the political process surrounding TA formation allows the emergence of novel international political externalities that operate outside the traditional terms-of-trade channel. These externalities emerge because the probability of TA ratification depends endogenously on trade policy and lobbying intensity. Hence, aggregate lobbying contributions in each country depend on the probability of TA ratification in the other country. Thus, governments who just internalize terms-of-trade externalities will not internalize our international political externalities.

References

Antras, P., Staiger, R. W., 2012. Offshoring and the role of trade agreements. American Economic Review 102 (7), 3140–3183.

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

Bagwell, K., Staiger, R. W., 2012a. The economics of trade agreements in the linear cournot delocation model. Journal of International Economics 88 (1), 32–46.

Bagwell, K., Staiger, R. W., 2012b. Profit shifting and trade agreements in imperfectly competitive markets. International Economic Review 53 (4), 1067–1104.

Bagwell, K., Staiger, R. W., 2016. The design of trade agreements. In: Bagwell, K., Staiger, R. W. (Eds.), Handbook of Commercial Policy. Vol. 1. Elsevier, pp. 435–529.

Baier, S. L., Bergstrand, J. H., 2004. Economic determinants of free trade agreements. Journal of International Economics 64 (1), 29–63.

Baldwin, R., 2016. The Great Convergence. Harvard University Press.

Baye, M. R., Kovenock, D., De Vries, C. G., 1996. The all-pay auction with complete information. Economic Theory 8 (2), 291–305.

Blanga-Gubbay, M., Conconi, P., Parenti, M., 2018. Globalization for sale. Mimeo.

Buzard, K., 2017. Trade agreements in the shadow of lobbying. Review of International Economics 25 (1), 21–43.

Conconi, P., Facchini, G., Zanardi, M., 2014. Policymakers' horizon and trade reforms: The protectionist effect of elections. Journal of International Economics 94, 102–118.

Corden, W. M., 1974. Trade policy and welfare. Clarendon Press.

Dam, K. W., 2001. The rules of the global game: a new look at US international economic policymaking. University of Chicago Press.

DeRemer, D., 2016. The principle of reciprocity in the 21st century. Mimeo.

Dixit, A., 1987. Strategic aspects of trade policy. In: Advances in Economic Theory: Fifth World Congress. Vol. 329.

Freund, C., McDaniel, C., 2016. How long does it take to conclude a trade agreement with the US? Trade & Investment Policy Watch, Peterson Instituite for International Economics.

Freund, C., Ozden, C., 2008. Trade policy and loss aversion. American Economic Review 98 (4), 1675–91.

Gawande, K., Bandyopadhyay, U., 2000. Is protection for sale? Evidence on the Grossman-Helpman theory of endogenous protection. Review of Economics and Statistics 82, 139–152.

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

Goldberg, P. K., Maggi, G., 1999. Protection for sale: An empirical investigation. American Economic Review 89, 1135–1155.

Grossman, G., Helpman, E., 1994. Protection for sale. American Economic Review 84, 833–850.

Grossman, G., Helpman, E., 1995a. The politics of free-trade agreements. The American Economic Review 85.

Grossman, G. M., Helpman, E., 1995b. Trade wars and trade talks. The Journal of Political Economy 103 (4), 675–708.

Handley, K., 2014. Exporting under trade policy uncertainty: Theory and evidence. Journal of International Economics 94 (1), 50–66.

Handley, K., Limão, N., 2015. Trade and investment under policy uncertainty: theory and firm evidence. American Economic Journal: Economic Policy 7 (4), 189–222.

Handley, K., Limão, N., 2017. Policy uncertainty, trade, and welfare: Theory and evidence for China and the United States. American Economic Review 107 (9), 2731–83.

Hillman, A. L., Moser, P., 1996. Trade liberalization as politically optimal exchange of market access. In: Canzoneri, M. B., Ethier, W. J., Grilli, V. (Eds.), The new transatlantic economy. Cambridge University Press, pp. 295–316.

Ho, C., 2015. Industry, labor and environmental groups gear up to oppose tpp trade deal. Washington Post.
URL `https://goo.gl/VmxLuK`

Krishna, P., Mitra, D., 2005. Reciprocated unilateralism in trade policy. Journal of International Economics 65 (2), 461–487.

Lake, J., Millimet, D. L., 2016. An empirical analysis of trade-related redistribution and the political viability of free trade. Journal of International Economics 99, 156–178.

Leggett, D., 2017. Ford backs trump on tpp withdrawal. Just Auto.
URL `https://goo.gl/gn9wXX`

Limão, N., Maggi, G., 2015. Uncertainty and trade agreements. American Economic Journal: Microeconomics 7 (4), 1–42.

Maggi, G., Rodriguez-Clare, A., 1998. The value of trade agreements in the presence of political pressures. Journal of Political Economy 106 (3), 574–601.

Maggi, G., Rodriguez-Clare, A., 2007. A political-economy theory of trade agreements. The American Economic Review 97 (4), 1374–1406.

Matschke, X., Sherlund, S. M., 2006. Do labor issues matter in the determination of us trade policy? an empirical reevaluation. American Economic Review 96 (1), 405–421.

Mayer, W., 1981. Theoretical considerations on negotiated tariff adjustments. Oxford Economic Papers 33 (1), 135–153.

Mölders, F., 2012. On the path to trade liberalization: Political regimes in international trade negotiations. Mimeo.

Mölders, F., 2015. On the path to trade liberalisation: Political regimes in trade negotiations. The World Economy 39 (7), 890–924.

Mrázová, M., 2011. Trade agreements when profits matter. Mimeo.

Ossa, R., 2011. A new trade theory of GATT/WTO negotiations. Journal of Political Economy 119 (1), 122–152.

Ossa, R., 2012. Profits in the "new trade" approach to trade negotiations. American Economic Review 102 (3), 466–69.

Pearson, D., 2017. Ford's curious approach to trade policy and customer relations. Cato Institue.
URL `https://goo.gl/TcLzG1`

Rai, B. K., Sarin, R., 2009. Generalized contest success functions. Economic Theory 40 (1), 139–149.

Rodrik, D., 2008. One economics, many recipes: globalization, institutions, and economic growth. Princeton University Press.

Sanger, D., 1994. The lame-duck congress: The vote; house approves trade agreement by a wide margin. The New York Times.
URL `https://goo.gl/FQNdg5`

Skaperdas, S., 1996. Contest success functions. Economic Theory 7 (2), 283–290.

Strange, M., 2013. Writing global trade governance: Discourse and the WTO. Routledge.

Tullock, G., 1980. Efficient rent seeking. In: James M. Buchanan, Robert D. Tollison, G. T. (Ed.), Towards a Theory of the Rent Seeking Society. Texas A&M University Press, pp. 97–112.

Van Long, N., 2013. The theory of contests: a unified model and review of the literature. European Journal of Political Economy 32, 161–181.

Venables, A. J., 1985. Trade and trade policy with imperfect competition: The case of identical products and free entry. Journal of International Economics 19 (1-2), 1–19.

Appendix

A Proofs from main text

Proof of Proposition 1

Proof. Focusing on the Home country without loss of generality,

$$G\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)=\hat{l}(\hat{\rho}_{T}^{*}(\boldsymbol{\tau}_{TA}),\boldsymbol{\tau}_{TA})=\hat{\rho}_{T}^{*}\left(\boldsymbol{\tau}_{TA}\right)\frac{1}{2}\bar{v}\left(\boldsymbol{\tau}_{TA}\right)$$

given $a=0$ and (6)-(9). Two observations establish the proposition. First, $\hat{\rho}_{T}\left(\boldsymbol{\tau}_{TA}\right)=\left[1+\frac{v_{A}(\boldsymbol{\tau}_{TA})}{v_{T}(\boldsymbol{\tau}_{TA})}\right]^{-1}$ follows from (6)-(9) and, by analogy, $\hat{\rho}_{T}^{*}\left(\boldsymbol{\tau}_{TA}\right)=\left[1+\frac{v_{A}^{*}(\boldsymbol{\tau}_{TA})}{v_{T}^{*}(\boldsymbol{\tau}_{TA})}\right]^{-1}$. Thus, the pro-trade biased polarization property implies $\hat{\rho}_{T}^{*}\left(\boldsymbol{\tau}_{TA}\right)$ is maximized by the most liberal TA satisfying $\mathbf{u}\left(\boldsymbol{\tau}_{TA}\right)$. Second, the polarization property implies $\bar{v}\left(\boldsymbol{\tau}_{TA}\right)=\left[\frac{1}{2}\left(\frac{1}{v_{T}(\boldsymbol{\tau}_{TA})}+\frac{1}{v_{A}(\boldsymbol{\tau}_{TA})}\right)\right]^{-1}$ is maximized by the most liberal TA satisfying $\mathbf{u}\left(\boldsymbol{\tau}_{TA}\right)$. Thus, $G\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)$ and, by analogy, $G^{*}\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)$ are maximized by the most liberal TA satisfying $\mathbf{u}\left(\boldsymbol{\tau}_{TA}\right)$. In turn, the restriction of no import subsidies implies free trade in at least one country. ■

Proposition 2 *Consider a reciprocity rule $\mathbf{u}\left(\boldsymbol{\tau}_{TA}\right)$ that satisfies the polarization and pro-trade biased polarization properties. For sufficiently small $a>0$, (i) the Home and Foreign governments propose the most liberal TA possible, implying at least one country adopts free trade, and (ii) the equilibrium probability of TA formation is again given by (12).*

Proof. Substituting (16)-(17) into (13), and remembering $s_{i}=l_{i}+ah_{i}$, establishes $\hat{\rho}_{T}\left(\boldsymbol{\tau}_{TA}\right)=\left[1+\frac{v_{A}(\boldsymbol{\tau}_{TA})}{v_{T}(\boldsymbol{\tau}_{TA})}\right]^{-1}$ and, by analogy, $\hat{\rho}_{T}^{*}\left(\boldsymbol{\tau}_{TA}\right)=\left[1+\frac{v_{A}^{*}(\boldsymbol{\tau}_{TA})}{v_{T}^{*}(\boldsymbol{\tau}_{TA})}\right]^{-1}$.

Focusing on the Home country without loss of generality, (20) says $-\frac{\partial G\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)}{\partial\boldsymbol{\tau}_{TA}}=-\frac{\partial\hat{l}\left(\rho_{T}^{*}(\boldsymbol{\tau}_{TA}),\boldsymbol{\tau}_{TA};a=0\right)}{\partial\boldsymbol{\tau}_{TA}}+\frac{\partial\Phi\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)}{\partial\boldsymbol{\tau}_{TA}}$ where (21) defines $\Phi\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)$ and $\frac{\partial\Phi\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)}{\partial\boldsymbol{\tau}_{TA}}$ is proportional to a. The proof of Proposition 1 establishes $-\frac{\partial\hat{l}\left(\rho_{T}^{*}(\boldsymbol{\tau}_{TA}),\boldsymbol{\tau}_{TA};a=0\right)}{\partial\boldsymbol{\tau}_{TA}}>0$ for all $\boldsymbol{\tau}_{TA}\leq\boldsymbol{\tau}_{SQ}$ such that $\boldsymbol{\tau}_{TA}$ satisfies $\mathbf{u}\left(\boldsymbol{\tau}_{TA}\right)$. Thus, $G\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)$ is maximized by the most liberal TA satisfying $\mathbf{u}\left(\boldsymbol{\tau}_{TA}\right)$ for sufficiently small $a>0$ if $\left|\lim_{a\rightarrow0}\frac{1}{a}\frac{\partial\Phi\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)}{\partial\boldsymbol{\tau}_{TA}}\right|\neq\infty$. Note that

$$\frac{1}{a}\frac{\partial\Phi(\cdot)}{\partial\boldsymbol{\tau}_{TA}}=\left[1-\hat{\rho}_{T}\left(\cdot\right)\hat{\rho}_{T}^{*}\left(\cdot\right)\right]\frac{\partial h_{T}(\cdot)}{\partial\boldsymbol{\tau}_{TA}}-\Delta h(\cdot)\frac{\partial\left[\hat{\rho}_{T}\left(\cdot\right)\hat{\rho}_{T}^{*}\left(\cdot\right)\right]}{\partial\boldsymbol{\tau}_{TA}}\tag{33}$$

Two observations follow from $\hat{\rho}_{T}=\left(1+\frac{v_{A}(\boldsymbol{\tau}_{TA})}{v_{T}(\boldsymbol{\tau}_{TA})}\right)^{-1}$ and $\hat{\rho}_{T}^{*}=\left(1+\frac{v_{A}^{*}(\boldsymbol{\tau}_{TA})}{v_{T}^{*}(\boldsymbol{\tau}_{TA})}\right)^{-1}$ and that $v_{i}\left(\cdot\right)$, $v_{i}^{*}\left(\cdot\right)$, $h_{i}\left(\cdot\right)$ and $h_{i}^{*}\left(\cdot\right)$ are independent of a. First, the right hand side of (33) is

independent of a. Second, the right hand side of (33) is real valued given the assumption that $v_i(\cdot)$, $v_i^*(\cdot)$, $h_i(\cdot)$ and $h_i^*(\cdot)$ and their first derivatives are real valued functions. Hence, $\left|\lim_{a\to 0}\frac{1}{a}\frac{\partial\Phi\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)}{\partial\boldsymbol{\tau}_{TA}}\right| \neq \infty$. Thus, for sufficiently small $a > 0$, $G(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})$ is maximized by the most liberal TA satisfying $\mathbf{u}(\boldsymbol{\tau}_{TA})$. The restriction of no import subsidies implies free trade in at least one country. ■

For online publication

B Microfounded Contest Success Function

B.1 Typical discrete choice setup

An agent chooses between two alternatives $i = 1, 2$. The utility from choice i is

$$u_i = x_i + \varepsilon_i.$$

The random disturbances ε_i follow the Type I Extreme Value distribution (i.e. Gumbel distribution)

$$\varepsilon_i \overset{\text{iid}}{\sim} EV(\mu, \sigma)$$

where $\mu \in \mathbb{R}$ is the location parameter and $\sigma > 0$ is a scale parameter. Given $\mathbb{E}(\varepsilon_i) = \mu + \sigma\gamma$, where γ is Euler's constant, ε_i is a mean zero disturbance when $\sigma = -\frac{\mu}{\gamma}$.[50]

The agent chooses alternative 1 if and only if $u_1 > u_2$. Thus, the probability that the agent chooses alternative 1 is

$$\begin{aligned}
\Pr(u_1 > u_2) &= \Pr(x_1 + \varepsilon_1 > x_2 + \varepsilon_2) \\
&= \Pr(x_1 - x_2 > \varepsilon_2 - \varepsilon_1) \\
&= \frac{\exp(x_1)}{\exp(x_1) + \exp(x_2)}.
\end{aligned}$$

B.2 Contest application

Stage 3. The government ratifies the TA if and only if $\tilde{G}_T > \tilde{G}_A$ where

$$\begin{aligned}
\tilde{G}_T &= \ln(s_T) + \varepsilon_T \\
\tilde{G}_A &= \ln(s_A) + \varepsilon_A \\
\varepsilon_i &\overset{\text{iid}}{\sim} EV(\mu, \sigma) \text{ for } i = A, T \text{ and } \mathbb{E}(\varepsilon_i) = 0.
\end{aligned}$$

The government has already received the lobbying contributions l_A and l_T in Stage 2. Thus, we assume some unmodelled repeated interaction between the government and lobbies drives the dependence of the choice rule $\tilde{G}_T \lessgtr \tilde{G}_A$ on l_A and l_T. In any case, the ε_i disturbances capture randomness in the government's valuation of lobby contributions (e.g. the extent to

[50] Various parameter restrictions on the Extreme Value distribution $GEV(\mu, \sigma, \xi)$ generate the Type I (i.e. Gumbel), Type II (i.e. Fréchet) and Type III (Weibull) Extreme Value distributions. The restriction for Gumbel is $\xi = 0$.

which media reporting paints trade in a positive or negative light). Hence,

$$\begin{aligned}\rho_T &= \Pr\left(\tilde{G}_T > \tilde{G}_A\right) \\ &= \Pr\left(\ln\left(s_T\right) - \ln\left(s_A\right) > \varepsilon_A - \varepsilon_T\right) \\ &= \frac{\exp\left(\ln\left(s_T\right)\right)}{\exp\left(\ln\left(s_T\right)\right) + \exp\left(\ln\left(s_A\right)\right)} \\ &= \frac{s_T}{s_T + s_A}.\end{aligned}$$

Stage 2. Regardless of $a = 0$ or $a > 0$, the lobbying outcomes do not change relative to our baseline analysis because the functional form of ρ_T is unchanged.

Stage 1. The government's expected payoff is

$$\mathbb{E}\left(G\right) = \rho_T \rho_T^* \mathbb{E}\left(G_T\right) + \left(1 - \rho_T \rho_T^*\right) \mathbb{E}\left(G_A\right)$$

where

$$\begin{aligned}G_T &= \ln\left(l_T + l_A + a h_T\right) + \varepsilon_T \\ G_A &= \ln\left(l_T + l_A + a h_A\right) + \varepsilon_A.\end{aligned}$$

When $a = 0$, this reduces to

$$\mathbb{E}\left(G\right) = \ln\left(l_T + l_A\right)$$

which is a monotonic transformation of $\mathbb{E}\left(G\right) = l_T + l_A$ in our baseline analysis. Hence, the optimal TA tariffs are unchanged from our baseline analysis with $a = 0$.

However, complications arise when $a > 0$. Now,

$$\mathbb{E}\left(G\right) = \rho_T \ln\left(l_T + l_A + a h_T\right) + \left(1 - \rho_T\right) \ln\left(l_T + l_A + a h_A\right) \tag{34}$$

$$\neq \ln\left(l_T + l_A\right) + \rho_T \ln\left(a h_T\right) + \left(1 - \rho_T\right) \ln\left(a h_A\right). \tag{35}$$

The forces we identified in the main text remain but the way they trade off is somewhat different. Following the approach in (34) rather than the approach we actually follow in (35) would sacrifice comparability of our model with the prior literature.

C The Extensive Margin of a TA Contest

In our Tullock contest setting, only the intensive margin of lobbying appeared. However, moving to an all-pay contest introduces the extensive margin of lobbying because interest

groups may refrain from making contributions in equilibrium. Using (1) and letting $r \to \infty$:

$$\rho_T = \begin{cases} 0 & \text{if } s_T < s_A \\ 1 & \text{if } s_T > s_A \\ \rho \in (0,1] & \text{if } s_T = s_A \end{cases}.$$

We now investigate various forms of our parallel all-pay contest.

The 'all-pay contest' literature builds on the 'all-pay auction' literature by generalizing the cost function of a bid/contribution beyond the bid/contribution itself. Hillman and Samet (1987), Hillman and Riley (1989) and Baye et al. (1996) pioneered the all-pay auction literature to model rent-seeking and lobbying activities. For example, Hillman (2013) argues unilateral trade policy can be viewed as an all-pay auction. Siegel (2009, 2010, 2014) develops the theory of all-pay contests by allowing the cost of contributions to vary across players. This generalization allows some players to have a 'head start' over others.

C.1 All pay auctions: no head starts

In the absence of head starts, i.e. $s_i = l_i$, the all pay contest reduces to an all pay auction and their equilibrium characterization was developed by Hillman and Riley (1989) and Baye et al. (1996). As described in the main text, the standard solution techniques and theorems used therein apply in our parallel contest because the preferences underlying the expected payoff functions are identical to those in a standard all pay auction where the exogenous valuations are given by our exogenous 'effective' valuations $\tilde{v}_i(\boldsymbol{\tau}_{TA})$.

As is well known in the literature, the standard all pay auction has no pure strategy equilibrium. Intuitively, given the deterministic nature of the Home government's TA ratification decision, Home lobbies only want to contribute if they are successful in swaying the Home government's ratification decision. That is, fixing the positive probability of Foreign ratification, each Home lobby prefers not contributing rather than making a contribution arbitrarily lower than the other lobby because any such contribution does not sway the Home government's ratification decision. However, in turn, the lobby that succeeds in swaying the government's decision will make an arbitrarily small contribution. The lack of a pure strategy equilibrium now becomes clear because the so-called 'unsuccessful' lobby benefits from becoming the 'successful' lobby through a contribution slightly above the arbitrarily small contribution of the other lobby. As a result, the Nash equilibrium of the all pay auction is a mixed strategy equilibrium where lobbies randomize uniformly over an interval. Because these randomization strategies depend on the valuation structure, we now build our discussion around the valuation structure.

C.1.1 Homogenous valuations: $v_T(\boldsymbol{\tau}_{TA}) = v_A(\boldsymbol{\tau}_{TA})$

In Stage 2, each lobby randomizes its contributions uniformly over $[0, \tilde{v}(\boldsymbol{\tau}_{TA})]$ or, equivalently, over $[0, \rho_T^* v(\boldsymbol{\tau}_{TA})]$ where $v(\boldsymbol{\tau}_{TA}) = v_T(\boldsymbol{\tau}_{TA}) = v_A(\boldsymbol{\tau}_{TA})$. While no lobby benefits from contributing above their effective valuation $\tilde{v}(\boldsymbol{\tau}_{TA})$, lobby competition forces the upper bound of their contribution to $\tilde{v}(\boldsymbol{\tau}_{TA})$. Moreover, two observations imply each lobby's lower bound contribution is zero. First, the lobbies must have equal lower bound contributions because otherwise the lobby with the larger lower bound could benefit by reducing their lower bound. Second, given equal lower bound contributions, a lobby's lower bound contribution never sways the government's ratification decision and hence the lower bound must be zero. Thus, ultimately, the interval $[0, \tilde{v}(\boldsymbol{\tau}_{TA})]$ characterizes the intensive margin of lobbying. Moreover, given the symmetric nature of the homogenous valuations all pay auction, the extensive margin plays no role in equilibrium. Formally, letting α_i denote the probability that $l_i = 0$, we have $\hat{\alpha}_A = \hat{\alpha}_T = 0$ in equilibrium.

In Stage 1, government incentives for setting TA tariffs match those in the main text. Given the absence of head starts, the Home government's expected payoff is merely the expected equilibrium aggregate lobbying contributions $\mathbb{E}\left[\hat{l}\left(\hat{\rho}_T^*(\cdot), \boldsymbol{\tau}_{TA}\right)\right] = \hat{\rho}_T^*(\cdot) v(\boldsymbol{\tau}_{TA})$. But, the symmetric mixed strategy equilibrium implies $\hat{\rho}_T(\cdot) = \hat{\rho}_T^*(\cdot) = \frac{1}{2}$ and, in turn, $\mathbb{E}\left[\hat{l}\left(\hat{\rho}_T^*(\cdot), \boldsymbol{\tau}_{TA}\right)\right] = \frac{1}{2} v(\boldsymbol{\tau}_{TA})$. Thus, we only need the assumption that trade liberalization polarizes lobby groups to ensure that the most liberal TA possible maximizes lobbying contributions received by governments. Intuitively, because homogeneous valuations pins down $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$ as constant, we no longer need the pro-trade biased polarization assumption that we needed in the Tullock contest setting. Thus, we see that our results in Propositions 1 - 2 of the main text are robust to the all pay auction homogenous valuation setting.

C.1.2 Heterogenous valuations: $v_T(\boldsymbol{\tau}_{TA}) \neq v_A(\boldsymbol{\tau}_{TA})$

Without loss of generality, we now assume $v_T(\boldsymbol{\tau}_{TA}) > v_A(\boldsymbol{\tau}_{TA})$. This heterogeneity assumption is consistent with our polarization and pro-trade biased polarization properties whereby a more liberal TA increases $v_T(\boldsymbol{\tau}_{TA})$, $v_A(\boldsymbol{\tau}_{TA})$ and also $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$.

In Stage 2, both lobbies randomize their contributions uniformly over $[0, \tilde{v}_A(\boldsymbol{\tau}_{TA})]$ or, equivalently, over $[0, \rho_T^* v_A(\boldsymbol{\tau}_{TA})]$. As the low valuation lobby, L_A never contributes above its effective valuation $\rho_T^* v_A(\boldsymbol{\tau}_{TA})$. Thus, despite its higher effective valuation, L_T never benefits from bidding above L_A's effective valuation when trying to sway the government's ratification decision. The same logic from the homogeneous valuations case implies each lobby's lower bound contribution remains zero. Thus, the interval $[0, \rho_T^* v_A(\boldsymbol{\tau}_{TA})]$ characterizes the intensive margin of lobbying.

The symmetric lobbying strategies at the intensive margin combined with the asymmetric lobby valuations generate an extensive margin of lobbying. Intuitively, as the low valuation lobby, L_A refrains from lobbying and more so as the relative valuation of the pro-trade lobby rises. Specifically, $\hat{\alpha}_A(\boldsymbol{\tau}_{TA}) = 1 - \frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}$ while $\hat{\alpha}_T = 0$. Combining this extensive lobbying margin with the intensive lobbying margin where the government ratifies the TA with probability $\frac{1}{2}$ conditional on both lobbies contributing, the unconditional probability of Home ratification is

$$\hat{\rho}_T(\boldsymbol{\tau}_{TA}) = \hat{\alpha}_A(\boldsymbol{\tau}_{TA}) + [1 - \hat{\alpha}_A(\boldsymbol{\tau}_{TA})]\frac{1}{2} = 1 - \frac{1}{2}\frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}. \tag{36}$$

In Stage 1, this extensive margin of lobbying has an important impact on government preferences over TA tariffs. Expected equilibrium aggregate contributions are

$$\mathbb{E}\left[\hat{l}(\rho_T^*, \boldsymbol{\tau}_{TA})\right] = \frac{1}{2}\rho_T^* v_A(\boldsymbol{\tau}_{TA})\left[1 + \frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\right]. \tag{37}$$

Like earlier, these contributions are proportional to ρ_T^*. But, unlike earlier, the proportionality with respect to $v_A(\boldsymbol{\tau}_{TA})$ now reflects the common upper bound on valuations. In any case, our polarization and pro-trade biased polarization properties ensure the most liberal TA maximizes both of these components. But, the square bracketed term says, all else equal, contributions are decreasing in $\frac{v_T(\boldsymbol{\tau}_{TA})}{v_A(\boldsymbol{\tau}_{TA})}$. Thus, here, pro-trade biased polarization says a more liberal TA *hurts* the government's expected payoff by increasing the probability that L_T refrains from contributing. That is, the extensive margin of lobbying introduced by the heterogeneous valuations all pay auction interferes with the processes that would otherwise lead to the most liberal possible TA.

Nevertheless, in reasonable situations, the impact of a more liberal TA increasing the probability of Foreign TA ratification via pro-trade biased polarization outweighs the impact of a more liberal TA reducing the probability of L_T refraining from contributing. Specifically, letting $\nu(\boldsymbol{\tau}_{TA}) \equiv \frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})} < 1$ and $\nu^*(\boldsymbol{\tau}_{TA}) \equiv \frac{v_A^*(\boldsymbol{\tau}_{TA})}{v_T^*(\boldsymbol{\tau}_{TA})} < 1$,

$$\begin{aligned} -\frac{\partial \hat{l}\left(\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}), \boldsymbol{\tau}_{TA}\right)}{\partial \boldsymbol{\tau}_{TA}} > 0 \quad &\Leftrightarrow \quad \tfrac{1}{2}\tfrac{\partial \nu^*(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}}[1 + \nu(\boldsymbol{\tau}_{TA})] - \left[1 - \tfrac{1}{2}\nu^*(\boldsymbol{\tau}_{TA})\right]\tfrac{\partial \nu(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0 \\ &\Leftrightarrow \quad f(\nu(\boldsymbol{\tau}_{TA}), \nu^*(\boldsymbol{\tau}_{TA})) \equiv \tfrac{1+\nu(\boldsymbol{\tau}_{TA})}{2-\nu^*(\boldsymbol{\tau}_{TA})} > \tfrac{\partial \nu(\boldsymbol{\tau}_{TA})/\partial \boldsymbol{\tau}_{TA}}{\partial \nu^*(\boldsymbol{\tau}_{TA})/\partial \boldsymbol{\tau}_{TA}}. \end{aligned} \tag{38}$$

With symmetric countries, this condition merely reduces to $\nu^*(\boldsymbol{\tau}_{TA}) = \nu(\boldsymbol{\tau}_{TA}) > \frac{1}{2}$. An analogous condition for the Foreign country's TA ratification decision is $f^*(\nu(\boldsymbol{\tau}_{TA}), \nu^*(\boldsymbol{\tau}_{TA}))$ $\equiv \frac{2-\nu(\boldsymbol{\tau}_{TA})}{1+\nu^*(\boldsymbol{\tau}_{TA})} < \frac{\partial \nu(\boldsymbol{\tau}_{TA})/\partial \boldsymbol{\tau}_{TA}}{\partial \nu^*(\boldsymbol{\tau}_{TA})/\partial \boldsymbol{\tau}_{TA}}$. Thus, $\frac{\partial \nu(\boldsymbol{\tau}_{TA})/\partial \boldsymbol{\tau}_{TA}}{\partial \nu^*(\boldsymbol{\tau}_{TA})/\partial \boldsymbol{\tau}_{TA}} \in (f(\cdot), f^*(\cdot))$ is a sufficient (but not necessary) condition for a more liberal TA to increase lobbying contributions in the Home and Foreign countries, and hence for the most liberal TA to be the equilibrium TA. This

sufficient condition can fail among symmetric countries when lobbies within a country are widely asymmetric (e.g. $\nu^*(\boldsymbol{\tau}_{TA}) = \nu(\boldsymbol{\tau}_{TA}) < \frac{1}{2}$) or among widely asymmetric countries. Proposition 3 summarizes our discussion.

Proposition 3 *Assume $r \to \infty$ and a reciprocity rule $\mathbf{u}(\boldsymbol{\tau}_{TA})$ that satisfies the polarization and pro-trade biased polarization properties. Further, for heterogeneous valuations, assume $\frac{\partial \nu(\boldsymbol{\tau}_{TA})/\partial \boldsymbol{\tau}_{TA}}{\partial \nu^*(\boldsymbol{\tau}_{TA})/\partial \boldsymbol{\tau}_{TA}} \in (f(\cdot), f^*(\cdot))$ where $f(\cdot)$ is defined by (38). Then, in equilibrium:*

(i) the extensive margin of lobbying is given by $\hat{\alpha}_A(\boldsymbol{\tau}_{TA}) = 1 - \frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}$ and $\hat{\alpha}_T = 0$;

(ii) aggregate expected lobbying contributions are $\frac{1}{2}\rho_T^* v_A(\boldsymbol{\tau}_{TA})\left[1 + \frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\right]$;

(iii) the probability of TA formation is $\hat{\rho}_T(\boldsymbol{\tau}_{TA})\,\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}) = \left[1 - \frac{1}{2}\frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\right] \cdot \left[1 - \frac{1}{2}\frac{v_A^*(\boldsymbol{\tau}_{TA})}{v_T^*(\boldsymbol{\tau}_{TA})}\right]$;

(iv) the Home and Foreign governments propose the most liberal TA possible, implying at least one country adopts free trade.

Proof. First, consider the homogenous valuations case of $v_A(\boldsymbol{\tau}_{TA}) = v_T(\boldsymbol{\tau}_{TA}) \equiv v(\boldsymbol{\tau}_{TA})$, and $v_A^*(\boldsymbol{\tau}_{TA}) = v_T^*(\boldsymbol{\tau}_{TA}) \equiv v^*(\boldsymbol{\tau}_{TA})$:

(i) Follows from Theorem 1 in Baye et al. (1996), noting that homogeneous valuations imply $\hat{\alpha}_A(\boldsymbol{\tau}_{TA}) = 1 - \frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})} = 0$.

(ii) Given homogenous valuations, $\mathbb{E}\left[\hat{l}(\rho_T^*, \boldsymbol{\tau}_{TA})\right] = \frac{1}{2}\rho_T^* v_A(\boldsymbol{\tau}_{TA})\left[1 + \frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\right] = \rho_T^* v(\boldsymbol{\tau}_{TA})$. By Theorem 1 in Baye et al. (1996) and (i) above, $\hat{l}_i(\rho_T^*, \boldsymbol{\tau}_{TA}) \overset{U}{\sim} [0, \tilde{v}(\boldsymbol{\tau}_{TA})]$ for $i \in \{A, T\}$ where $\tilde{v}(\boldsymbol{\tau}_{TA}) = \rho_T^* v(\boldsymbol{\tau}_{TA})$. Thus, $\mathbb{E}\left[\hat{l}_i(\rho_T^*, \boldsymbol{\tau}_{TA})\right] = \frac{1}{2}\tilde{v}(\boldsymbol{\tau}_{TA}) = \frac{1}{2}\rho_T^* v(\boldsymbol{\tau}_{TA})$ for $i \in \{A, T\}$. In turn, $\mathbb{E}\left[\hat{l}(\rho_T^*, \boldsymbol{\tau}_{TA})\right] = \tilde{v}(\boldsymbol{\tau}_{TA}) = \rho_T^* v(\boldsymbol{\tau}_{TA})$.

(iii) Given homogenous valuations, $\hat{\rho}_T(\boldsymbol{\tau}_{TA})\,\hat{p}_T^*(\boldsymbol{\tau}_{TA}) = \left[1 - \frac{1}{2}\frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\right] \cdot \left[1 - \frac{1}{2}\frac{v_A^*(\boldsymbol{\tau}_{TA})}{v_T^*(\boldsymbol{\tau}_{TA})}\right] = \frac{1}{4}$. Note, $\hat{\rho}_T(\boldsymbol{\tau}_{TA}) = \Pr(l_T > l_A) = \frac{1}{2}$ and, analogously, $\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}) = \Pr(l_T^* > l_A^*) = \frac{1}{2}$ because $\hat{l}_i(\rho_T^*, \boldsymbol{\tau}_{TA}) \overset{U}{\sim} [0, \tilde{v}(\boldsymbol{\tau}_{TA})]$ and $\hat{l}_i^*(\rho_T, \boldsymbol{\tau}_{TA}) \overset{U}{\sim} [0, \tilde{v}^*(\boldsymbol{\tau}_{TA})]$ for $i \in \{A, T\}$.

(iv) Focusing on the Home country without loss of generality, $G(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}) = \mathbb{E}\left[\hat{l}(\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}), \boldsymbol{\tau}_{TA})\right] = \hat{\rho}_T^*(\boldsymbol{\tau}_{TA})\, v(\boldsymbol{\tau}_{TA})$ given $a = 0$. Because $\hat{\rho}_T^*(\boldsymbol{\tau}_{TA})$ is independent of $\boldsymbol{\tau}_{TA}$, the polarization property implies $G(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ})$ is maximized by the most liberal TA that satisfies $\mathbf{u}(\boldsymbol{\tau}_{TA})$. The restriction of no import subsidies implies free trade in at least one country.

Second, consider heterogeneous valuations:

(i) Follows from Theorem 3 in Baye et al. (1996).

(ii) By Theorem 3 in Baye et al. (1996), $\hat{l}_T(\rho_T^*, \boldsymbol{\tau}_{TA}) \overset{U}{\sim} [0, \tilde{v}_A(\boldsymbol{\tau}_{TA})] = [0, \rho_T^* v_A(\boldsymbol{\tau}_{TA})]$ while $\hat{l}_A(\rho_T^*, \boldsymbol{\tau}_{TA}) \overset{U}{\sim} [0, \tilde{v}_A(\boldsymbol{\tau}_{TA})] = [0, \rho_T^* v_A(\boldsymbol{\tau}_{TA})]$ with probability $\hat{\alpha}_A(\boldsymbol{\tau}_{TA})$ and $\hat{l}_A(\rho_T^*, \boldsymbol{\tau}_{TA}) = 0$ with probability $1-\hat{\alpha}_A(\boldsymbol{\tau}_{TA})$. In turn, $\mathbb{E}\left[\hat{l}(\rho_T^*, \boldsymbol{\tau}_{TA})\right] = \frac{1}{2}\rho_T^* v_A(\boldsymbol{\tau}_{TA}) + (1 - \hat{\alpha}_A(\boldsymbol{\tau}_{TA}))\ \frac{1}{2}\rho_T^* v_A(\boldsymbol{\tau}_{TA}) = \frac{1}{2}\rho_T^* v_A(\boldsymbol{\tau}_{TA})\left[1 + \frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\right]$.

(iii) Note the common support when L_A and L_T lobby and that ratification requires $l_T > 0$. Thus, $\hat{\rho}_T(\boldsymbol{\tau}_{TA}) = \hat{\alpha}_A(\boldsymbol{\tau}_{TA})(1 - \hat{\alpha}_T) + \frac{1}{2}(1 - \hat{\alpha}_A(\boldsymbol{\tau}_{TA}))(1 - \hat{\alpha}_T)$. In turn, $\hat{\rho}_T(\boldsymbol{\tau}_{TA}) = \left(1 - \frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\right) + \frac{1}{2}\frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})} = 1 - \frac{1}{2}\frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}$. And, analogously, $\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}) = 1 - \frac{1}{2}\frac{v_A^*(\boldsymbol{\tau}_{TA})}{v_T^*(\boldsymbol{\tau}_{TA})}$.

(iv) Given (37) combined with the polarization property and (38), we have $-\frac{\partial G(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})}{\partial \boldsymbol{\tau}_{TA}} > 0$ and $-\frac{\partial G^*(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})}{\partial \boldsymbol{\tau}_{TA}} > 0$ for all $\boldsymbol{\tau}_{TA} \leq \boldsymbol{\tau}_{SQ}$. Thus, the most liberal TA satisfying $\mathbf{u}(\boldsymbol{\tau}_{TA})$ maximizes $G(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ})$ and $G^*(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ})$. The restriction of no import subsidies implies free trade in at least one country.

■

C.2 All pay contests: head starts

When lobby groups have head starts, the government's ratification decision in Stage 3 depends on the augmented contributions $s_i = l_i + ah_i(\cdot)$. Effectively, head starts subsidize the cost of augmented contributions s_i (the cost is merely l_i) and distinguish the all pay contest from an all pay auction. Drawing on novel techniques developed by Siegel (2009, 2010, 2014), we now analyze the all pay contest. For the sake of exposition, we continue to assume heterogenous valuations where $v_T(\boldsymbol{\tau}_{TA}) > v_A(\boldsymbol{\tau}_{TA})$, so that L_A is the low valuation lobby, and that any anti-trade head start does not outweigh the heterogeneity in valuations: $\rho_T^* v_T(\boldsymbol{\tau}_{TA}) + a\Delta h(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}) > \rho_T^* v_A(\boldsymbol{\tau}_{TA})$.[51]

First, consider the impact of anti-trade head starts $a\Delta h(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}) < 0$ in Stage 2. At the intensive margin, L_A still randomizes over $[0, \rho_T^* v_A]$ as the low valuation lobby with a net head start that does not outweigh the valuation difference. However, facing a net head start disadvantage, L_T must contribute $-a\Delta h(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ})$ and $\rho_T^* v_A - a\Delta h(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ})$ to compete against, respectively, L_A's lowest and highest contribution. Thus, L_T randomizes over $[-a\Delta h(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}), \rho_T^* v_A - a\Delta h(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ})]$. For the extensive margin, notice the impact of the anti-trade head start on the highest payoffs that lobbies can guarantee themselves. For L_A, as in the absence of head starts, this zero payoff comes by not contributing. For L_T, as in the absence of head starts with $\rho_T^* v_T(\boldsymbol{\tau}_{TA}) > \rho_T^* v_A(\boldsymbol{\tau}_{TA})$, this payoff still comes via a contribution that guarantees Home ratification. But, given the anti-trade head start,

[51] This latter assumption implies L_A is the 'marginal' lobby in Siegel's terminology.

this contribution rises, and the associated payoff falls, by $-a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)>0$. Importantly, the adjustment at the intensive margin perfectly reflects these effects: the probability of Home ratification remains $\frac{1}{2}$ with L_A's expected contributions remaining unchanged but L_T's expected contributions rising by $-a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)>0$. Thus anti-trade head starts impact the intensive margin but not the extensive margin so that, in turn, TA ratification probabilities (in Stage 3) and the equilibrium TA (in Stage 1) mirror our earlier analysis.

Second, consider the impact of pro-trade head starts $a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)>0$ in Stage 2. At the intensive margin, as the low valuation lobby facing a net head start disadvantage, L_A adjusts its lower bound upward to compete with L_T's zero contribution and, thus, randomizes over $\left[a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right),\rho_T^* v_A\right]$. Further, because of its head start advantage, L_T adjusts its upper bound downwards to compete against L_A's highest contribution and, thus, randomizes over $\left[0,\rho_T^* v_A-a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)\right]$. For the impact at the extensive margin, notice that the increase in L_A's expected contribution implies that, absent any adjustment at the extensive margin, it would benefit from not contributing and ensuring a zero payoff. The required adjustments at the extensive margin imply $\hat{\alpha}_A\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)=1-\frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\left[1-\frac{a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)}{\rho_T^* v_A(\boldsymbol{\tau}_{TA})}\right]$ and $\hat{\alpha}_T\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)=\frac{a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)}{\rho_T^* v_A(\boldsymbol{\tau}_{TA})}$ so that these adjustments rise with the size of the pro-trade head start $a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)$. Proposition 4 summarizes this discussion.

Proposition 4 *Assume $r\to\infty$ and a reciprocity rule $\mathbf{u}\left(\boldsymbol{\tau}_{TA}\right)$ that satisfies the polarization and pro-trade biased polarization properties. Further, assume $\frac{\partial\nu(\boldsymbol{\tau}_{TA})/\partial\boldsymbol{\tau}_{TA}}{\partial\nu^*(\boldsymbol{\tau}_{TA})/\partial\boldsymbol{\tau}_{TA}}\in\left(f\left(\cdot\right),f^*\left(\cdot\right)\right)$ where $f\left(\cdot\right)$ is defined by (38). Then, in equilibrium:*

(i) the extensive margin of lobbying is given by $\hat{\alpha}_A\left(\boldsymbol{\tau}_{TA}\right)=1-\frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}$ and $\hat{\alpha}_T\left(\boldsymbol{\tau}_{TA}\right)=0$ when $a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)<0$ but $\hat{\alpha}_A\left(\rho_T^*,\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)=1-\frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\left[1-\frac{a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)}{\rho_T^* v_A(\boldsymbol{\tau}_{TA})}\right]$ and $\hat{\alpha}_T\left(\rho_T^*,\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)=\frac{a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)}{\rho_T^* v_A(\boldsymbol{\tau}_{TA})}$ when $a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)>0$;

(ii) expected aggregate contributions are $a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)$ lower than when $a=0$;

(iii) the probability of Home TA ratification (and analogously for Foreign) is $\hat{\rho}_T\left(\boldsymbol{\tau}_{TA}\right)=1-\frac{1}{2}\frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}$ when $a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)<0$ but $\hat{\rho}_T\left(\rho_T^*,\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)=1-\frac{1}{2}\frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\left[1-\left(\frac{a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)}{\rho_T^* v_A(\boldsymbol{\tau}_{TA})}\right)^2\right]$ when $a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)>0$;

(iv) for sufficiently small $a>0$, the Home and Foreign governments propose the most liberal TA possible, implying that at least one country adopts free trade.

Proof. First, consider the anti-trade head start case, $a\Delta h\left(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ}\right)<0$.

(i) Follows from the algorithm in Siegel (2014).

(ii) Following the algorithm in Siegel (2014), $\hat{l}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) \overset{U}{\sim} [-a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right), \tilde{v}_A\left(\boldsymbol{\tau}_{TA}\right) - a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)]$ where $\tilde{v}_A\left(\boldsymbol{\tau}_{TA}\right) = \rho_T^* v_A\left(\boldsymbol{\tau}_{TA}\right)$ while $\hat{l}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) \overset{U}{\sim} [0, \tilde{v}_A\left(\boldsymbol{\tau}_{TA}\right)]$ with probability $\hat{\alpha}_A\left(\boldsymbol{\tau}_{TA}\right)$ and $\hat{l}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) = 0$ with probability $1 - \hat{\alpha}_A\left(\rho_T^*\right)$. Thus,

$$\begin{aligned}\mathbb{E}\left[\hat{l}\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)\right] &= \frac{1}{2}\left[\rho_T^* v_A\left(\boldsymbol{\tau}_{TA}\right) - 2a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)\right] + \left(1 - \hat{\alpha}_A\left(\boldsymbol{\tau}_{TA}\right)\right)\frac{1}{2}\rho_T^* v_A \\ &= \frac{1}{2}\rho_T^* v_A\left(\boldsymbol{\tau}_{TA}\right)\left[1 + \frac{v_A\left(\boldsymbol{\tau}_{TA}\right)}{v_T\left(\boldsymbol{\tau}_{TA}\right)}\right] - a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right).\end{aligned}$$

(iii) When lobbying with positive probability, part (i) establishes that $\hat{l}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$ and $\hat{l}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$ have common support and, hence, so do $\hat{s}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$ and $\hat{s}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$. Thus, $\hat{\rho}_T\left(\boldsymbol{\tau}_{TA}\right) = \hat{\alpha}_A\left(\boldsymbol{\tau}_{TA}\right)\left[1 - \hat{\alpha}_T\left(\boldsymbol{\tau}_{TA}\right)\right] + \frac{1}{2}\left[1 - \hat{\alpha}_A\left(\boldsymbol{\tau}_{TA}\right)\right]\left[1 - \hat{\alpha}_T\left(\boldsymbol{\tau}_{TA}\right)\right]$ given $a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) < 0$ and that ratification requires $l_T > 0$. In turn,

$$\hat{\rho}_T\left(\boldsymbol{\tau}_{TA}\right) = \left(1 - \frac{v_A\left(\boldsymbol{\tau}_{TA}\right)}{v_T\left(\boldsymbol{\tau}_{TA}\right)}\right) + \frac{1}{2}\frac{v_A\left(\boldsymbol{\tau}_{TA}\right)}{v_T\left(\boldsymbol{\tau}_{TA}\right)} = 1 - \frac{1}{2}\frac{v_A\left(\boldsymbol{\tau}_{TA}\right)}{v_T\left(\boldsymbol{\tau}_{TA}\right)}.$$

(iv) Given part (ii), equations (20)-(22) apply as in the main text. Focusing on the Home country's perspective without loss of generality and following the logic from the proof of Proposition 2(iii), we have $\left|\lim_{a\to 0}\frac{1}{a}\frac{\partial\Phi(\cdot)}{\partial\boldsymbol{\tau}_{TA}}\right| \neq \infty$. In turn, $\lim_{a\to 0} a\frac{\partial\Phi(\cdot)}{\partial\boldsymbol{\tau}_{TA}} = 0$. Further, note that $-\frac{\partial\hat{l}\left(\rho_T^*(\boldsymbol{\tau}_{TA}), \boldsymbol{\tau}_{TA}; a=0\right)}{\partial\boldsymbol{\tau}_{TA}} > 0$ for all $\boldsymbol{\tau}_{TA} \leq \boldsymbol{\tau}_{SQ}$ such that $\boldsymbol{\tau}_{TA}$ satisfies $\mathbf{u}\left(\boldsymbol{\tau}_{TA}\right)$. Thus, for sufficiently small $a > 0$, $G\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$ and $G^*\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$ are maximized by the most liberal TA satisfying $\mathbf{u}\left(\boldsymbol{\tau}_{TA}\right)$ when $\frac{\partial\nu(\boldsymbol{\tau}_{TA})/\partial\boldsymbol{\tau}_{TA}}{\partial\nu^*(\boldsymbol{\tau}_{TA})/\partial\boldsymbol{\tau}_{TA}} \in \left(f\left(\cdot\right), f^*\left(\cdot\right)\right)$. The restriction of no import subsidies implies free trade in at least one country.

Second, consider the pro-trade head start case, $a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) > 0$.

(i) Follows from the algorithm in Siegel (2014).

(ii) Following the algorithm in Siegel (2014), $\hat{l}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) \overset{U}{\sim} [0, \tilde{v}_A\left(\boldsymbol{\tau}_{TA}\right) - a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)]$ where $\tilde{v}_A\left(\boldsymbol{\tau}_{TA}\right) = \rho_T^* v_A\left(\boldsymbol{\tau}_{TA}\right)$ with probability $1 - \hat{\alpha}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$ and $\hat{l}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) = 0$ with probability $\hat{\alpha}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$ while $\hat{l}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) \overset{U}{\sim} [a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right), \tilde{v}_A\left(\boldsymbol{\tau}_{TA}\right)]$ with probability $\hat{\alpha}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$ and $\hat{l}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) = 0$ with probability $1 - \hat{\alpha}_A\left(\cdot\right)$. Thus,

$$\begin{aligned}\mathbb{E}\left[\hat{l}\left(\cdot\right)\right] &= \frac{1}{2}\left[\rho_T^* v_A\left(\boldsymbol{\tau}_{TA}\right) - 2a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)\right] + \left[1 - \hat{\alpha}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)\right]\frac{1}{2}\rho_T^* v_A\left(\boldsymbol{\tau}_{TA}\right) \\ &= \frac{1}{2}\rho_T^* v_A\left(\boldsymbol{\tau}_{TA}\right)\left[1 + \frac{v_A\left(\boldsymbol{\tau}_{TA}\right)}{v_T\left(\boldsymbol{\tau}_{TA}\right)}\right] - a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right).\end{aligned}$$

(iii) Given $\hat{l}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$ and $\hat{l}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$ when lobbying with positive probability from part (ii),

$$\hat{s}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) \overset{U}{\sim} \left[a h_T\left(\boldsymbol{\tau}_{TA}\right), \rho_T^* v_A\left(\boldsymbol{\tau}_{TA}\right) + a h_A\left(\boldsymbol{\tau}_{SQ}\right)\right], \text{ and}$$
$$\hat{s}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) \overset{U}{\sim} \left[a h_T\left(\boldsymbol{\tau}_{TA}\right), \rho_T^* v_A\left(\boldsymbol{\tau}_{TA}\right) + a h_A\left(\boldsymbol{\tau}_{SQ}\right)\right]$$

have common support. Thus, $\hat{\rho}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) = \hat{\alpha}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)\left[1 - \hat{\alpha}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)\right] + \frac{1}{2}\left[1 - \hat{\alpha}_A\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)\right]\left[1 - \hat{\alpha}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)\right]$ given $\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) > 0$ and that ratification requires $l_T > 0$. In turn,

$$\hat{\rho}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) = 1 - \frac{1}{2}\frac{v_A\left(\boldsymbol{\tau}_{TA}\right)}{v_T\left(\boldsymbol{\tau}_{TA}\right)}\left[1 - \left(\frac{a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)}{\rho_T^* v_A\left(\boldsymbol{\tau}_{TA}\right)}\right)^2\right]$$
$$\hat{\rho}_T^*\left(\rho_T, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) = 1 - \frac{1}{2}\frac{v_A^*\left(\boldsymbol{\tau}_{TA}\right)}{v_T^*\left(\boldsymbol{\tau}_{TA}\right)}\left[1 - \left(\frac{a\Delta h^*\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)}{\rho_T v_A^*\left(\boldsymbol{\tau}_{TA}\right)}\right)^2\right].$$

(iv) Given part (ii), equations (20)-(22) apply as in the main text. Here, we focus on the Home country's perspective without loss of generality. Following the logic from the proof of Proposition 2(iii), we want to establish $\left|\lim_{a\to 0} \frac{1}{a}\frac{\partial \Phi(\cdot)}{\partial \boldsymbol{\tau}_{TA}}\right| \neq \infty$. However, unlike the proof of Proposition 2(iii), $\hat{\rho}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$ is an implicit function given that $\hat{\rho}_T^*\left(\rho_T, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)$. Nevertheless, we will show $\lim_{a\to 0} \frac{\partial \rho_T}{\partial \boldsymbol{\tau}_{TA}} = \frac{1}{2}\frac{\partial (v_A/v_T)}{\partial \boldsymbol{\tau}_{TA}}$ so that the logic from the proof of Proposition 2(iii) still holds.

By the implicit function theorem, $\frac{\partial \rho_T}{\partial \boldsymbol{\tau}_{TA}} = -\frac{\partial g(\cdot)/\partial \boldsymbol{\tau}_{TA}}{\partial g(\cdot)/\partial \rho_T}$ where

$$g\left(\cdot\right) = \hat{\rho}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) - 1 + \frac{1}{2}\frac{v_A\left(\boldsymbol{\tau}_{TA}\right)}{v_T\left(\boldsymbol{\tau}_{TA}\right)}\left[1 - \left(\frac{a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)}{\hat{\rho}_T^*\left(\rho_T, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) v_A\left(\boldsymbol{\tau}_{TA}\right)}\right)^2\right].$$

First,

$$\frac{\partial g\left(\cdot\right)}{\partial \rho_T} = 1 - \frac{v_A\left(\boldsymbol{\tau}_{TA}\right)}{v_T\left(\boldsymbol{\tau}_{TA}\right)}\frac{v_A^*\left(\boldsymbol{\tau}_{TA}\right)}{v_T^*\left(\boldsymbol{\tau}_{TA}\right)}\left(\frac{a\Delta h\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)}{v_A\left(\boldsymbol{\tau}_{TA}\right)}\right)^2\left(\frac{a\Delta h^*\left(\boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right)}{v_A^*\left(\boldsymbol{\tau}_{TA}\right)}\right)^2\frac{1}{\hat{\rho}_T^*\left(\cdot\right)^4 \hat{\rho}_T\left(\cdot\right)^3}.$$

Thus, $\lim_{a\to 0} \frac{\partial g(\cdot)}{\partial \rho_T} = 1$ given that $\lim_{a\to 0} \hat{\rho}_T\left(\rho_T^*, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) = \lim_{a\to 0} \hat{\rho}_T^*\left(\rho_T, \boldsymbol{\tau}_{TA}; \boldsymbol{\tau}_{SQ}\right) >$

0. Second,

$$\frac{\partial g(\cdot)}{\partial \boldsymbol{\tau}_{TA}} = \frac{1}{2}\frac{\partial\left[v_A(\boldsymbol{\tau}_{TA})/v_T(\boldsymbol{\tau}_{TA})\right]}{\partial \boldsymbol{\tau}_{TA}}\left[1-\left(\frac{a\Delta h(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})}{\hat{\rho}_T^*(\cdot)\,v_A(\boldsymbol{\tau}_{TA})}\right)^2\right] - \frac{1}{2}\frac{v_A(\boldsymbol{\tau}_{TA})}{v_T(\boldsymbol{\tau}_{TA})}\left(\frac{a}{\hat{\rho}_T^*(\cdot)}\right)^2\frac{\partial\left[\Delta h(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})/v_T(\boldsymbol{\tau}_{TA})\right]}{\partial \boldsymbol{\tau}_{TA}}$$

where $\lim_{a\to 0}\frac{\partial g(\cdot)}{\partial \boldsymbol{\tau}_{TA}} = \frac{1}{2}\frac{\partial[v_A(\boldsymbol{\tau}_{TA})/v_T(\boldsymbol{\tau}_{TA})]}{\partial \boldsymbol{\tau}_{TA}}$. Thus, $\lim_{a\to 0}\frac{\partial \rho_T}{\partial \boldsymbol{\tau}_{TA}} = -\frac{1}{2}\frac{\partial(v_A/v_T)}{\partial \boldsymbol{\tau}_{TA}}$. In turn, using (33), $\lim_{a\to 0}\frac{\partial \Phi}{\partial \boldsymbol{\tau}_{TA}} > 0$ and $\lim_{a\to 0} a\frac{\partial \Phi}{\partial \boldsymbol{\tau}_{TA}} = 0$. Further, note that $-\frac{\partial \tilde{l}\left(\rho_T^*(\boldsymbol{\tau}_{TA}),\boldsymbol{\tau}_{TA};a=0\right)}{\partial \boldsymbol{\tau}_{TA}} > 0$ for all $\boldsymbol{\tau}_{TA} \leq \boldsymbol{\tau}_{SQ}$ such that $\boldsymbol{\tau}_{TA}$ satisfies $\mathbf{u}(\boldsymbol{\tau}_{TA})$. Hence, for sufficiently small $a > 0$, $G(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})$ and, by analogous logic, $G^*(\boldsymbol{\tau}_{TA};\boldsymbol{\tau}_{SQ})$ are maximized by the most liberal TA satisfying $\mathbf{u}(\boldsymbol{\tau}_{TA})$ when $\frac{\partial \nu(\boldsymbol{\tau}_{TA})/\partial \boldsymbol{\tau}_{TA}}{\partial \nu^*(\boldsymbol{\tau}_{TA})/\partial \boldsymbol{\tau}_{TA}} \in (f(\cdot), f^*(\cdot))$. The restriction of no import subsidies implies free trade in at least one country.

■

D Examples of particular underlying trade models

D.1 Specific Factors Models

D.1.1 General equilibrium model

Consider two sectors, X and Y, produced using labor and a specific factor $\bar{K}_X$ and $\bar{K}_Y$ respectively. Formally, $X = F\left(L_X, \bar{K}_X\right)$ and $Y = H\left(L_Y, \bar{K}_Y\right)$ subject to the full employment condition $\bar{L} = L_X + L_Y$ where (i) $F_L > 0$ and $H_L > 0$, (ii) $F_{LL} < 0$ and $H_{LL} < 0$ and (iii) $F_{KL} > 0$ and $H_{KL} > 0$ where the subscripts K and L denote partial derivatives.

Profit maximization by firms gives the following equilibrium factor price conditions: $w_X = p_X F_L$, $r_X = p_X F_K$, $w_Y = p_Y H_L$ and $r_Y = p_Y H_K$ where the subscripts X and Y denote the sector. Labor mobility also implies wage equalization, so $w_X = w_Y$ and, in turn, $g(p_X, p_Y, L_X) \equiv p_X F_L\left(L_X, \bar{K}_X\right) - p_Y H_L\left(\bar{L} - L_X, \bar{K}_Y\right) = 0$. Thus,

$$\frac{\partial L_X}{\partial p_X} = -\frac{\partial g/\partial p_X}{\partial g/\partial L_X} = -\frac{F_L}{p_X F_{LL} + p_Y H_{LL}} > 0 \text{ and } \frac{\partial L_X}{\partial p_Y} = -\frac{\partial g/\partial p_Y}{\partial g/\partial L_X} = \frac{H_L}{p_X F_{LL} + p_Y H_{LL}} < 0.$$

What are the impacts of tariffs on real factor incomes for the specific factors? Without loss of generality, suppose the Home country imports good X. Then, assuming the Home country is small, the local price is $p_X = p_X^* + \tau$ where p_X^* is the world price of good X and τ

is the specific tariff. Then, for any variable z, we have $\frac{dz}{d\tau} = \frac{dz}{dp_X}\frac{dp_X}{d\tau} = \frac{dz}{dp_X}$. In turn, we have:

$$\frac{d\frac{r_X}{p_X}}{dp_X} = F_{KL}\frac{\partial L_X}{\partial p_X} > 0 \text{ and } \frac{d\frac{r_X}{p_Y}}{dp_X} = \frac{dF_K}{dp_X}\frac{p_X}{p_Y} + F_K\frac{1}{p_Y} > 0 \tag{39}$$

$$\frac{d\frac{r_Y}{p_Y}}{dp_X} = H_{KL}\frac{\partial L_Y}{\partial p_X} < 0 \text{ and } \frac{d\frac{r_Y}{p_X}}{dp_X} = \frac{dH_K}{dp_X}\frac{p_Y}{p_X} - H_K\frac{p_Y}{p_X}\frac{1}{p_X} < 0. \tag{40}$$

Note, these results hold for *any* marginal tariff reduction. Hence, consider a tariff reduction from τ_0 to τ_1. And, without loss of generality given (39)-(40), let the exportable good Y be the numeraire and choose its units of measurement so that $p_Y^* = 1$. Then, the real income changes associated with a TA are $v_T = \bar{K}_Y \cdot (r_Y(\tau_1) - r_Y(\tau_0)) > 0$ and $v_A = \bar{K}_X \cdot (r_X(\tau_0) - r_X(\tau_1)) > 0$. Finally, fixing τ_0, v_T and v_A are decreasing in τ_1 which establishes our polarization property.

In the limit as $\tau_1 - \tau_0$ gets arbitrarily small, we have $v_T = -\bar{K}_Y\frac{\partial H_K}{\partial p_X} > 0$ and $v_A = \bar{K}_X\frac{\partial(p_X F_K)}{\partial p_X} > 0$. For our pro-trade biased polarization property, we want to show $\frac{\partial\frac{v_T}{v_A}}{\partial p_X} < 0$:

$$\begin{aligned}
&\frac{\partial\frac{v_T}{v_A}}{\partial p_X} \propto \frac{\partial v_T}{\partial p_X}v_A - \frac{\partial v_A}{\partial p_X}v_T < 0 \\
&\quad\Rightarrow -\bar{K}_Y\frac{\partial^2 H_K}{\partial p_X^2}\cdot\bar{K}_X\frac{\partial(p_X F_K)}{\partial p_X} + \bar{K}_X\frac{\partial^2(p_X F_K)}{\partial p_X^2}\cdot -\bar{K}_Y\frac{\partial H_K}{\partial p_X} < 0 \\
&\quad\Rightarrow -\frac{\partial H_K}{\partial p_X}\left[\frac{\partial^2 H_K}{\partial p_X^2}\right]^{-1} > -\frac{\partial(p_X F_K)}{\partial p_X}\left[\frac{\partial^2(p_X F_K)}{\partial p_X^2}\right]^{-1}.
\end{aligned} \tag{41}$$

Note that, given v_T and v_A are both positive and decreasing in p_X, both sides of (41) are positive. Thus, pro-trade biased polarization requires that, as the tariff decreases and labor shifts into the comparative advantage sector Y then $VMPK_Y = p_Y H_K$ increases at a faster rate than the rate at which $VMPK_X = p_X F_K$ falls. Put simply, the free trade production point cannot get too close to the corner of the PPF.

D.1.2 Two country partial equilibrium model

Each country i has a 'comparative advantage' in good $Z = I$ with an endowment $e_i^Z = e > 0$ and a 'comparative disadvantage' in any good $Z \neq I$ with an endowment $e_i^Z = d > 0$. Demand curves in each country i are $q_i^I = \alpha - p_i^I$ and, for $Z \neq I$, $q_i^Z = \theta - p_i^Z$. No-arbitrage conditions link equilibrium cross-country local prices of each good and balanced trade determines equilibrium local prices. In turn, country i's national welfare $W_i(\cdot)$ is maximized by $\tau_{TA} = 0$ and is given by the sum of consumer surplus $CS_i(\cdot)$, producer surplus of the export and import-competing sectors $PS_i^X(\cdot)$ and $PS_i^M(\cdot)$, and tariff revenue

$TR_i(\cdot)$. With two countries $z = i, j$ and two goods $Z = I, J$ we have

$$\begin{aligned}
CS_i(\cdot) &= \frac{1}{8}\left[(\theta-\alpha)+(e+d)-\tau_{ij}\right]^2+\frac{1}{8}\left[(\alpha-\theta)+(e+d)-\tau_{ji}\right]^2,\\
PS_i^X(\cdot) &= \frac{1}{2}e\left[(\alpha+\theta)-(e+d)-\tau_{ji}\right],\\
PS_i^M(\cdot) &= \frac{1}{2}d\left[(\alpha+\theta)-(e+d)+\tau_{ij}\right]\\
TR_i(\cdot) &= \tau_{ij}\left[(\theta-\alpha)+(e-d)-\tau_{ij}\right]
\end{aligned}$$

and analogously for country j. In turn, $v_T = PS_i^X(\tau_{TA},\cdot) - PS_i^X(\tau_{SQ},\cdot) = \frac{1}{2}e(\tau_{SQ}-\tau_{TA})$ and $v_A = PS_i^M(\tau_{SQ},\cdot) - PS_i^M(\tau_{TA},\cdot) = \frac{1}{2}d(\tau_{SQ}-\tau_{TA})$.

In a symmetric Protection for Sale setting, τ_{SQ} maximizes $G_i(\tau_{SQ},\cdot) = PS_i^I(\tau_{SQ},\cdot) + PS_i^J(\tau_{SQ},\cdot) + aW_i(\tau_{SQ},\cdot)$ while τ_{TA} maximizes $G_i(\tau_{TA},\cdot) + G_j(\tau_{TA},\cdot)$ (analogously for τ_{SQ}^* and τ_{TA}^*). This yields $\tau_{SQ}^{GH} = \frac{1}{3}\left[(\theta-\alpha)+(e-d)-\frac{d}{a}\right]+\frac{d}{a}$ and $\tau_{TA}^{GH} = \frac{d-e}{a}$. Our linear structure implies the terms-of-trade effect, i.e. the inverse export supply elasticity faced by the importer, merely equals the import level: $\tau_{TOT}^{GH} = \frac{1}{3}\left[(\theta-\alpha)+(e-d)-\frac{d}{a}\right]$. Thus, τ_{TA}^{GH} eliminates τ_{TOT}^{GH} from τ_{SQ}^{GH} and just combines the politics effects of Home $\frac{d}{a}$ and Foreign $-\frac{e}{a}$.

In our setting, $\boldsymbol{\tau}_{SQ}$ is exogenous while $\boldsymbol{\tau}_{TA}$ maximizes $G_i(\boldsymbol{\tau}_{TA},\cdot)+G_j(\boldsymbol{\tau}_{TA},\cdot)$ where, for the Home country, $G_i(\boldsymbol{\tau}_{TA},\cdot) = \hat{l}_T\left(\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}),\boldsymbol{\tau}_{TA},\cdot\right) + \hat{l}_A\left(\hat{\rho}_T^*(\boldsymbol{\tau}_{TA}),\boldsymbol{\tau}_{TA},\cdot\right) + aW_i(\boldsymbol{\tau}_{TA},\cdot)$. Note that our polarization and pro-trade biased polarization properties hold: $-\frac{\partial v_T(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$, $-\frac{\partial v_A(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$ and $-\frac{\partial[v_T(\boldsymbol{\tau}_{TA})/v_A(\boldsymbol{\tau}_{TA})]}{\partial \boldsymbol{\tau}_{TA}} = 0$. Thus, Proposition 2 implies free trade is the equilibrium TA for sufficiently small a.

D.1.3 Three country partial equilibrium model

The setup is the same as the two country case except we now have three countries and three goods $Z = I, J, K$ with each country i having comparative disadvantage in goods $Z \neq I$. In turn,

$$\begin{aligned}
CS_i(\cdot) &= \frac{1}{18}\left[2(\alpha-\theta)+(e+2d)+(\tau_{ji}+\tau_{ki})\right]^2+\frac{1}{18}\sum_{\substack{z=j,k;\\ z'\neq i,h}}\left[(\theta-\alpha)+(e+2d)-(2\tau_{iz}-\tau_{z'z})\right]^2,\\
PS_i^X(\cdot) &= \frac{1}{3}e\left[(2\theta+\alpha)-(e+2d)-(\tau_{ji}+\tau_{ki})\right],\\
PS_i^M(\cdot) &= \frac{1}{3}d\sum_{\substack{z=j,k;\\ z'\neq i,z}}\left[(2\theta+\alpha)-(e+2d)+(2\tau_{iz}-\tau_{z'z})\right],\\
TR_i(\cdot) &= \sum_{\substack{z=j,k;\\ z'\neq i,z}}\tau_{iz}\left[(\theta-\alpha)+(e-d)+(\tau_{iz}-2\tau_{iz'})\right],
\end{aligned}$$

and analogously for countries j and k. Letting $\boldsymbol{\tau}_{SQ}$ denote the global tariff vector before the FTA and $\boldsymbol{\tau}_{FTA}$ denote the global tariff vector in the presence of an FTA between countries i and j which now imposes zero bilateral tariffs between i and j, we have $v_T = PS_i^X(\boldsymbol{\tau}_{FTA}, \cdot) - PS_i^X(\boldsymbol{\tau}_{SQ}, \cdot) = \frac{1}{3}e\tau_{SQ}$ and $v_A = PS_i^M(\boldsymbol{\tau}_{FTA}, \cdot) - PS_i^M(\boldsymbol{\tau}_{SQ}, \cdot) = \frac{2}{3}d\tau_{SQ}$.

With $a = 0$ in a Protection for Sale setting, $G_i(\cdot) = PS_i^X(\cdot) + PS_i^M(\cdot)$ and an FTA forms if and only if $G_i(\boldsymbol{\tau}_{FTA}, \cdot) - G_i(\boldsymbol{\tau}_{SQ}, \cdot) = \frac{1}{3}\tau_{SQ}(e - 2d) > 0$. Thus, an FTA does not form if $d > \frac{1}{2}e$. With $a = 0$ in our setting, the polarization and pro-trade biased polarization properties hold: $-\frac{\partial v_T(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$, $-\frac{\partial v_A(\boldsymbol{\tau}_{TA})}{\partial \boldsymbol{\tau}_{TA}} > 0$ and $-\frac{\partial [v_T(\boldsymbol{\tau}_{TA})/v_A(\boldsymbol{\tau}_{TA})]}{\partial \boldsymbol{\tau}_{TA}} = 0$. Thus, Proposition 2 implies that, in this three country world, countries i and j would propose a bilateral TA with zero bilateral tariffs; i.e., an FTA between countries i and j.

D.2 Oligopoly Model

We assume two symmetric countries where country 1 (2) is the Home (Foreign) country. Two firms exist in each country: firm 1 has marginal cost $c = \bar{c} > 0$ and firm 0 has zero marginal cost (i.e. $c = 0$). A firm incurs a fixed cost of exporting $f_X \geq 0$ so that inefficient firms can be "domestic only" firms in equilibrium. Each country imposes the common TA tariff τ_{TA} and has a linear inverse demand function with intercept α.

Let $x_i(c)$ denote the sales of a Home country firm in country $i \in \{1, 2\}$ and $x_i^*(c)$ denote the sales of a Foreign country firm in country i. Assume inefficient firms do not export. Then, local sales by Home country firms are (i) $x_1(0) > 0$ and (ii) $x_1(\bar{c}) > 0$ if $\tau_{TA} > 3\bar{c} - \alpha$ which holds if $\bar{c} < \frac{1}{3}\alpha$. And, export sales of the efficient Foreign firm are $x_1^*(0) > 0$ if $\tau_{TA} < \frac{\alpha + \bar{c}}{3}$. Taking these equilibrium quantities as given, the inefficient Foreign firm does not export if $\pi_1^*(\bar{c}) = (x_1^*(\bar{c}))^2 = \frac{1}{64}[\alpha - 3\bar{c} - 3\tau_{TA}]^2 < f_X$. Since $\pi_1^*(\bar{c})$ is maximized at free trade (i.e. $\tau_{TA} = 0$) then a lower bound on f_X that ensures $\pi_1^*(\bar{c}) < f_X$ is $\underline{f}_X \equiv \frac{1}{64}[\alpha - 3\bar{c}]^2$.

What about our polarization properties? Let $\pi(c)$ and $\pi^*(c)$ denote total profits for, respectively, a Home and Foreign firm. Then, imposing $f_X > \underline{f}_X$, inefficient firms are anti-trade, i.e. $v_A = \pi(\bar{c}; \tau_{TA}) - \pi(\bar{c}; \tau_{SQ}) > 0$, because $\frac{\partial \pi(\bar{c})}{\partial \tau_{TA}} > 0$ for all τ_{TA} if and only if $\bar{c} < \frac{1}{3}\alpha$ which is the condition required for, regardless of τ_{TA}, strictly positive local sales by inefficient firms. Whether efficient firms are pro-trade depends on τ_{TA}: $\frac{\partial \pi(0)}{\partial \tau_{TA}} > 0$ if and only if $\tau_{TA} > \frac{\alpha + \bar{c}}{5}$ so that efficient firms suffer from marginal tariff cuts when $\tau_{TA} > \frac{\alpha + \bar{c}}{5}$ but benefit from marginal tariff cuts when $\tau_{TA} < \frac{\alpha + \bar{c}}{5}$. Specifically, efficient firms are pro-trade, i.e. $v_T(0; \tau_{TA}, \tau_{SQ}) > 0$, if and only if $\tau_{TA} < \tau_{SQ} - \frac{\alpha + \bar{c}}{5}$. Thus, our polarization properties hold for a well defined area of the parameter space. And, noting that conditions above required $\bar{c} < \frac{1}{3}\alpha$, our pro-trade biased polarization property also holds: $-\frac{\partial v_T(\cdot)/v_A(\cdot)}{\partial \tau_{TA}} = \frac{8(3\alpha - 7\bar{c})}{(\tau_{SQ} + \tau_{TA} + 2\alpha - 6\bar{c})^2} > 0$. Hence, Proposition 2 applies.

D.3 Melitz Model

Focusing on the Home country, utility of the representative agent is

$$U = \omega \ln(X) + Y \tag{42}$$

where

$$X = \left(\int_{i \in \Omega} x(i,\tau)^{\theta} di \right)^{\frac{1}{\theta}}$$

aggregates over a set Ω of varieties (potentially) available to the consumer with an elasticity of substitution $\varepsilon = 1/(1-\theta)$ where $0 < \theta < 1$. Demand for each variety in Home is

$$x(i,\tau) = \begin{cases} \frac{p(i)^{-\varepsilon}\omega}{\mathcal{P}(\tau)^{1-\varepsilon}} \text{ for domestic firm } i \\ \tau^{-\varepsilon}\frac{p(i)^{-\varepsilon}\omega}{\mathcal{P}(\tau)^{1-\varepsilon}} \text{ for Foreign firm } i \end{cases}$$

where $p(i)$ is the price charged by a monopolistically competitive firm selling variety i in Home and $\mathcal{P}(\tau)^{1-\varepsilon}$ is the consumer price index in Home for a symmetric ad valorem tariff $\tau \geq 1$ imposed by Home and Foreign. Analogous equations hold for Foreign where, by assumption, $\omega^* = \omega$.

Firms considering entry to sector X face a sunk market entry cost f_E (measured in units of labor). If paid, firm i draws a constant marginal cost c_i from the Pareto distribution with shape parameter $k > \varepsilon - 1$:

$$G(c) = \left(\frac{c}{c_U} \right)^k \text{ for } 0 < c < c_U.$$

Once observed, a firm decides whether to undertake production. Upon production, it incurs (i) a (per-period) fixed cost f_D and (ii) an additional (per-period) fixed cost $f_X = \gamma f_D > f_D$ if it exports.

The decisions of whether to produce and export depend on the associated profits. Production exhibits constant returns to scale with labor as the only input. Thus, given the wage of 1, firm i's operating profit in the Home market is

$$\pi_D(i,\tau) = \left[\frac{(p(i) - c_i)\,\omega}{\mathcal{P}(\tau)^{1-\varepsilon}} \right] p(i)^{-\varepsilon} - f_D.$$

In turn, given profit maximization implies a constant markup over marginal cost, $p(i) = \frac{c_i}{\theta}$:

$$\pi_D(i,\tau) = c_i^{1-\varepsilon} B - f_D \text{ where } B = \frac{1}{\varepsilon \theta^{1-\varepsilon}} \left(\frac{\omega}{\mathcal{P}(\tau)^{1-\varepsilon}} \right). \tag{43}$$

In addition to the exporting fixed cost γf_D, an exporting firm faces the symmetric ad valorem tariff τ. As is common in the literature, we assume governments consume the numeraire with tariff revenue. Thus, given profit maximization implies a constant markup over marginal cost, $p(i) = \frac{c_i}{\theta}$, a Home firm's operating profit from exporting is

$$\pi_X(i,\tau) = \tau^{-\varepsilon} c_i^{1-\varepsilon} B^* - \gamma f_D \text{ where } B^* = \frac{1}{\varepsilon \theta^{1-\varepsilon}} \left(\frac{\omega}{\mathcal{P}^*(\tau)^{1-\varepsilon}} \right). \tag{44}$$

D.3.1 Equilibrium

Status Quo We assume firms do not anticipate the TA and consider a one-period version of the Melitz model. A firm with marginal cost $c_{D,SQ}$ is indifferent between supplying the domestic market and exiting. Further, a firm with marginal cost $c_{X,SQ}$ is indifferent between exporting and only supplying the domestic market. Using (43) and (44), $c_{D,SQ}$ and $c_{X,SQ}$ are defined by

$$f_D = \frac{\omega}{\varepsilon} \left[\frac{c_{D,SQ}}{\theta \mathcal{P}_{SQ}(\tau_{SQ})} \right]^{1-\varepsilon} \tag{45}$$

$$\gamma f_D = \frac{\omega}{\tau_{SQ} \varepsilon} \left[\frac{\tau_{SQ} c_{X,SQ}}{\theta \mathcal{P}^*_{SQ}(\tau_{SQ})} \right]^{1-\varepsilon}. \tag{46}$$

Free entry implies an entrepreneur takes a marginal cost draw if the expected operating profit exceeds the sunk entry cost f_E. The zero-operating profit and free entry conditions close the model. The zero-operating profit conditions pin down $c_{D,SQ}$ and $c_{X,SQ}$ and the free entry condition pins down the mass of firms N_E taking a marginal cost draw:

$$N_E = \left[\frac{\gamma^{\psi} \tau_{SQ}^{\frac{k}{\theta}} + 1}{\gamma^{\psi} \tau_{SQ}^{\frac{k}{\theta}} + \tau_{SQ}} \right] \left(\frac{\theta \omega}{k f_E} \right) \tag{47}$$

$$c_{D,SQ} = \left(\gamma^{\psi+1} \tau_{SQ}^{\frac{k}{\theta}} \right)^{\frac{1}{k}} c_{X,SQ} \tag{48}$$

$$c_{X,SQ} = \left(\frac{1}{\gamma^{\psi} \tau_{SQ}^{\frac{k}{\theta}} + 1} \frac{\psi f_E}{\gamma f_D} \right)^{\frac{1}{k}} c_U \tag{49}$$

where $\psi \equiv \frac{k-(\varepsilon-1)}{\varepsilon-1} > 0$. Given symmetric countries, $c_{D,SQ} = c^*_{D,SQ}$ and $c_{X,SQ} = c^*_{X,SQ}$.

Finally, in the status quo, ex post aggregate operating profits and tariff revenue are

$$\Pi_{SQ} = N_E f_E = \left[\frac{\gamma^{\psi}\tau_{SQ}^{\frac{k}{\theta}} + 1}{\gamma^{\psi}\tau_{SQ}^{\frac{k}{\theta}} + \tau_{SQ}}\right]\frac{\theta\omega}{k} \tag{50}$$

$$TR_{SQ} = \left[\frac{\tau_{SQ} - 1}{\gamma^{\psi}\tau_{SQ}^{\frac{k}{\theta}} + \tau_{SQ}}\right]\omega. \tag{51}$$

Proposed TA We again solve a one-period version of the Melitz model. We solve for the 'short-run' equilibrium, i.e. N_E remains unchanged from the status quo. As discussed in the main text, the long-run equilibrium entails homogeneous valuations thus our polarization properties follow trivially (see footnotes 45 and 47). Using the same methods as above, we have new marginal cost cutoffs given a symmetric TA tariff across countries τ_{TA}:

$$c_{D,TA} = \left(\gamma^{\psi+1}\tau_{TA}^{\frac{k}{\theta}}\right)^{\frac{1}{k}} c_{X,TA} \tag{52}$$

$$c_{X,TA} = \left[\left(\frac{\gamma^{\psi}\tau_{SQ}^{\frac{k}{\theta}} + \tau_{SQ}}{\gamma^{\psi}\tau_{TA}^{\frac{k}{\theta}} + \tau_{TA}}\right)\left(\frac{1}{\gamma^{\psi}\tau_{SQ}^{\frac{k}{\theta}} + 1}\right)\frac{\psi f_E}{\gamma f_D}\right]^{\frac{1}{k}} c_U. \tag{53}$$

Additionally, a firm with marginal cost $\bar{c}$ is indifferent between the status quo and the TA:

$$\pi_{TA}(\bar{c}, \tau_{TA}) = \pi_{SQ}(\bar{c}, \tau_{SQ}) \text{ if and only if } \bar{c} = \left(\lambda\tau_{SQ}^{\frac{1}{\theta}}\right) c_{X,SQ} \tag{54}$$

where $\lambda \equiv \left[(1 + \tau_{TA}^{-\varepsilon})\Omega^{\varepsilon-1} - 1\right]^{\frac{1}{\varepsilon-1}}$, and $\Omega \equiv \left(\frac{\gamma^{\psi}\tau_{SQ}^{\frac{k}{\theta}} + \tau_{SQ}}{\gamma^{\psi}\tau_{TA}^{\frac{k}{\theta}} + \tau_{TA}}\right)^{\frac{1}{k}} \left(\frac{\tau_{TA}}{\tau_{SQ}}\right)^{\frac{1}{\theta}}$. Finally, aggregate operating profits and tariff revenue are

$$\Pi_{TA} = \left[\frac{\gamma^{\psi}\tau_{TA}^{\frac{k}{\theta}} + 1}{\gamma^{\psi}\tau_{TA}^{\frac{k}{\theta}} + \tau_{TA}}\right]\left(\frac{\theta\omega}{k}\right) \tag{55}$$

$$TR_{TA} = \left[\frac{\tau_{TA} - 1}{\gamma^{\psi}\tau_{TA}^{\frac{k}{\theta}} + \tau_{TA}}\right]\omega. \tag{56}$$

D.3.2 Lobbying, Strategies and Comparative Statics

Given the status quo and TA equilibrium, (31) and (32) from the main text give the value to L_A of maintaining the status quo and the value to L_T of the TA being adopted. Thus,

$$v_T(\tau_{TA}) - v_A(\tau_{TA}) = \Pi_{TA} - \Pi_{SQ} = \frac{\theta}{k}\left(TR_{SQ} - TR_{TA}\right). \tag{57}$$

Given the concavity of tariff revenue in τ_{TA}, we assume τ_{SQ} is below the tariff revenue maximizing tariff (a sufficient condition is $\tau_{SQ} \leq \frac{k}{k-\theta}$) so that $\tau_{TA} < \tau_{SQ}$ implies $TR_{SQ} > TR_{TA}$ and hence $v_T(\tau_{TA}) > v_A(\tau_{TA})$.

We now confirm our polarization properties.

Lemma 1 *In our symmetric Melitz model with symmetric trade liberalization, a more liberal TA polarizes lobby groups,* $-\frac{\partial v_T(\tau_{TA})}{\partial \tau_{TA}} > 0$ *and* $-\frac{\partial v_A(\tau_{TA})}{\partial \tau_{TA}} > 0$*, when* γ *is sufficiently large.*

Proof. Differentiating (31) and (32) with respect to τ_{TA} yields:

$$-\frac{\partial v_T(\tau_{TA})}{\partial \tau_{TA}} = -N_E \left[\int_0^{\bar{c}} \underbrace{\left(\frac{\partial \pi_X(c;\tau_{TA})}{\partial \tau_{TA}} + \frac{\partial \pi_D(c;\tau_{TA})}{\partial \tau_{TA}} \right)}_{(-)} dG(c) \right]$$

$$-\frac{\partial v_A(\tau_{TA})}{\partial \tau_{TA}} = N_E \left[\int_{\bar{c}}^{c_{X,TA}} \underbrace{\left(\frac{\partial \pi_X(c;\tau_{TA})}{\partial \tau_{TA}} + \frac{\partial \pi_D(c;\tau_{TA})}{\partial \tau_{TA}} \right)}_{(-)} dG(c) + \int_{c_{X,TA}}^{c_{D,TA}} \underbrace{\frac{\partial \pi_D(c;\tau_{TA})}{\partial \tau_{TA}}}_{(+)} dG(c) \right].$$

While $-\frac{\partial v_T(\tau_{TA})}{\partial \tau_{TA}} > 0$ trivially reflects export profits increasing in Foreign tariff liberalization, offsetting effects underlie $-\frac{\partial v_A(\tau_{TA})}{\partial \tau_{TA}}$. On one hand, L_A consists of some purely domestic firms and $-\frac{\partial \pi_D(c;\tau_{TA})}{\partial \tau_{TA}} < 0$. On the other hand, L_A also consists of some ex post exporting firms and $-\frac{\partial \pi_X(c;\tau_{TA})}{\partial \tau_{TA}} > 0$. However, the effect from purely domestic firms dominates for sufficiently high γ. To see this, note that

$$-\frac{\partial v_A(\tau_{TA})}{\partial \tau_{TA}} = -\frac{\theta}{k}\left[\frac{\partial \delta}{\partial \tau_{TA}} TR_{SQ} + \frac{\partial TR_{TA}}{\partial \tau_{TA}} \right]$$

where $\delta \equiv \frac{\tau_{SQ}^{\frac{k}{\theta}} \lambda^k - 1}{\tau_{SQ} - 1}$. It can be easily shown that $-\frac{\partial v_A(\tau_{TA})}{\partial \tau_{TA}}$ is increasing in γ. Moreover,

$$\lim_{\gamma \to \infty} -\frac{\partial v_A}{\partial \tau_{TA}} = \underbrace{\left(\frac{\tau_{SQ}}{\tau_{TA}} \right)^{\frac{k}{\theta}} \left[\frac{\left(\tau_{TA}^{\frac{k}{\theta}} - 1 \right) k \tau_{TA}^{\varepsilon - 1} + \left(\tau_{TA}^{\frac{k}{\theta}} k - \theta \right)}{k(\tau_{SQ} - 1)} \right]}_{(+)} \underbrace{\lim_{\gamma \to \infty} TR_{SQ}}_{=0} = 0.$$

Thus, $-\frac{\partial v_A}{\partial \tau_{TA}}$ approaches zero from above given that $TR_{SQ} \geq 0$. Hence, $-\frac{\partial v_A(\tau_{TA})}{\partial \tau_{TA}} > 0$ for sufficiently large γ. ■

We can further verify through numerical analysis that pro-trade biased polarization holds.

Lemma 2 *In our symmetric Melitz model with symmetric trade liberalization, a more liberal TA generates pro-trade biased polarization,* $-\frac{\partial[v_T(\tau_{TA})/v_A(\tau_{TA})]}{\partial\tau_{TA}} > 0$.

Lemma 2 is verified by an exhaustive numerical grid search. Given Lemmas 1 and 2, we can apply our general results to conclude that governments will propose free trade.

Proposition 5 *Consider our symmetric Melitz model with symmetric trade liberalization and a sufficiently high* γ. *Then, for sufficiently small a, governments propose free trade in our parallel Tullock contest* ($r = 1$) *and our parallel all pay contest* ($r \to \infty$).

Proof. Note that, by definition, the reciprocity rule with symmetric status quo tariffs and symmetric TA tariffs includes free trade $\tau_{TA} = 1$. Thus, the proof follows directly from Lemmas 1 and 2 and Propositions 1 - 4. ■

Finally, we perform comparative statics on $\frac{v_T(\tau_{TA})}{v_A(\tau_{TA})}$.

Proposition 6 *With symmetric countries and a common TA tariff* τ_{TA} *below the tariff revenue maximizing tariff, the following comparative static results hold:* $\frac{d\frac{v_T(\tau_{TA})}{v_A(\tau_{TA})}}{d\gamma} < 0$, $\frac{d\frac{v_T(\tau_{TA})}{v_A(\tau_{TA})}}{d\varepsilon} > 0$, *and* $\frac{d\frac{v_T(\tau_{TA})}{v_A(\tau_{TA})}}{dk} < 0$.

Noting that $\frac{v_T(\tau_{TA})}{v_A(\tau_{TA})} = \frac{\theta}{k}\left[\frac{\delta TR(\tau_{SQ})}{(\delta-1)TR(\tau_{SQ})+TR(\tau_{TA})}\right]$ where $\delta = \frac{\tau_{SQ}^{\frac{k}{\theta}}\lambda^k-1}{\tau_{SQ}-1}$, we verify the proposition by an exhaustive numerical grid search.

References (For Online Appendices Only)

Baye, M. R., Kovenock, D., De Vries, C. G., 1996. The all-pay auction with complete information. Economic Theory 8 (2), 291–305.

Hillman, A. L., 2013. The political economy of protection. Taylor & Francis.

Hillman, A. L., Riley, J. G., 1989. Politically contestable rents and transfers. Economics & Politics 1 (1), 17–39.

Hillman, A. L., Samet, D., 1987. Dissipation of contestable rents by small numbers of contenders. Public choice 54 (1), 63–82.

Siegel, R., 2009. All-pay contests. Econometrica 77 (1), 71–92.

Siegel, R., 2010. Asymmetric contests with conditional investments. The American Economic Review 100 (5), 2230–2260.

Siegel, R., 2014. Asymmetric contests with head starts and nonmonotonic costs. American Economic Journal: Microeconomics 6 (3), 59–105.