

# Contesting an International Trade Agreement\*

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## 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 because anti- and pro-trade interests contest each other to influence their own government’s ratification decision. As in the terms-of-trade theory of TAs, the TA removes terms-of-trade externalities created by unilateral tariffs. But, a TA also creates new terms-of-trade and local-price externalities in our framework due to endogenous ratification uncertainty combined with the requirement that each country ratifies the TA for it to go ahead. Thus, reciprocal TA liberalization fails to eliminate all terms-of-trade externalities.

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# 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 this ratification uncertainty. 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.

Multilateral TAs, the historical cornerstone of the world trading system where countries negotiate non-discriminatory MFN tariffs, feature conflicting lobbying interests and ratification uncertainty.<sup>1</sup> 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 small businesses and labor unions in the United States (US), via the ‘US Business and Industrial Council’, and pro-trade major US corporations, via the ‘Alliance for GATT Now’ (also, see [Dam 2001, p.14](#)). Even after passing the US House of Representatives in November 1994, ratification by the US Senate remained uncertain with last-minute cajoling of wavering Senators by then-president Clinton.<sup>2</sup> These descriptions emphasize that conflicting lobbying interests and inherent ratification uncertainty characterize multilateral TAs.

Free Trade Agreements (FTAs), which have proliferated since the Uruguay Round, are also characterized by conflicting lobbying interests and ratification uncertainty. One way to see the empirical relevance of this ratification uncertainty is to compare lobbying in the final phase of FTA negotiations with lobbying in the FTA ratification phase. Based on US lobbying data over US FTAs from [Hakobyan et al. \(2020\)](#), [Table 1](#) illustrates that lobbying during the ratification phase can be quite large relative to lobbying during the final negotiations phase.<sup>3</sup> Since lobbying data became available in 1997, lobbying expenditures during the ratification phase amount to 56% of lobbying expenditures during the final negotiations phase. Moreover, having sorted FTAs according to the ease of ratification in the US Senate, [Table 1](#) shows that especially close votes (e.g. CAFTA and the US-Oman FTA) saw ratification lobbying far exceed that during the final negotiations phase. Overall, to the extent that one believes lobbying plays an important empirical role during FTA negotiations, [Table 1](#) shows

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<sup>1</sup>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.

<sup>2</sup>See [Sanger \(1994\)](#) from the [New York Times](#).

<sup>3</sup>The notes to [Table 1](#) detail how we measure lobbying during these two phases. In doing so, they explain that our definition of ratification lobbying is more restrictive than negotiation lobbying.

that lobbying also plays an important role during FTA ratification.

	Negotiations Phase		Ratification Phase		Ratification lobbying share	US Congress votes (Y/N)	
	FTA signed	Lobbying	U.S Senate ratified	Lobbying		House	Senate
CAFTA	5/28/2004	\$0.9	7/28/2005	\$4.6	510%	217-215	55-45
Oman	1/19/2006	\$0.8	9/19/2006	\$6.6	817%	221-205	62-32
Chile	6/6/2003	\$2.5	7/31/2003	\$1.4	56%	270-156	65-32
Colombia	11/22/2006	\$5.5	10/12/2011	\$5.0	90%	262-167	66-33
Singapore	5/6/2003	\$2.5	7/31/2003	\$1.4	56%	272-155	66-32
Peru	4/12/2006	\$0.8	12/4/2007	\$10.1	1,324%	285-132	77-18
Panama	6/30/2007	\$14.6	10/12/2011	\$4.0	27%	300-129	77-22
Australia	5/18/2004	\$3.4	7/15/2004	\$1.0	28%	314-109	80-16
Korea	6/30/2007	\$36.5	10/12/2011	\$4.7	13%	278-151	83-15
Bahrain	9/14/2004	\$0.8	12/13/2005	\$0.0	3%	327-95	Voice vote
Morocco	6/15/2004	\$0.3	7/22/2004	\$0.2	49%	323-99	Unanimous consent
Jordan	10/24/2000	\$0.4	12/7/2001	\$0.0	3%	Voice vote	Voice vote
Total		\$69.1		\$38.9	56%		

Notes: Lobbying in millions of real 2010 dollars. Lobbying data from [Hakobyan et al. \(2020\)](#), underlying source is Center for Responsive Politics ([opensecrets.org](#)) and based on lobbying reports filed under The Lobbying Disclosure Act of 1995 (semi-annually pre-2008, quarterly 2008 onwards). Negotiations lobbying time period defined as lobbying reporting period when FTA signed and period immediately prior. Negotiations lobbying defined as interest group (i) listing FTA partner country in “specific issue” field and listing TRD or TAR in “issue” field, or (ii) listing relevant House or Senate bill number in “specific issue” field. Ratification lobbying time period defined as lobbying reporting period when ratified by US Congress. Ratification lobbying defined as interest group listing relevant House or Senate bill number in “specific issue” field.

Table 1: Lobbying during negotiations and ratification phases of US FTAs

[Rodrik \(2008\)](#) and [Baldwin \(2016\)](#) describe how conflicting lobbying interest is at the core of TA formation.<sup>4</sup> Importantly, this political tension relies on the reciprocity principle linking exporter interests in foreign tariff reductions to opposition by import-competing sectors 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.” Although Baldwin and Rodrik refer to multilateral TA formation, arguably the same driving force underpins FTA formation as well.

While the literature has long acknowledged that conflicting lobbying interests shape the outcomes of trade policy, it has largely ignored ratification uncertainty. Various frameworks

<sup>4</sup>[Rodrik \(2008, pp.233-234\)](#) says: “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 \(2016, pp.69-70\)](#) says: “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”.

have been used to model conflicting lobbying interest over unilateral tariffs in a small country: [Findlay and Wellisz \(1982\)](#) and [Hillman \(1982\)](#) use a political support function approach, [Hillman \(1989\)](#) uses contest theory, and [Grossman and Helpman \(1994\)](#) use a menu-auction. Indeed, although ignoring ratification uncertainty, TA formation has been modeled using the political support function approach ([Hillman and Moser, 1996](#)) and a menu-auction (e.g. [Grossman and Helpman 1995a,b](#)). In contrast, [Buzard \(2017\)](#) is the only prior paper we know of that models ratification uncertainty. However, she ignores the role of conflicting lobbying interests. Our paper is the first to bring together the two facets of conflicting lobbying interests and ratification uncertainty to model TA formation.

In our new parallel contest framework, the political fight over TA ratification within each country lies at center stage. The existing contest literature considers interested parties competing against each other to influence the decision of a *single* ‘decision maker’.<sup>5</sup> Interested parties move the decision maker’s decision probabilistically by exerting more influence.<sup>6</sup> In our TA setting, export and import-competing interest groups contest each other over ratifying the TA in their own country through contributions that, probabilistically, influence their government’s ratification decision to either ratify the TA or maintain ‘status quo’ tariffs. Following 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, i.e. the two national governments, deciding over contests occurring *in parallel* in each of their countries.<sup>7</sup> Crucially, because implementing the TA requires ratification by both countries, these parallel contests are intrinsically linked: lobbying contributions by each interest group in one country depend on the TA ratification probability in the other country.<sup>8</sup>

To clarify the new features of TA formation that emerge from our framework, we specify a familiar two-country general equilibrium model of perfect competition with standard assumptions that effectively reduce the model to a partial equilibrium model. We define a country’s ‘tariff-related welfare’ as its national welfare augmented by a weight that allows additional importance to be attributed to import-competing sector profits. Government

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<sup>5</sup>[Van Long \(2013\)](#) reviews the contest literature pioneered by the ‘Tullock contest’ of [Tullock \(1980\)](#).

<sup>6</sup>For example, an employee exerts more effort to win a promotion or a lobby gives more political contributions to sway a policy-maker’s decision in their favor.

<sup>7</sup>As mentioned above, contest theory has been used to model the political economy of tariff setting in a small country by [Hillman \(1989\)](#). Because his treatment of the political economy of trade policy is couched in a small-country setting, where decisions over trade policy are purely unilateral, a standard contest suffices. But TA formation by multiple governments necessitates the development of our parallel contest framework.

<sup>8</sup>In the working paper version of this paper, [Cole et al. \(2018\)](#), we show 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. Even in that setting, ex-ante TA ratification decisions remain uncertain because equilibrium strategies are mixed strategies.

preferences depend on their expected tariff-related welfare as well as lobbying contributions generated from the contest. Following [Bagwell and Staiger \(2001\)](#), we impose that reciprocal TA liberalization satisfy a principle of reciprocity whereby tariff-induced changes in world prices leave each country’s tariff-related welfare unchanged. But while the reciprocity rule leaves tariff-related welfare unchanged by tariff-induced changes in world prices, it does not leave lobbying contributions nor *expected* tariff-related welfare unchanged.

To determine the effects of TA formation, we first analyze unilaterally optimal tariffs. Here, pro-trade interest groups have no incentive to lobby because their profits only depend on foreign tariffs. Thus, each country’s government proposes increased protection and its probabilistic contest decision about implementing this proposal pits its anti-trade interest group against its tariff-related welfare. In turn, each government’s unilaterally optimal tariff balances, at the margin, the benefit of higher lobbying contributions from their anti-trade interest group against the cost of lower tariff-related welfare. Importantly, as in a standard contest setting, each country’s contest is unaffected by the other country’s contest.

In the contest over TA ratification, *reciprocal* liberalization draws the pro-trade interest group into the TA contest. Thus, each government pits the anti-trade lobby against the pro-trade lobby. In this setting, depending on its sign, the change in tariff-related welfare augments the influence of either the pro-trade or anti-trade lobby. If reciprocal liberalization increases the benefit to the pro-trade interest group proportionately more than the cost to the anti-trade interest group, we say there is ‘pro-trade biased polarization’.<sup>9</sup> Indeed, pro-trade biased polarization ensures that lobbying pressures push governments past the degree of reciprocal liberalization that maximizes tariff-related welfare. Here, the equilibrium degree of reciprocal liberalization balances, at the margin, the benefit of polarizing interest groups to extract greater lobbying contributions against the cost of lower tariff-related welfare.

Recasting these results using standard terms-of-trade theory provides further insight into the role of a TA in our parallel contest framework. Reflecting standard results, the TA removes terms-of-trade externalities from unilaterally optimal tariffs that balance the terms-of-trade benefit of a lower importable *world* price against the cost of a higher importable *local* price. But, while the sole purpose of a TA is to remove the terms-of-trade externalities in standard terms-of-trade-theory ([Bagwell and Staiger, 1999](#)), the TA also creates novel ‘international political externalities’ in our parallel contest framework that are not present in unilateral tariffs.

These novel international political externalities emerge from the defining feature of our parallel contest framework: the TA goes ahead if and only if both countries ratify the

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<sup>9</sup>In [Cole et al. \(2018\)](#), we show that pro-trade biased polarization weakly holds in the Melitz model, a profit-shifting oligopolistic model, and the specific factors model.

TA. In particular, in our two-country model with Home and Foreign countries, the Home government is better off for two reasons when the Foreign probability of TA ratification increases: (i) Home lobbying contributions increase because their contest becomes more pivotal for whether the TA goes ahead and (ii) the probability increases that Home realizes the TA-induced change in tariff-related welfare. Importantly, we show that TA liberalization respecting the reciprocity rule still impacts the Foreign probability of TA ratification through changing both the Foreign *local* price of its importable and the *world* price of the Foreign exportable. That is, the international political externalities on Home consist of both a Foreign local price externality and a terms-of-trade externality. We show that, under the assumption of pro-trade biased polarization, these international political externalities lead to deeper reciprocal liberalization than predicted by standard terms-of-trade theory.

Having established the above results, we extend our core analysis. First, we contrast a TA that increases tariffs with our baseline TA that reduces tariffs. Indeed, starting from the unilaterally optimal tariffs, governments benefit from a TA with reciprocal protection if the marginal increase in lobbying contributions dominates the additional loss of tariff-related welfare. Nevertheless, the terms-of-trade externalities in the unilaterally optimal tariffs suggest governments prefer a TA that embodies reciprocal liberalization because it mitigates local price distortions, and thereby increases tariff-related welfare, while reciprocal protection exacerbates local price distortions, and thereby reduces tariff-related welfare.

Second, by simultaneously modeling lobbying both within and between interest groups, we show how our framework can potentially deliver insights regarding the choice of whether members of an interest group lobby collectively (e.g. through an industry association) or individually (e.g. as a firm).<sup>10</sup> For example, collective lobbying increases the relative strength of anti-trade interests and dampens pro-trade lobbying incentives when the benefits of liberalization are highly concentrated but the costs of liberalization are widely dispersed. Indeed, our analysis shows that moving from an environment without collective lobbying to an environment with collective lobbying can increase total lobbying by the anti-trade lobby but decrease total lobbying by the pro-trade lobby. That is, the benefits of collective lobbying can be quite asymmetric across interest groups.

Third, while our baseline model analyzes an uncertain TA ratification process that follows successful TA negotiations, an alternative model could analyze an uncertain TA negotiation process that precedes certain TA ratification. However, these two models are isomorphic if lobby groups and governments have common expectations over the policy outcome of TA ne-

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<sup>10</sup>In Cole et al. (2018), we do not model within-group lobbying. Blanga-Gubay et al. (2018) extend our parallel contest framework to model within-group lobbying, but ignore across-group lobbying by assuming anti-trade interests do not lobby.

gotiations in the alternative model. Thus, one can interpret our model as capturing lobbying that influences whether TA negotiations are successful ahead of certain TA ratification.

Fourth, we illustrate the broad applicability of our parallel contest framework beyond international trade. Many economic situations share the two defining features of our parallel contest framework: (i) collaboration among multiple entities goes ahead if the decision maker in each entity ratifies collaboration and (ii) uncertainty over ratification emerges because interested parties within each entity contest each other to influence their own entity's decision maker. To illustrate this concretely, we apply our framework to an international environmental agreement (IEA). Using the underlying environmental economics model of [Marchiori et al. \(2017\)](#), we characterize the unilaterally optimal and equilibrium IEA pollution emissions policy. In line with prior literature, the IEA removes the negative pollution externalities from unilateral policy. But, like our TA analysis and new to the IEA literature as well, we show that the IEA creates an international political externality: lobbying intensity in one country depends on the probability of IEA ratification in the other country which in turn depends on that country's emission policy.<sup>11</sup>

Our paper relates to, and builds on, multiple strands of the literature. First, within the menu-auction based 'protection for sale' framework, [Grossman and Helpman \(1995a\)](#) is the closest set-up to ours. In that paper, interest groups lobby their government over TA ratification *after* observing the ratification decision and, as such, *only* the successful interest group lobbies in equilibrium. In contrast, our parallel contest framework features equilibrium lobbying by anti-trade and pro-trade groups which matches a fundamental feature of the data that both of these groups lobby over TA ratification (e.g. pro-trade firms versus anti-trade environmental groups and labor unions).

Second, as discussed above, a central tenet of standard terms-of-trade theory is that the sole purpose of a TA is to remove the terms-of-trade externality from unilaterally optimal tariffs ([Bagwell and Staiger, 1999](#)). 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".<sup>12</sup> Our parallel contest framework emphasizes that TAs can also create externalities not present in unilaterally optimal tariffs.

One of these externalities created by the TA is a terms-of-trade externality that brings pro-trade lobbies to the TA lobbying table. As such, it relies on an absence of pro-trade

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<sup>11</sup>See [Marchiori et al. \(2017\)](#) for a review of the literature on IEAs.

<sup>12</sup>They put such models into three groups: (i) 'domestic commitment theory' of TAs (e.g. [Maggi and Rodriguez-Clare 1998, 2007](#)), (ii) imperfect competition in a 'missing instrument' setting that omits export subsidies and focuses on delocation externalities (see, e.g., [Venables 1985](#) and [Ossa 2011](#)) or profit shifting externalities (see, e.g., [Mrázová 2011](#) and [Ossa 2012](#)), and (iii) international firm-to-firm bargaining externalities (e.g. [Antras and Staiger 2012](#)).

lobbying over unilateral tariffs. We do not discuss this externality above because it already exists in the literature. [Levy \(1999\)](#) shows that Foreign liberalization brings Home pro-trade interest groups to the TA lobbying table and thus pushes TA liberalization further. [Krishna and Mitra \(2005\)](#) show that unilateral Foreign tariff liberalization can make it profitable for the Home pro-trade interest group to cover the fixed cost of lobbying. This brings the Home pro-trade interest group to the lobbying table and reduces the Home country's unilaterally optimal tariff even if it is a small country.

Our analysis pushes beyond [Levy \(1999\)](#) and [Krishna and Mitra \(2005\)](#) because the TA also creates international political externalities in our parallel contest framework and these externalities do not rely on an absence of pro-trade lobbying over unilateral tariffs. Indeed, one can easily glean the real-world prevalence of pro-trade interests lobbying over unilateral tariff policy. For example, recent discussions in both academic and non-academic spheres emphasize the impact of the Trump administration's trade war tariffs on US firms that rely on imported intermediate inputs.<sup>13</sup>

Third, pioneered by [Baier and Bergstrand \(2004\)](#), a large literature focuses on the empirical determinants of FTAs. To this end, our framework delivers a simple sufficient statistic for the probability of FTA ratification: the benefit of the TA for pro-trade interests relative to the cost for anti-trade interests. It can thus provide a structural foundation for such empirical analyses. Indeed, [Blanga-Gubay et al. \(2018\)](#) extend our parallel contest framework by modeling lobbying decisions of pro-trade firms (unlike us, they assume anti-trade interests do not lobby) and find empirical evidence that firm-level lobbying expenditures conform with their model's predictions. We take this as affirmation of our parallel contest framework.

Fourth, prior literature has analyzed trade policy uncertainty. As mentioned above, [Buzard \(2017\)](#) models TA ratification uncertainty but ignores conflicting lobbying interests: unlike our parallel contest framework, she assumes only the anti-trade interest group lobbies. More importantly, the anti-trade interest group treats its own government's ratification decision as completely pivotal for implementing the TA in her model and thus, unlike our parallel contest, ignores the Foreign probability of ratification. [Handley \(2014\)](#) and [Handley and Limão \(2015, 2017\)](#) show FTAs can increase welfare by reducing trade policy uncertainty. But, theoretically, [Limão and Maggi \(2015\)](#) show countries may benefit from a TA with *higher* uncertainty. In contrast, our paper highlights how a TA creates international political externalities because reciprocal liberalization makes lobbying incentives in each country dependent on the probability of TA ratification in the other country.

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<sup>13</sup>For an academic reference that looks at the effect of Trump's tariffs on US exporters through higher prices for intermediates, see [Handley et al. \(2020\)](#). For a time line of the China-US trade war, with references to newspaper articles and policy pieces as well as academic journal articles, see [Bown and Kolb \(2019\)](#).



Fifth, multi-battle contests represent the closest strand of the contest literature to our framework. In Colonel Blotto games, contests take place across multiple battlefields but players with aligned interests can perfectly coordinate their resources across the various battlefields (see, e.g., [Kovenock and Roberson 2015](#)). Like our setting, [Fu et al. \(2015\)](#) assume players with aligned interests cannot coordinate their resources. However, unlike our political economy TA focus, [Fu et al. \(2015\)](#) focus on showing how the inability of a group with aligned interests to coordinate their resources eliminates a ‘strategic momentum’ that emerges in multi-period Colonel Blotto games. Further, while [Fu et al. \(2015\)](#) assume a group with aligned interests win the overall contest if it wins a majority of battles, a TA emerges in our framework only when the pro-trade lobby prevails in every country.

Our paper proceeds as follows. Section 2 introduces the underlying economic model. Section 3 analyzes unilaterally optimal tariffs. Section 4 analyzes the TA. Section 5 presents extensions to our baseline analysis. Section 6 concludes.

## 2 Economic environment and government objectives

We consider a standard two-country model of perfect competition with a numeraire good and two non-numeraire goods. Consumers have quasi-linear preferences that are linear in the numeraire good and additively separable in non-numeraire goods  $x$  and  $y$ . Home imports good  $x$  from Foreign and exports good  $y$  to Foreign. Denoting Foreign country variables by ‘\*’ hereafter,  $p_i$  and  $p_i^*$  denote local prices. Demand functions for non-numeraire goods  $i = x, y$  are represented by the decreasing functions  $D_i(p_i)$  and  $D_i^*(p_i^*)$ . Supply functions for non-numeraire goods are represented by the increasing functions  $Q_i(p_i)$  and  $Q_i^*(p_i^*)$ , and supply of the numeraire good is governed by a linear technology that only uses labor. Home imports of good  $x$  and exports of good  $y$  are, respectively,  $M_x(p_x) = D_x(p_x) - Q_x(p_x)$  and  $E_y(p_y) = Q_y(p_y) - D_y(p_y)$  (and analogously for Foreign).

With no substitution effects between non-numeraire goods and income effects absorbed by the numeraire good, this general equilibrium setup reduces to an effective partial equilibrium setup. It also has the appealing property that export interests have no incentive to lobby over unilateral trade policy. Thus, the reciprocal liberalization of a TA brings export interests to the lobbying table and creates a contest between pro- and anti-trade interests.

No-arbitrage conditions link prices of non-numeraire goods across countries. And, world market clearing conditions determine equilibrium prices for non-numeraire goods. Denoting Home and Foreign tariffs by  $\tau_x$  and  $\tau_y^*$  respectively:

$$\begin{aligned} p_x &= p_x^* + \tau_x & \text{and} & & p_y^* &= p_y + \tau_y^* \\ M_x(p_x) &= E_x^*(p_x^*) & \text{and} & & E_y(p_y) &= M_y^*(p_y^*) \end{aligned} \quad (1)$$

Since we ignore export policies, local prices of exportable goods represent world prices so that  $p_x^w \equiv p_x^*$  and  $p_y^w \equiv p_y$ .<sup>14</sup>

Government payoffs depend on lobbying contributions and what we refer to as ‘tariff-related welfare’. At Home, total contributions  $l = l_A + l_T$  combine contributions  $l_T$  from the pro-trade lobby  $L_T$  and contributions  $l_A$  from the anti-trade lobby  $L_A$ . The set-up in Foreign is analogous. Given our effective partial equilibrium setting, tariff-related welfare of Home and Foreign,  $W$  and  $W^*$  respectively, only depend on non-numeraire goods and comprise consumer surplus ( $\nu_i(\cdot)$  are sub-utility functions), producer surplus and tariff revenue:

$$\begin{aligned} W(\tau_x, \tau_y^*) &= W(p_x, p_y, p_x^w) = \sum_{i=x,y} [\nu_i(D_i) - p_i] + \gamma \pi_x(p_x) + \pi_y(p_y) + (p_x - p_x^w) M_x(p_x) \\ W^*(\tau_x, \tau_y^*) &= W^*(p_x^*, p_y^*, p_y^w) = \sum_{i=x,y} [\nu_i(D_i^*) - p_i^*] + \pi_x^*(p_x) + \gamma \pi_y^*(p_y^*) (p_y^* - p_y^w) M_y^*(p_y^*). \end{aligned}$$

Here,  $\pi_i(p_i)$  and  $\pi_i^*(p_i^*)$  denote producer surplus or, equivalently, profits. A weight of  $\gamma \geq 1$  allows governments, independent of lobbying contributions, to place additional value on a domestic transfer of welfare to the importable sector due to distributional concerns.

### 3 Unilateral protection

Our main interest lies in modeling the parallel contest over a TA. However, understanding how a TA shapes international externalities created by tariffs requires an understanding of each government’s unilateral tariff choice. Thus, we first use our framework to model unilateral tariffs.

In general, a contest framework builds on a situation with an existing policy and a contest taking place over a proposed change in policy. Anticipating our later modeling of a TA, we refer to the existing policy in place before the contest over unilateral tariffs as the ‘pre-status quo’ tariffs,  $\tau_{PSQ}$  and  $\tau_{PSQ}^*$ , and model the contest over proposed unilateral tariff changes to ‘status quo’ tariffs,  $\tau_{SQ}$  and  $\tau_{SQ}^*$ . When modeling a TA, we then treat the existing policy in place before the TA contest as the ‘status quo’ tariffs and model the contest over a proposed policy change to ‘TA tariffs’,  $\tau_{TA}$  and  $\tau_{TA}^*$ . Formally, we use backward induction to analyze

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<sup>14</sup>For clarity, and reflecting real-world practice, we focus on TAs over tariffs and not export instruments. Our simplified framework enables us to identify the key tensions and features of our parallel contest framework without adding unnecessary complexity.

the following three-stage game for the Home country's choice of its unilateral status quo tariff (with an analogous game taking place simultaneously in the Foreign country):

**Stage 1** Given a pre-status quo tariff on good  $x$  of  $\tau_{PSQ}$ , the Home government announces a status-quo tariff on good  $x$  of  $\tau_{SQ}$ .

**Stage 2** Lobbies  $L_A$  and  $L_T$  make non-negative contributions to the Home government.

**Stage 3** The Home government decides whether to implement the tariff change on good  $x$  from  $\tau_{PSQ}$  to  $\tau_{SQ}$ .

Given our effective partial equilibrium setting, pro-trade lobby profits are independent of the tariff in the import-competing sector. Thus, as we will soon show, they will not lobby in equilibrium. In turn, we model unilateral tariff proposals of governments that increase protection to their import-competing sectors:  $\boldsymbol{\tau}_{SQ} = (\tau_{SQ}, \tau_{SQ}^*) \geq \boldsymbol{\tau}_{PSQ} = (\tau_{PSQ}, \tau_{PSQ}^*)$ .

Given the status-quo tariffs  $\boldsymbol{\tau}_{SQ}$  announced in Stage 1, each lobby group  $L_A$  and  $L_T$  can lobby in Stage 2 either in support of or opposition to the trade policy. Each lobby  $L_i$ ,  $i \in \{A, T\}$ , has a valuation  $v_i$ . Taking the Foreign tariff  $\tau^*$  as given and using the effective partial equilibrium setting, these valuations are  $v_A(\tau_{SQ}, \tau_{PSQ}, \tau^*) \equiv |\pi_A(\tau_{SQ}) - \pi_A(\tau_{PSQ})| \geq 0$  and  $v_T(\tau_{SQ}, \tau_{PSQ}, \tau^*) \equiv |\pi_T(\tau^*) - \pi_T(\tau^*)| = 0$ . They represent, in absolute value, the impact on  $L_A$ 's and  $L_T$ 's profits due to Home's proposed tariff change from  $\tau_{PSQ}$  to  $\tau_{SQ}$ . Given lobbies make contributions before the government's decision, they *cannot* condition their contributions on whether the government implements the proposed tariff increase.

After receiving lobbying contributions, the Home government decides whether to implement the proposed tariff change in Stage 3. A standard contest success function (CSF) would say the probability of implementing the policy change,  $\rho$ , increases with the amount of contributions by the group favoring the change relative to the amount contributed by the group opposing the change. Building on this, we assume the government's preferences endow an 'expected head start'  $\mathbb{E}h \geq 0$  that effectively augments the contributions for *one* lobby group.<sup>15</sup> Given a tariff protection proposal  $\tau_{SQ} > \tau_{PSQ}$ , we say the government endows an expected anti-trade head start on  $L_A$  of  $\mathbb{E}h$  if  $\mathbb{E}h > 0$  but an expected pro-trade head start on  $L_T$  of  $|\mathbb{E}h|$  if  $\mathbb{E}h < 0$ . We now proceed with backward induction.

**Stage 3.** The Home government implements the policy change from  $\tau_{PSQ}$  to  $\tau_{SQ} > \tau_{PSQ}$  with a probability given by the following CSF:

$$\rho(l_T, l_A, \mathbb{E}h) = \begin{cases} \frac{l_A}{l_T + b|\mathbb{E}h| + l_A} & \text{if } \mathbb{E}h < 0 \\ \frac{l_A + b\mathbb{E}h}{l_T + l_A + b\mathbb{E}h} & \text{if } \mathbb{E}h \geq 0 \end{cases} \quad (2)$$

<sup>15</sup>Siegel (2014) introduces head starts into the all-pay auction literature. Unlike Siegel (2014), our head starts are 'expected' because policy outcomes are not known when lobbies make contributions.

where  $b \geq 0$  governs the extent that expected head starts augment lobbying contributions.<sup>16,17</sup> Further, letting  $a > 0$  denote how governments value tariff-related welfare relative to lobbying contributions, we define the expected head start  $\mathbb{E}h$  as the expected change in the government's tariff-related welfare of implementing  $\tau_{SQ}$  relative to maintaining  $\tau_{PSQ}$ :

$$\begin{aligned}\mathbb{E}h &\equiv a [\rho^* W(\tau_{SQ}) + (1 - \rho^*) W(\tau_{SQ}, \tau_{PSQ}^*)] - a [\rho^* W(\tau_{PSQ}, \tau_{SQ}) + (1 - \rho^*) W(\tau_{PSQ})] \\ &= a [W(\tau_{SQ}, \tau^*) - W(\tau_{PSQ}, \tau^*)] \\ &\equiv a \Delta W\end{aligned}\tag{3}$$

where the effective partial equilibrium environment implies  $\Delta W \equiv W(\tau_{SQ}, \tau^*) - W(\tau_{PSQ}, \tau^*)$  is independent of  $\tau^*$ .

**Stage 2.** Turning to lobby group expected payoffs,  $L_A$ 's expected payoff,  $\mathbb{E}u_A$ , is

$$\begin{aligned}\mathbb{E}u_A(\tau_{SQ}, \tau_{PSQ}) &= \rho \pi_A(\tau_{SQ}) + (1 - \rho) \pi_A(\tau_{PSQ}) - l_A \\ &= \mu_A + (1 - \rho) v_A(\tau_{SQ}, \tau_{PSQ}) - l_A\end{aligned}\tag{4}$$

where  $\mu_A \equiv \pi_A(\tau_{SQ})$  is independent of  $l_A$ . Since  $\rho$  depends on  $l_A$  via (2),  $L_A$  has an incentive to lobby because this impacts the probability of realizing its valuation  $v_A$ . Similarly,  $L_T$ 's expected payoff,  $\mathbb{E}u_T$ , is

$$\begin{aligned}\mathbb{E}u_T(\tau_{SQ}^*, \tau_{PSQ}^*) &= \rho^* \pi_T(\tau_{SQ}^*) + (1 - \rho^*) \pi_T(\tau_{PSQ}^*) - l_T \\ &= \mu_T - l_T\end{aligned}\tag{5}$$

where  $\mu_T \equiv \pi_T(\tau_{PSQ}^*) - \rho^* v_T(\tau_{SQ}^*, \tau_{PSQ}^*)$ . Unlike  $L_A$ ,  $L_T$  has no incentive to lobby over unilateral protection because its expected payoff is independent of  $\rho$ . Intuitively, this follows because the effective partial equilibrium setting implies Home exporter profits depend on Foreign rather than Home tariffs.

Given  $L_T$  has no incentive to lobby, so that  $l_T = 0$  can be taken as given, the general CSF from (2) reduces to

$$\rho(l_A, \mathbb{E}h) = \begin{cases} \frac{l_A}{b \cdot |\mathbb{E}h| + l_A} & \text{if } \mathbb{E}h < 0 \\ 1 & \text{if } \mathbb{E}h \geq 0 \end{cases}.\tag{6}$$

<sup>16</sup>We assume that  $\rho > 0$  if  $l_A = l_T = b\mathbb{E}h = 0$ . This nests the typical assumption that  $\rho = \frac{1}{2}$ .

<sup>17</sup>Within the generalized CSF  $\rho = \frac{s_T^r}{s_T^r + s_A^r}$ , our CSF represents the 'simple Tullock contest' of  $r = 1$  with 'augmented contributions'  $s_A = l_A + b\mathbb{E}h \cdot 1[\mathbb{E}h > 0]$  and  $s_T = l_T + b|\mathbb{E}h| \cdot 1[\mathbb{E}h < 0]$ . Appendix A provides a microfoundation for our CSF. Further, our augmented contributions correspond to the 'effective investments' of Rai and Sarin (2009) who axiomatize the generalized CSF and thereby build on Skaperdas (1996) who axiomatizes the CSF with  $r = 1$  and  $s_i = l_i$ .

Importantly, (6) says the Home government implements protection in the presence of an anti-trade head start, i.e.  $\Delta W > 0$ , even if  $L_A$  does not lobby. Thus, equilibrium lobbying over tariff protection requires a pro-trade expected head start  $\mathbb{E}h < 0$ .

For tariff proposals such that  $\mathbb{E}h < 0$ , or equivalently  $\Delta W < 0$ ,  $L_A$  lobbies to maximize its expected payoff in (4). Thus, Stage 2 equilibrium lobbying contributions are

$$l = l_A = (v_A \cdot b |\mathbb{E}h|)^{1/2} - b |\mathbb{E}h|. \quad (7)$$

We call the second term ‘lobbying leakage’, reflecting the negative effect of the expected headstart  $b |\mathbb{E}h|$  on lobbying contributions. Three features of (7) stand out. First, unsurprisingly,  $l_A$  is increasing in  $v_A$ :  $L_A$  lobbies more for increased protection when it benefits more. Second,  $b |\mathbb{E}h|$  has offsetting effects on  $l_A$ :  $l_A$  is decreasing (increasing) in  $b |\mathbb{E}h|$  when  $\rho < \frac{1}{2}$  ( $\rho > \frac{1}{2}$ ). Third,  $l_A$  is independent of the Foreign probability of implementing  $\tau_{SQ}^*$  and the Foreign tariffs  $\tau_{SQ}^*$  and  $\tau_{PSQ}^*$ . Moreover, this independence flows through to the equilibrium probability of implementing  $\tau_{SQ}$ :

$$\rho = 1 - \left[ \frac{b |a \Delta W|}{v_A} \right]^{1/2}. \quad (8)$$

That is, the Home contest over its unilateral tariff is strategically independent of the analogous contest in Foreign.

**Stage 1.** The Home government’s expected payoff consists of lobbying contributions  $l_A$  and expected tariff-related welfare  $a\mathbb{E}W(\tau_{SQ}, \tau_{PSQ})$ . Given the respective probabilities  $\rho$  and  $1 - \rho$  that Home implements  $\tau_{SQ}$  and  $\tau_{PSQ}$  as well as the respective probabilities  $\rho^*$  and  $1 - \rho^*$  that Foreign implements  $\tau_{SQ}^*$  and  $\tau_{PSQ}^*$ , Home’s expected tariff-related welfare is

$$\begin{aligned} a\mathbb{E}W(\tau_{SQ}, \tau_{PSQ}) &\equiv \rho a [\rho^* W(\tau_{SQ}) + (1 - \rho^*) W(\tau_{SQ}, \tau_{PSQ}^*)] \\ &\quad + (1 - \rho) a [\rho^* W(\tau_{PSQ}, \tau_{SQ}^*) + (1 - \rho^*) W(\tau_{PSQ})] \\ &= \rho a \Delta W + a\mathbb{E}W_{PSQ}. \end{aligned} \quad (9)$$

Here,  $a\mathbb{E}W_{PSQ} \equiv \rho^* a W(\tau_{PSQ}, \tau_{SQ}^*) + (1 - \rho^*) a W(\tau_{PSQ})$  is independent of  $\tau_{SQ}$  and represents the Home government’s expected payoff when lobbying does not take place in equilibrium. Hence, remembering that  $\Delta W < 0$ , the Home government’s expected payoff is

$$\begin{aligned} \mathbb{E}G(\tau_{SQ}, \tau_{PSQ}) &= l + a\mathbb{E}W(\tau_{SQ}, \tau_{PSQ}) \\ &= [-v_A \cdot b a \Delta W]^{1/2} + (\rho + b) a \Delta W + a\mathbb{E}W_{PSQ} \end{aligned} \quad (10)$$

where  $\mathbb{E}G(\tau_{SQ}, \tau_{PSQ}) > a\mathbb{E}W_{PSQ}$  represents the Home government's participation constraint to propose increasing its tariff above  $\tau_{PSQ}$ .

Proposition 1 now characterizes the Home government's optimal unilateral tariff.

**Proposition 1** *Assume that  $b \in ((1 - \rho)^2, 1 - \rho)$ . Then, each government's optimal unilateral tariff is characterized by, at the margin, protection that (i) increases lobbying contributions by increasing the valuation of the anti-trade lobby (i.e.  $\frac{\partial v_A}{\partial \tau_{SQ}} > 0$  and  $\frac{\partial v_A^*}{\partial \tau_{SQ}^*} > 0$ ) but (ii) decreases tariff-related welfare (i.e.  $\frac{\partial W}{\partial \tau_{SQ}} < 0$  and  $\frac{\partial W^*}{\partial \tau_{SQ}^*} < 0$ ).*

The Home government's expected payoff depends on lobbying contributions *net* of lobbying leakage as well as the *expected change* in tariff-related welfare. Nevertheless, its optimal tariff is characterized by a trade-off that ignores these complications and simply pits a higher benefit to the anti-trade lobby against lower tariff-related welfare.

Formally, the Home government's FOC for its optimal unilateral tariff can be written as

$$\frac{\partial \mathbb{E}G}{\partial \tau_{SQ}} = \frac{\partial v_A}{\partial \tau_{SQ}} \varphi_1(\rho, b) + a \frac{\partial W}{\partial \tau_{SQ}} \varphi_2(\rho, b) = 0 \quad (11)$$

where  $\varphi_1(\rho, b) \equiv \frac{1}{2}(1 - \rho) \frac{b - (1 - \rho)^2}{b}$  and  $\varphi_2(\rho, b) \equiv \frac{1}{2} \frac{1}{1 - \rho} [-b + (1 - \rho)(2b + 3\rho - 1)]$ . Moreover,  $\varphi_1(\rho, b) > 0$  and  $\varphi_2(\rho, b) > 0$  when  $b \in ((1 - \rho)^2, 1 - \rho)$  which, as explained below, we treat as the natural case. In turn, given  $\frac{\partial v_A}{\partial \tau_{SQ}} > 0$ , the FOC implies that  $\frac{\partial W}{\partial \tau_{SQ}} < 0$ . Intuitively, at the optimal  $\tau_{SQ}$ , the government trades off lower expected tariff-related welfare from further protection against the higher lobbying contributions through increasing  $v_A$ .

Decomposing the FOC in more detail, the higher  $v_A$  from extra protection has offsetting effects on  $\mathbb{E}G$ . On one hand,  $\mathbb{E}G$  increases because of higher anti-trade lobby contributions. On the other hand,  $\mathbb{E}G$  decreases because, given  $\rho$  is increasing in  $v_A$ , the probability of suffering the loss of tariff-related welfare increases. Thinking of the natural case as the former effect outweighing the latter,  $\mathbb{E}G$  is increasing in  $v_A$ . This requires  $b > (1 - \rho)^2$ .

The impact of rising protection on the government's expected tariff-related welfare  $a\mathbb{E}W$  has various offsetting effects on  $\mathbb{E}G$ . First, holding lobbying fixed, offsetting effects impact the loss in expected tariff-related welfare  $\rho |a\Delta W|$ . On one hand, taking  $\frac{\partial W}{\partial \tau_{SQ}} < 0$  as given, protection directly increases  $|a\Delta W|$ . On the other hand, the higher  $|a\Delta W|$  reduces  $\rho$  and, hence,  $\rho |a\Delta W|$ . Second,  $|a\Delta W|$  impacts lobbying and, as discussed above,  $|a\Delta W|$  has offsetting effects on  $l_A$  with  $l_A$  decreasing (increasing) in  $|a\Delta W|$  when  $\rho < \frac{1}{2}$  ( $\rho > \frac{1}{2}$ ). Combining these two effects, and the offsetting forces within each effect, the direct effect of protection increasing the loss of tariff-related welfare  $|a\Delta W|$ , and hence reducing  $\mathbb{E}G$ , dominates when  $b < 1 - \rho$ . Thus, we think of this as the natural case. In turn, we treat  $b \in ((1 - \rho)^2, 1 - \rho)$  as the natural case which implies  $\frac{\partial W}{\partial \tau_{SQ}} < 0$  at the FOC.

Ultimately, our model of unilateral protection reflects the standard setup of the contest literature where each country's contest is strategically independent of the other. Specifically, lobbying activity in each country is independent of whether the other country implements increased protection. Hence, each country's probability of implementing increased protection is independent of the probability in the other country. In the next section, we show how reciprocal liberalization of the TA gives rise to the fundamental feature of our parallel contest framework: strategic dependencies between the contests whereby lobbying activity in one country depends on the probability of TA ratification in the other country.

## 4 Trade Agreement

We now model the contest over a TA between the Home and Foreign countries, drawing attention to the specific features of our parallel contest framework.

### 4.1 TA negotiations and reciprocity

Although we relax this assumption later, we initially focus on a TA that liberalizes tariffs. Like much of the literature on two-country TAs, we assume that a reciprocity condition guides negotiation of the TA tariffs  $\boldsymbol{\tau}_{TA} = (\tau_{TA}, \tau_{TA}^*)$  given the status quo tariffs  $\boldsymbol{\tau}_{SQ} = (\tau_{SQ}, \tau_{SQ}^*)$  in place before the TA. We follow the reciprocity definition from [Bagwell and Staiger \(2001\)](#) who use the same economic environment, an effective partial equilibrium setting, as we do. Specifically, the negotiated TA tariffs  $\boldsymbol{\tau}_{TA}$  satisfy

$$[p_x^w(\tau_{SQ}) - p_x^w(\tau_{TA})] M_x(p_x(\tau_{TA})) = [p_y^w(\tau_{SQ}^*) - p_y^w(\tau_{TA}^*)] M_y(p_y(\tau_{TA}^*)). \quad (12)$$

When describing how a variable  $z$  changes with TA tariffs, we define  $-\frac{\partial z}{\partial \boldsymbol{\tau}_{TA}}$  as the change due to a marginal increase in TA *liberalization* that respects the reciprocity rule (12). Formally, we define the unit vector  $\mathbf{u}(\boldsymbol{\tau}_{TA}, \boldsymbol{\tau}_{SQ}) = (u_{TA}(\boldsymbol{\tau}_{TA}, \boldsymbol{\tau}_{SQ}), u_{TA}^*(\boldsymbol{\tau}_{TA}, \boldsymbol{\tau}_{SQ}))$  where  $u_{TA}^*(\cdot)/u_{TA}(\cdot)$  gives the required rate at which  $\tau_{TA}^*$  must change relative to  $\tau_{TA}$  to ensure that (12) holds. Then, using the standard notation  $\nabla z = \left( \frac{\partial z}{\partial \tau_{TA}}, \frac{\partial z}{\partial \tau_{TA}^*} \right)$ ,

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

Given the lack of substitution effects between non-numeraire goods and that the numeraire good absorbs income effects, world prices change when tariffs change from  $\boldsymbol{\tau}_{SQ}$  to  $\boldsymbol{\tau}_{TA}$ . Nevertheless, reciprocity ensures that the resulting changes in *world* prices leave each

government's tariff-related welfare unaffected. When the TA reduces the Home tariff on good  $x$  from  $\tau_{SQ}$  to  $\tau_{TA}$ , the left hand side of the reciprocity condition (12) represents the terms-of-trade loss for Home (via lower tariff revenue) and terms-of-trade gain for Foreign (via higher export profits). The right hand side of (12) captures the fact that Foreign's tariff cut on good  $y$  from  $\tau_{SQ}^*$  to  $\tau_{TA}^*$  generates an exactly offsetting terms-of-trade gain for Home (via higher export profits) and terms-of-trade loss for Foreign (via lower tariff revenue). As such, negotiated tariffs respecting reciprocity deliver changes in world prices and trade volumes that leave each government's tariff-related welfare unchanged.

Following the natural extension of the three-stage game for unilateral tariff setting, negotiation and ratification of the TA tariffs proceeds as follows:

**Stage 1** Given status quo tariffs  $\tau_{SQ}$ , governments announce TA tariffs  $\tau_{TA} \leq \tau_{SQ}$  that respect the reciprocity rule in (12).

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

**Stage 3** Each government decides whether to ratify the TA. If both governments ratify, the TA tariffs  $\tau_{TA}$  are implemented. Otherwise, the status quo tariffs  $\tau_{SQ}$  prevail.

In principle, the TA tariffs  $\tau_{TA}$  emerge in Stage 1 through a bargaining process. However, apart from imposing that TA tariffs respect the reciprocity rule, we merely assume the bargaining process is efficient in that there are no TA tariffs  $\tau'_{TA} \neq \tau_{TA}$  that increase the expected payoff of both governments. We now proceed by backward induction.

**Stage 3.** Given the lobbying contributions received in Stage 2, each government simultaneously decides whether to ratify the TA. The Home government ratifies the TA according to the following CSF (and analogously in Foreign):

$$\rho(l_T, l_A, \mathbb{E}h) = \begin{cases} \frac{l_T + b\mathbb{E}h}{l_T + b\mathbb{E}h + l_A} & \text{if } \mathbb{E}h \geq 0 \\ \frac{l_T}{l_T + l_A + b|\mathbb{E}h|} & \text{if } \mathbb{E}h < 0 \end{cases} . \quad (13)$$

Unlike the CSF in (2) over unilateral tariff protection, the CSF in (13) for the TA contest is over tariff liberalization. Hence, the numerator of the CSF for the TA contest is based around  $l_T$  whereas the numerator of the CSF for unilateral tariff setting is based around  $l_A$ . Analogous to the unilateral case, the expected head start is defined as the expected change in the government's tariff-related welfare of ratifying the TA and explicitly recognizes that



Foreign may or may not ratify the TA:

$$\begin{aligned}\mathbb{E}h &\equiv a[\rho^*W(\tau_{TA}) + (1 - \rho^*)W(\tau_{SQ})] - aW(\tau_{SQ}) \\ &= \rho^*a\Delta W\end{aligned}\tag{14}$$

where  $\Delta W \equiv W(\tau_{TA}) - W(\tau_{SQ})$ . Given the TA involves liberalization, the government endows a pro-trade expected head start on  $L_T$  of  $\mathbb{E}h$  when  $\mathbb{E}h \geq 0$  but endows an anti-trade expected head start on  $L_A$  of  $|\mathbb{E}h|$  when  $\mathbb{E}h < 0$ .

**Stage 2.** Because implementing the TA requires ratification by both countries, lobby group expected payoff functions differ from the unilateral case.  $L_A$ 's expected payoff is now

$$\begin{aligned}\mathbb{E}u_A(\tau_{TA}, \tau_{SQ}) &= \rho\rho^*\pi_A(\tau_{TA}) + (1 - \rho\rho^*)\pi_A(\tau_{SQ}) - l_A \\ &= \mu_A + (1 - \rho)\rho^*v_A(\tau_{TA}, \tau_{SQ}) - l_A\end{aligned}\tag{15}$$

where  $\mu_A \equiv \pi_A(\tau_{SQ}) - \rho^*v_A(\tau_{TA}, \tau_{SQ})$  is independent of  $l_A$ . And,  $L_T$ 's expected payoff is

$$\begin{aligned}\mathbb{E}u_T(\tau_{TA}^*, \tau_{SQ}^*) &= \rho\rho^*\pi_T(\tau_{TA}^*) + (1 - \rho\rho^*)\pi_T(\tau_{SQ}^*) - l_T \\ &= \mu_T + \rho\rho^*v_T(\tau_{TA}^*, \tau_{SQ}^*) - l_T\end{aligned}\tag{16}$$

where  $\mu_T \equiv \pi_T(\tau_{SQ}^*)$  is independent of  $l_T$ . Crucially, unlike the unilateral tariff setting case,  $L_T$ 's expected payoff depends on  $\rho$ . Thus,  $L_T$  has an incentive to lobby because its interest in Foreign liberalization is now directly tied to Home ratifying the TA.

These lobby group expected payoffs in the TA setting display the strategic interdependencies of our parallel contest structure that differentiate it from the contest structure over unilateral tariffs. Specifically, Home lobby groups lobby more intensively in the TA setting when they perceive the outcome of the Home contest as more pivotal to whether the TA is implemented. Home lobbies view their contest as completely pivotal when  $\rho^* = 1$  because the TA is implemented if and only if Home ratifies the TA. But, the Home contest is irrelevant when  $\rho^* = 0$  because Foreign fails to ratify the TA for sure. More generally, the Home contest becomes more pivotal as  $\rho^*$  increases. In turn, the benefit of lobbying for each Home lobby is proportional to  $\rho^*$  and their equilibrium lobbying contributions will depend on the probability of Foreign TA ratification. This strategic interdependency between contests distinguishes our parallel contest setup from the prior contest literature. Nevertheless, the preferences embodied in the expected payoff functions mirror those of a standard Tullock (or all-pay) contest with *effective* valuations  $\tilde{v}_i \equiv \rho^*v_i$  and, thus, standard solution techniques

apply.<sup>18</sup>

Maximizing their expected payoffs, equilibrium lobbying contributions for  $L_A$  and  $L_T$  are

$$l_A = \rho^* \frac{1}{2 \left(1 + \frac{v_T}{v_A}\right)} \bar{v} - b |\mathbb{E}h| \cdot 1 [\mathbb{E}h < 0] \quad (17)$$

$$l_T = \rho^* \frac{1}{2 \left(1 + \frac{v_A}{v_T}\right)} \bar{v} - b \mathbb{E}h \cdot 1 [\mathbb{E}h \geq 0] \quad (18)$$

where  $\bar{v} = \left[ \frac{1}{2} \left( \frac{1}{v_A} + \frac{1}{v_T} \right) \right]^{-1}$  denotes the harmonic mean of the valuations and  $1 [\cdot]$  denotes the indicator function. Four features of  $l_A$  and  $l_T$  stand out. First, by increasing the likelihood of the Home contest being pivotal, equilibrium lobbying contributions increase with the probability of Foreign TA ratification  $\rho^*$ . This highlights the key strategic interdependency of a parallel contest and is the key feature of contribution functions in a parallel contest. Second, contributions of *both* lobbies rise with the average valuation  $\bar{v}$  but, all else equal, a given lobby  $L_i$  reduces its contribution as the relative valuation of the opposing lobby group  $\frac{v_j}{v_i}$  rises.<sup>19</sup> Third, expected head starts create lobbying leakage: the pro-trade (anti-trade) lobby drops their contributions by their expected head start which reflects the government's inherent value of the TA going ahead (not going ahead). Fourth, participation constraints emerge because contributions are decreasing in head starts. We hereafter assume  $ba$  is sufficiently small to ensure positive contributions by both groups.

Given equilibrium lobbying contributions by the anti-trade and pro-trade lobbies, and noting that  $\frac{1}{2}\bar{v} = \rho v_A$ , equilibrium aggregate lobbying contributions are

$$l = l_A + l_T = \rho^* \frac{1}{2} \bar{v} - b |\mathbb{E}h| = \rho^* \rho v_A - b |\mathbb{E}h|. \quad (19)$$

This shows that aggregate lobbying contributions only depend on average rather than relative valuations. Moreover, aggregate lobbying contributions increase with  $\rho^*$  which again illustrates the strategic interdependency in our parallel contest framework. While aggregate lobbying contributions depend on the average valuation, the relative valuation  $\frac{v_T}{v_A}$  is a simple sufficient statistic for the equilibrium probability of Home TA ratification:

$$\rho = \left( 1 + \frac{v_A}{v_T} \right)^{-1}. \quad (20)$$

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<sup>18</sup>The application of standard solution techniques relies on the property that the terms  $\mu_A$  and  $\mu_T$  in the lobby expected payoff functions are merely intercept shifters (i.e. independent of the choice variables  $l_i$  for  $i \in \{A, T\}$ ) that do not affect lobby group preferences over strategy profiles.

<sup>19</sup>The former effect dominates the latter if and only if  $v_i > v_j$ .

**Stage 1.** As with unilateral tariff setting, the Home government's expected payoff consists of lobbying contributions and expected tariff-related welfare. Given the TA goes ahead if and only if both countries ratify, the Home government's expected tariff-related welfare is

$$aEW \equiv \rho\rho^* aW(\tau_{TA}) + (1 - \rho\rho^*) aW(\tau_{SQ}) = \rho\rho^* a\Delta W + aW(\tau_{SQ})$$

In turn, the Home government's expected payoff in Stage 1 is

$$\mathbb{E}G(\tau_{TA}; \tau_{SQ}) = l + aEW = \rho^* \rho [v_A + a\Delta W] - b\rho^* |a\Delta W| + aW(\tau_{SQ}) \quad (21)$$

and the participation constraint  $\mathbb{E}G(\tau_{TA}; \tau_{SQ}) > aW(\tau_{SQ})$  must hold for the Home government to participate in the TA. Assuming this participation constraint holds, we think of  $v_A + a\Delta W > 0$  as the 'gross surplus' and  $\rho(v_A + a\Delta W) - b|a\Delta W| > 0$  as the 'expected net surplus' for the Home government from its political interaction with the lobbies that combines lobbying contributions and the change in tariff-related welfare.

Proposition 2 now characterizes the equilibrium degree of TA liberalization. To this end, we rely on the notion of pro-trade biased polarization:  $-\frac{\partial(v_T/v_A)}{\partial\tau_{TA}} > 0$  and  $-\frac{\partial(v_T^*/v_A^*)}{\partial\tau_{TA}} > 0$ . Intuitively, pro-trade biased polarization requires that the benefit to the pro-trade lobby grows faster than the cost to the anti-trade lobby when reciprocal liberalization deepens.

**Proposition 2** *Assume (i) governments bargain efficiently and (ii) TA liberalization satisfies the reciprocity rule in (12). Then, the equilibrium TA is characterized by  $\min\left\{-\frac{\partial\mathbb{E}G}{\partial\tau_{TA}}, -\frac{\partial\mathbb{E}G^*}{\partial\tau_{TA}}\right\} = 0$ . Additionally, assume (iii) TA liberalization satisfies pro-trade biased polarization, and (iv)  $b < \rho$ . Then, the equilibrium TA balances reciprocal liberalization that, at the margin, (i) increases lobbying by polarizing lobby groups and also increases the probability of the government realizing the surplus from interacting with lobbies, but (ii) decreases tariff-related welfare.*

The assumptions that governments bargain efficiently and TA liberalization respects the reciprocity rule in (12) immediately imply that the equilibrium TA tariffs are characterized by  $\min\left\{-\frac{\partial\mathbb{E}G}{\partial\tau_{TA}}, -\frac{\partial\mathbb{E}G^*}{\partial\tau_{TA}}\right\} = 0$ . Any further liberalization respecting the reciprocity rule would decrease the expected payoff of at least one government. Thus, without loss of generality, we focus on the Home government's preferences as characterizing the equilibrium TA tariffs.

Using the Home government's preferences, the FOC characterizing the equilibrium TA is

$$\begin{aligned} \frac{\partial\mathbb{E}G}{\partial\tau_{TA}} &= \frac{\partial\rho}{\partial\tau_{TA}} \rho^* [v_A + a\Delta W] + \frac{\partial\rho^*}{\partial\tau_{TA}} [\rho(v_A + a\Delta W) - b|a\Delta W|] \\ &+ \rho^* \left[ \rho \frac{\partial v_A}{\partial\tau_{TA}} + a \left( \rho \frac{\partial W}{\partial\tau_{TA}} - b \frac{\partial |a\Delta W|}{\partial\tau_{TA}} \right) \right] = 0. \end{aligned} \quad (22)$$

The first two terms and the first part of the third term represent the marginal benefit of reciprocal liberalization. The assumption of pro-trade biased polarization implies  $\frac{\partial \rho}{\partial \tau_{TA}} < 0$  since  $\frac{v_T}{v_A}$  is a sufficient statistic for  $\rho$ , and  $\rho$  is increasing in  $\frac{v_T}{v_A}$ . In turn, given the government's participation constraint holds, the first two terms of the FOC represent the increased probability that the Home government realizes the strictly positive gross and expected net surplus from its political interaction with lobbies. Moreover, the first part of the third term captures the additional benefit that reciprocal liberalization increases lobbying revenue by polarizing lobby groups and thereby increasing the intensity of lobbying.

The second and third parts of the third term in the FOC represent, at the margin, the cost of reciprocal liberalization. These terms capture how changes in tariff-related welfare affect  $\mathbb{E}G$ . First, the direct effect: holding lobbying fixed,  $\mathbb{E}G$  increases with  $W(\tau_{TA})$ . Second, the indirect effect: the lobby leakage cost for the government increases with  $|\Delta W|$ . The assumption  $b < \rho$  implies that the direct effect determines the net effect. Moreover, this net effect must be a cost to balance the benefits of reciprocal liberalization at the FOC. As such, at the margin, reciprocal liberalization reduces tariff-related welfare:  $\frac{\partial W}{\partial \tau_{TA}} > 0$ .

The equilibrium TA and the optimal unilateral tariff share the property of reducing tariff-related welfare at the margin. The optimal unilateral tariff pushes above the tariff-related-welfare-maximizing tariff, leaving  $\frac{\partial W(\tau_{SQ})}{\partial \tau_{SQ}} < 0$ , while the equilibrium TA pushes liberalization below the tariff-related-welfare-maximizing tariff, leaving  $-\frac{\partial W(\tau_{TA})}{\partial \tau_{TA}} < 0$ . Both reflect a trade-off between trade policy incentivizing lobbying but reducing tariff-related welfare. To understand the differences between optimal unilateral tariffs and equilibrium TA tariffs, the following section moves away from our political economy focus thus far and recasts the analysis using insights from the terms-of-trade theory of TAs.

## 4.2 The purpose of a TA

A key question in the TA literature concerns what a country achieves by engaging in reciprocal liberalization that it could not achieve through unilateral liberalization. Perhaps the most prominent answer is provided by the terms-of-trade theory of TAs. That theory shows how countries set unilateral tariffs to exploit terms-of-trade gains. But, countries find reciprocal liberalization mutually beneficial because exploiting terms-of-trade gains imposes a negative terms-of-trade externality on their trading partners. Indeed, the key insight from the terms-of-trade theory is that the *sole* purpose of a TA is to internalize this terms-of-trade externality. Since our analysis also features terms-of-trade externalities, we now address the purpose of a TA in our parallel contest framework using standard terms-of-trade theory.

### 4.2.1 Externalities in unilateral tariffs

Given the model setup in Section 2, the benefit of protection to the Home anti-trade lobby,  $v_A$ , and the resulting change in Home tariff-related welfare,  $\Delta W$ , can be written as depending on the prices that result from the status quo tariffs rather than depending on the status quo tariffs themselves. In terms of the prices that result from  $\tau_{SQ}$ , and remembering  $p_y \equiv p_y^w$  and  $p_x^* \equiv p_x^w$  given that we abstract from export policies,  $v_A$  depends on  $p_x$  and  $\Delta W$  depends on  $\mathbf{p} = (p_x, p_x^w, p_y^*, p_y^w)$ . Similarly,  $v_A^*$  depends on  $p_y^*$  and  $\Delta W^*$  depends on  $\mathbf{p}$ . Thus, for example, we can isolate the impact of the Home importable local price  $p_x$  on the Home government's expected payoff while holding the world price of its importable  $p_x^w$  fixed or, in other words, neutralizing terms-of-trade externalities. Similarly, we can isolate the impact of the world price  $p_x^w$  on the Home government's expected payoff while holding the local price  $p_x$  fixed. Letting price subscripts denote partial derivatives, these respective impacts are  $\mathbb{E}G_{p_x} \equiv \frac{\partial \mathbb{E}G}{\partial p_x}$  and  $\mathbb{E}G_{p_x^w} \equiv \frac{\partial \mathbb{E}G}{\partial p_x^w}$ .

From this perspective, the following proposition describes the unilateral analysis.

**Proposition 3** *When governments choose unilaterally optimal tariffs, the following properties hold.*

- (i) *Government preferences are  $\mathbb{E}G(\mathbf{p})$  and  $\mathbb{E}G^*(\mathbf{p})$ .*
- (ii) *Each country's tariff imposes a negative terms-of-trade externality as well as a local-price externality on the other country.*
- (iii) *Assuming each government benefits from terms-of-trade improvements, each country's optimal unilateral tariff is characterized by, at the margin, protection that improves its terms-of-trade but distorts the local price of its importable.*

Standard terms-of-trade theory says that the only externality imposed on Home by Foreign is the terms-of-trade externality or, in other words, an international externality that travels through world prices. That is,  $\frac{\partial \mathbb{E}G}{\partial \tau_{SQ}^*} = \mathbb{E}G_{p_y^w} \frac{\partial p_y^w}{\partial \tau_{SQ}^*}$  and, in turn,  $\mathbb{E}G$  is independent of the Foreign local price  $p_y^*$ . In contrast, our parallel-contest setting features terms-of-trade and local-price externalities:

$$\frac{\partial \mathbb{E}G(\mathbf{p})}{\partial \tau_{SQ}^*} = \mathbb{E}G_{p_y^w} \frac{\partial p_y^w}{\partial \tau_{SQ}^*} + \mathbb{E}G_{p_y^*} \frac{dp_y^*}{d\tau_{SQ}^*}.$$

Here, the Foreign *local-price externality* on Home is

$$\mathbb{E}G_{p_y^*} = a [W(\tau, \tau_{SQ}^*) - W(\tau, \tau_{PSQ}^*)] \frac{\partial \rho^*}{\partial p_y^*}. \quad (23)$$

Parts (i) and (ii) of Proposition 3 now follow because this Foreign local-price externality travels through the Foreign local price  $p_y^*$  and implies  $\mathbb{E}G$  depends on the Foreign local price  $p_y^*$  in addition to the world price  $p_y^w$ .

As shown by (23), the Foreign local-price externality works via the Foreign probability of implementing increased protection  $\rho^*$ . For fixed world prices, a higher Foreign local price  $p_y^*$  increases the benefit of protection to Foreign's anti-trade lobby but exacerbates the local price distortion of tariff-related welfare. Using (8), these effects have an offsetting impact on  $\rho^*$  and imply the Foreign local-price externality could be positive or negative. In any case, the Foreign local-price externality exists if and only if the terms-of-trade externality exists because the Foreign local-price externality is proportional to  $W(\tau, \tau_{SQ}^*) - W(\tau, \tau_{PSQ}^*)$ .

Turning to part (iii) of Proposition 3, the FOC for Home's optimal tariff is

$$\frac{\partial \mathbb{E}G(\mathbf{p})}{\partial \tau_{SQ}} = \mathbb{E}G_{p_x} \frac{dp_x}{d\tau_{SQ}} + \mathbb{E}G_{p_x^w} \frac{\partial p_x^w}{\partial \tau_{SQ}} = 0. \quad (24)$$

As one would expect, the Home tariff increases the local price ( $\frac{dp_x}{d\tau_{SQ}} > 0$ ) and reduces the world price ( $\frac{\partial p_x^w}{\partial \tau_{SQ}} < 0$ ) of its importable good. Thus, assuming government expected payoffs increase with terms-of-trade improvements (i.e.  $\mathbb{E}G_{p_x^w} < 0$ ), the FOC implies  $\mathbb{E}G_{p_x} < 0$ . This result mirrors standard terms-of-trade theory: unilateral tariffs reflect governments trading off terms-of-trade benefits against the distortion cost of a higher local price of the importable good. As such, reciprocal liberalization that keeps tariff-related welfare unchanged due to changes in world prices could create a mutually beneficial TA through mitigating each country's local price distortion.

While the Home government's trade-off present in (24) mirrors that of standard terms-of-trade theory, two features stemming from the parallel contest framework are worth emphasizing. First,  $\mathbb{E}G_{p_y^*}$  does not appear in the FOC and, hence, Home's optimal unilateral tariff is independent of the Foreign local-price externality. This is because its source,  $\rho^*$ , enters the Home government's expected payoff in an additively separable way through  $\mathbb{E}W_{PSQ}$  which is independent of  $\tau_{SQ}$  as shown by (9).

Second, the local price distortion  $\mathbb{E}G_{p_x} < 0$  is a distortion of the government's expected payoff that can also be viewed as a distortion of tariff-related welfare. Section 3 establishes that the equilibrium status quo tariff reflects, at the margin, welfare-reducing protection:  $\frac{\partial W}{\partial \tau_{SQ}} < 0$ . This immediately implies  $W_{p_x} < 0$  and, hence, one can think of the local price distortion in (24) as distorting tariff-related welfare  $W$ .<sup>20</sup>

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<sup>20</sup>To see this note that  $\frac{\partial W}{\partial \tau_{SQ}} = W_{p_x} \frac{dp_x}{d\tau_{SQ}} + W_{p_x^w} \frac{\partial p_x^w}{\partial \tau_{SQ}}$  and  $\frac{dp_x}{d\tau_{SQ}} > 0$ ,  $\frac{\partial p_x^w}{\partial \tau_{SQ}} < 0$  and  $W_{p_x^w} < 0$ .

### 4.2.2 Externalities in TA tariffs

Given the welfare-reducing effect of protection at the unilaterally optimal status quo tariffs, each government benefits from TA tariff liberalization that respects the reciprocity rule. First, such liberalization leaves tariff-related welfare unaffected by changes in *world prices*. Second, such liberalization not only mitigates the local price distortion behind welfare-reducing unilateral protection, but also stimulates lobbying contributions by polarizing the anti-trade and pro-trade lobbies who both have an interest in lobbying over TA ratification. Proposition 4 describes government preferences and how a TA shapes externalities.

**Proposition 4** *Assume governments bargain efficiently and TA liberalization respects the reciprocity rule in (12). Then, the following properties hold.*

- (i) *Government preferences are  $\mathbb{E}G(\mathbf{p})$  and  $\mathbb{E}G^*(\mathbf{p}^*)$ .*
- (ii) *Equilibrium TA tariffs eliminate the terms-of-trade externalities present in unilaterally optimal tariffs.*
- (iii) *Although not present in unilaterally optimal tariffs, the equilibrium TA tariffs bear the imprint of, and therefore the TA creates, positive terms-of-trade externalities and negative local price externalities.*

Part (i) of Proposition 4 establishes that government preferences for TA tariffs depend on the same set of prices as preferences for unilateral tariffs. However, the functional form of government preferences has changed in substantive ways. This is particularly true for the impact of world prices and local price externalities on government expected payoffs.

Part (ii) shows that our framework echoes the key insight from standard terms-of-trade theory: through reciprocal liberalization, a TA eliminates the terms-of-trade externality from unilateral tariffs. For the unilateral tariff characterized by (11), the terms-of-trade externality reflected by  $\mathbb{E}G_{p_x^w}$  is proportional to  $W_{p_x^w}$ . Thus, reciprocal liberalization eliminates the terms-of-trade externality because the reciprocity rule implies

$$W_{p_x^w} \frac{\partial p_x^w}{\partial \tau_x} u + W_{p_y^w} \frac{\partial p_y^w}{\partial \tau_y^*} u^* = 0. \quad (25)$$

In turn, one may have expected that reciprocal liberalization would leave each government's expected payoff unaffected by changes in world prices. However, part (iii) of

Proposition 4 states otherwise. Specifically, for the Home country,

$$\begin{aligned} \mathbb{E}G_{p_x^w} \frac{\partial p_x^w}{\partial \tau_x} u + \mathbb{E}G_{p_y^w} \frac{\partial p_y^w}{\partial \tau_y^*} u^* \\ = \frac{\partial \rho}{\partial p_y^w} \frac{\partial p_y^w}{\partial \tau_y^*} u^* \left[ \frac{1}{\rho} \tilde{l} + \rho^* a \Delta W \right] + \frac{\partial \rho^*}{\partial p_x^w} \frac{\partial p_x^w}{\partial \tau_x} u \left[ \frac{1}{\rho^*} \tilde{l} + \rho a \Delta W \right] < 0 \end{aligned} \quad (26)$$

where  $\tilde{l} \equiv l + |b\mathbb{E}h|$  is lobbying before lobbying leakage.<sup>21</sup> Moreover, the reciprocity rule has already been used to simplify (26) by using (25) to eliminate the effects of changes in world prices. Nevertheless, (26) shows TA liberalization that respects the reciprocity rule still leaves an imprint of world prices on government expected payoffs and, hence, negotiated TA tariffs will reflect such terms-of-trade externalities. Indeed, the sign of (26) says these are positive terms-of-trade externalities of liberalization.

Importantly, both terms-of-trade externalities in (26) are *created by the TA*. First, by increasing the world price of Home's exportable, Foreign liberalization increases  $v_T$  which increases both Home pro-trade lobbying and, by increasing  $\rho$ , the probability of realizing the TA-induced change in tariff-related welfare. This externality is not present in the unilateral tariffs because, given our economic model, pro-trade lobbies have no incentive to lobby over unilateral tariffs. But, via *reciprocal* liberalization, the TA creates this externality by bringing pro-trade lobbies into the lobbying contest.

Second, by increasing the world price of Foreign's exportable, Home liberalization increases  $v_T^*$  which increases Foreign pro-trade lobbying. The associated increase in  $\rho^*$  not only increases Home lobbying contributions, by making the Home contest more pivotal, but also increases the probability of realizing the TA-induced change in tariff-related welfare. This externality is not present in the unilateral tariffs because Home government preferences over its unilateral tariff are independent of  $\rho^*$ . But, stemming from the core of our parallel contest framework, the TA creates this externality because TA liberalization requires that *both* countries ratify the TA. Ultimately, TA liberalization not only removes terms-of-trade externalities from unilateral tariffs but also creates terms-of-trade externalities.

Part (iii) of Proposition 4 establishes that the TA also creates a Foreign local-price externality on Home.<sup>22</sup> The Home government's preferences over its unilateral tariff are additively separable in, and hence its optimal tariff is independent of, the Foreign local price  $p_y^*$ . However, due to the defining feature of the parallel contest framework that both

<sup>21</sup>The sign of (26) follows because: (i)  $\frac{\partial \rho}{\partial p_y^w} > 0$  and  $\frac{\partial \rho^*}{\partial p_x^w} > 0$ , (ii) world prices are decreasing in tariffs, and (iii) the Home government participation constraint implies the square parentheses are positive.

<sup>22</sup>Unlike the unilateral tariff setting, the local price externalities in the TA setting exist even in the absence of terms-of-trade externalities because they exist even if  $\frac{\partial W}{\partial \tau^*} = 0$ .



countries must ratify the TA for it to go ahead, this independence no longer holds in a TA. Specifically,

$$\mathbb{E}G_{p_y^*} = \left[ \frac{1}{\rho^*} \tilde{l} + \rho a \Delta W \right] \frac{\partial \rho^*}{\partial p_y^*} > 0. \quad (27)$$

Intuitively, by decreasing the Foreign local price  $p_y^*$ , Foreign liberalization increases  $v_A^*$  which increases Foreign anti-trade lobbying and, in turn, decreases  $\rho^*$ . This lower probability of Foreign TA ratification reduces Home lobbying contributions, by making the Home contest less pivotal, and reduces the probability that Home realizes the TA-induced change in tariff-related welfare. This represents a (net) negative Foreign local-price externality of liberalization on Home.<sup>23</sup>

Given these externalities, Proposition 5 further describes the equilibrium TA.

**Proposition 5** *Assume (i) governments bargain efficiently, (ii) TA liberalization satisfies the reciprocity rule in (12), and (iii) TA liberalization satisfies pro-trade biased polarization. Then, the equilibrium TA involves:*

(a) *More liberalization than standard terms-of-trade theory, i.e.  $\min \{ \mathbb{E}G_{p_x}, \mathbb{E}G_{p_y^*}^* \} > 0$ .*

(b) *At the margin, welfare-reducing own-tariff liberalization for at least one country, i.e.  $\max \{ W_{p_x}, W_{p_y^*}^* \} > 0$ .*

As we described when discussing Proposition 2, the equilibrium TA is characterized by  $\min \left\{ -\frac{\partial \mathbb{E}G}{\partial \tau_{TA}}, -\frac{\partial \mathbb{E}G^*}{\partial \tau_{TA}} \right\} = 0$  and hence, without loss of generality, we focus on the Home government's preferences as characterizing the equilibrium TA tariffs. Thus, the FOC for the equilibrium TA is

$$\frac{\partial \mathbb{E}G}{\partial \tau_{TA}} = \mathbb{E}G_{p_x} \frac{dp_x}{d\tau_x} u + \left[ \mathbb{E}G_{p_x^w} \frac{\partial p_x^w}{\partial \tau_x} u + \mathbb{E}G_{p_y^w} \frac{\partial p_y^w}{\partial \tau_x^*} u^* \right] + \mathbb{E}G_{p_y^*} \frac{dp_y^*}{d\tau_y^*} u^* = 0. \quad (28)$$

In standard terms-of-trade theory, the FOC (28) would simply be  $\mathbb{E}G_{p_x} = 0$  and, hence, removing the terms-of-trade externalities  $\mathbb{E}G_{p_x^w} \neq 0$  from the unilateral tariffs is the sole purpose of a TA. However, the TA also creates externalities in our parallel contest setup: the positive terms-of-trade externalities of TA liberalization in (26) and the negative Foreign local-price externality of liberalization in (27). Yet, their offsetting nature implies that we cannot generally say whether  $\mathbb{E}G_{p_x} \leq 0$  and, hence, whether TA liberalization is deeper than that characterized by  $\mathbb{E}G_{p_x} = 0$  in standard terms-of-trade theory.

<sup>23</sup>The sign of  $\mathbb{E}G_{p_y^*}^*$  follows from: (i) the Home government's participation constraint implying the square parenthesis is positive, and (ii)  $\frac{\partial \rho^*}{\partial p_y^*} > 0$  given Foreign liberalization reduces  $p_y^*$  which, in turn, increases  $v_A^*$  and decreases  $\rho^*$ .

Nevertheless, the assumption of pro-trade biased polarization resolves this ambiguity. As described above, the part of the terms-of-trade externality in (26) working via the impact of Foreign liberalization on  $\rho$  is a positive externality of liberalization. Combining the other part of the terms-of-trade externality in (26) with the Foreign local price externality in (27):

$$\mathbb{E}G_{p_x^w} \frac{\partial p_x^w}{\partial \tau_x} + \mathbb{E}G_{p_y^*} \frac{\partial p_y^*}{\partial \tau_y^*} = \frac{\partial \rho^*}{\partial \tau_{TA}} \left[ \frac{1}{\rho^*} \tilde{l} + \rho a \Delta W \right] < 0. \quad (29)$$

We refer to (29) as the ‘international political externality’ created by the TA in that it reflects an externality on Home due to reciprocal TA liberalization impacting the Foreign probability of TA ratification. Using (20), the assumption of pro-trade biased polarization implies  $\frac{\partial \rho^*}{\partial \tau_{TA}} < 0$  and, hence, a (net) positive international political externality of liberalization. In turn, the FOC implies  $\mathbb{E}G_{p_x} > 0$ . Thus, given standard terms-of-trade theory implies  $\mathbb{E}G_{p_x} = 0$ , the assumption of pro-trade biased polarization implies the equilibrium TA liberalizes tariffs further than standard terms-of-trade theory would imply.

Given  $\mathbb{E}G_{p_x} > 0$ , the falling local price of Home’s importable due to Home liberalization actually decreases the Home government’s expected payoff. That is,

$$\mathbb{E}G_{p_x} = \frac{\partial l}{\partial p_x} + \frac{\partial \rho}{\partial p_x} \rho^* \Delta W + \rho \rho^* W_{p_x} > 0. \quad (30)$$

This expression comprises various effects. Nevertheless, under the assumption of pro-trade biased polarization, Section 4.1 established that  $\frac{\partial W}{\partial \tau_{TA}} > 0$  which, in turn, implies  $W_{p_x} > 0$ . Thus, in equilibrium, the fundamental trade-off for the Home government regarding its own liberalization is the cost of lower tariff-related welfare versus the benefit of extracting higher lobby contributions by polarizing the Home lobby groups. To this fundamental trade-off, the FOC (28) adds the impact of Home liberalization on the probability of realizing the TA-induced change in tariff-related welfare (i.e.  $\frac{\partial \rho}{\partial p_x} \rho^* \Delta W$  in (30)) as well as the terms-of-trade and foreign local-price externalities in, respectively, (26) and (27).

Ultimately, our parallel contest framework differs from the standard terms-of-trade theory of TAs where the sole purpose of a TA is removing terms-of-trade externalities from unilateral tariffs. While a TA does remove terms-of-trade externalities from unilateral tariffs in our parallel contest framework, the TA also creates externalities. Stemming from the core feature of our parallel contest framework that implementing the TA requires ratification by *both* countries, the TA creates international political externalities. From Home’s (Foreign’s) perspective, this international political externality operates because TA liberalization impacts the probability of Foreign (Home) TA ratification. Importantly, part of this international political externality is a local price externality: Foreign (Home) liberalization increases

the cost of the TA to its anti-trade lobby by reducing the local price of its importable good and thereby decreases the probability of Foreign (Home) TA ratification.<sup>24</sup>

However, the TA also creates terms-of-trade externalities that are not internalized through the reciprocity rule that keeps tariff-related welfare unaffected by changes in world prices. As such, these externalities leave an imprint on the equilibrium TA tariffs. Indeed, part of the international political externality is a terms-of-trade externality: Home (Foreign) liberalization increases the benefit to the Foreign (Home) pro-trade lobby by increasing the world price of the Foreign (Home) exportable and thereby increases the probability of Foreign (Home) TA ratification. On net, pro-trade biased polarization implies the international political externality is a net positive externality of liberalization that pushes TA liberalization further than predicted by standard terms-of-trade theory. Additionally, the TA also creates a second positive terms-of-trade externality of liberalization because reciprocal liberalization brings pro-trade lobbies to the lobbying table. Specifically, Foreign (Home) liberalization increases the benefit of the TA to the Home (Foreign) pro-trade lobby by increasing the world price of the Home (Foreign) exportable and thereby increases the probability of Home (Foreign) TA ratification. Overall, the externalities created by the TA emphasize the key features of our parallel contest framework that differentiate it from standard terms-of-trade theory.

## 5 Extensions

### 5.1 TA protection

Until now, we assumed that a TA liberalizes tariffs. We now consider the possibility that a TA increases tariffs. Assuming the government participation constraint holds for a TA that increases tariffs, a government would face a choice over the TA we characterized in Section 4 that liberalized tariffs and the TA we characterize below that increases tariffs.

Given a country's unilateral status quo tariff pushes beyond the welfare-maximizing level, tariff-related welfare falls in a TA that further increases tariffs. In turn, this loss of tariff-related welfare gives a head start of  $|\mathbb{E}h| = \rho^* a |\Delta W|$  (see (14)) to the Home pro-trade group who now oppose the TA. Thus, the Home government ratifies this TA according to the CSF:

$$\rho(l_T, l_A, \mathbb{E}h) = \frac{l_A}{l_T + b|\mathbb{E}h| + l_A}. \quad (31)$$

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<sup>24</sup>Remember, as explained in Section 4.2.1, the local-price externality leaves no imprint on unilateral tariffs.

And, lobby group expected payoffs are then<sup>25</sup>

$$\mathbb{E}u_A(\tau_{TA}, \tau_{SQ}) = \mu_A + \rho\rho^*v_A - l_A \quad (32)$$

$$\mathbb{E}u_T(\tau_{TA}^*, \tau_{SQ}^*) = \mu_T + (1 - \rho)\rho^*v_T - l_T. \quad (33)$$

Equilibrium interest group lobbying contributions are given by (17)-(18) and equilibrium aggregate lobbying contributions by (19). Again, the relative valuation  $\frac{v_T}{v_A}$  is a sufficient statistic for the equilibrium probability of Home TA ratification. But, given the TA now involves protection rather than liberalization, this is

$$\rho = \left(1 + \frac{v_T}{v_A}\right)^{-1}. \quad (34)$$

In turn, the Home government's expected payoff in Stage 1 is

$$\mathbb{E}G(\tau_{TA}, \tau_{SQ}) = l + a\mathbb{E}W = \rho^*\rho[v_T + a\Delta W] + b\rho^*a\Delta W + aW(\tau_{SQ}) \quad (35)$$

where  $a\Delta W < 0$  and the participation constraint  $\mathbb{E}G(\tau_{TA}, \tau_{SQ}) > aW(\tau_{SQ})$  implies  $v_T + a\Delta W > \rho(v_T + a\Delta W) + ba\Delta W > 0$ . Assuming, as in Section 4.1, that Home government preferences determine the TA tariffs  $\tau_{TA}$ , the FOC is

$$\begin{aligned} \frac{\partial \mathbb{E}G}{\partial \tau_{TA}} &= \frac{\partial \rho}{\partial \tau_{TA}} \rho^* [v_T + a\Delta W] + \frac{\partial \rho^*}{\partial \tau_{TA}} [\rho(v_T + a\Delta W) + ba\Delta W] \\ &\quad + \rho^* \left[ \rho \frac{\partial v_T}{\partial \tau_{TA}} + a(\rho + b) \frac{\partial W}{\partial \tau_{TA}} \right] = 0. \end{aligned}$$

This FOC has a very similar interpretation to (22). Pro-trade biased polarization for TA liberalization implies anti-trade biased polarization for TA protection. That is,  $\frac{\partial(v_A/v_T)}{\partial \tau_{TA}} > 0$  and, hence,  $\frac{\partial \rho}{\partial \tau_{TA}} > 0$ . In turn, as with TA liberalization, the first two terms of the FOC represent the Home government benefit of increased TA protection generating a higher likelihood of realizing the gross and net expected surplus from its political interaction with lobbies. Similar to TA liberalization, the first part of the third term in the FOC reflects the benefit of increased lobbying contributions because greater TA protection increases the lobbying incentive for the Home pro-trade lobby. So, like TA liberalization, the second part of the third term is the cost of the TA which is now the cost of welfare-reducing protection.

To understand whether the Home government would prefer TA liberalization or TA protection, we can rewrite the FOC as (28). Overall, given anti-trade biased polarization, the externalities are a net positive externality of TA protection. First, due to the terms-of-trade

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<sup>25</sup>Note that, in this case,  $\mu_A \equiv \pi_A(\tau_{SQ})$  and  $\mu_T \equiv \pi_T(\tau_{TA}^*) - \rho^*v_T$ .

externality whereby  $p_y^w$  falls with higher Foreign protection, Home pro-trade lobbying contributions increase. Additionally, the Home government also benefits from the associated lower probability of realizing the TA-induced loss of tariff-related welfare. Second, the international political externality of TA protection in (29) is a positive externality given anti-trade biased polarization implies  $\rho^*$  increases with TA protection. Intuitively, the higher  $\rho^*$  makes the Home contest more pivotal and increases lobbying contributions. And, the government participation constraint ensures this effect outweighs the higher probability of realizing the TA-induced loss of tariff-related welfare. Ultimately, these externalities are positive externalities of TA negotiations regardless of whether the TA liberalizes or increases tariffs.

Nevertheless, TA liberalization and TA protection fundamentally differ in their impact on the local price distortion. The status quo tariffs bear the imprint of a local price distortion that brings, at the margin, welfare-reducing protection. A key benefit of TA liberalization is that, through neutralizing terms-of-trade effects, liberalization mitigates this local price distortion. In contrast, TA protection exacerbates this local price distortion. That is, starting from the unilateral status quo tariffs, marginal and reciprocal TA liberalization increases both tariff-related welfare and lobbying contributions whereas marginal and reciprocal TA protection also increases lobbying contributions but decreases tariff-related welfare. Thus, although a definitive assessment would require further model structure, this fundamental difference between TA liberalization and TA protection suggests governments will prefer TA liberalization in our parallel contest framework. Indeed, we essentially find this result in our extension to international environmental agreements in Section 5.4.

## 5.2 Between- versus within-interest-group lobbying

Our analysis has focused on between-interest-group lobbying. This assumes away free riding problems within interest groups. At the opposite extreme, [Blanga-Gubay et al. \(2018\)](#) extend our parallel contest framework to model lobbying within the pro-trade interest group while assuming the anti-trade interest group does not lobby. In doing so, they show free riding affects within-group lobbying. We now show that interesting insights emerge when considering the interaction of between-group and within-group lobbying. This interaction revolves around whether members of an interest group prefer to ‘lobby together’ as a single interest group (e.g. environmental groups, labor unions, industry associations) or ‘lobby alone’ as individual members of the interest group.

For clarity, we ignore head starts and focus on a single contest between the interest groups  $L_T$  and  $L_A$ . Later, we informally discuss how the resulting interactions carry over to a parallel contest setting. Respectively, these interest groups have  $n_T$  and  $n_A$  symmetric

members with per-member valuations  $v_T$  and  $v_A$ . Letting  $l_j = \sum_{i \in L_j} l_{j,i}$  denote total lobbying by all members  $i \in L_j$ , the probability of the policy proposal favored by  $L_T$ , say ‘policy  $T$ ’, being ratified is  $\rho = \frac{l_T}{l_A + l_T}$  (e.g. a policy proposal to reduce tariffs).

When ‘lobbying alone’, each member  $i \in L_T$  and  $i \in L_A$  solves, respectively,

$$\max_{l_{T,i}} \rho v_T - l_{T,i} \text{ and } \max_{l_{A,i}} (1 - \rho) v_A - l_{A,i}.$$

Total interest-group lobbying is then  $l_T^{alone} = \frac{1}{2} \bar{v} \left[ 1 + \frac{v_A}{v_T} \right]^{-1}$  and  $l_A^{alone} = \frac{1}{2} \bar{v} \left[ 1 + \frac{v_T}{v_A} \right]^{-1}$ . In turn, aggregate lobbying is  $l^{alone} = \frac{1}{2} \bar{v}$  and  $\rho^{alone} = \left[ 1 + \frac{v_A}{v_T} \right]^{-1}$ . Unsurprisingly, these results mimic our baseline analysis if one views each interest group as a single firm.

When ‘lobbying together’, the interest groups  $L_T$  and  $L_A$  solve, respectively,

$$\max_{\{l_{T,i}\}_{i \in L_T}} \rho n_T v_T - l_{T,i} \text{ and } \max_{\{l_{A,i}\}_{i \in L_A}} (1 - \rho) n_A v_A - l_{A,i}.$$

Total interest-group lobbying is then  $l_A^{together} = \frac{1}{2} \bar{V} \left[ 1 + \frac{V_T}{V_A} \right]^{-1}$  and  $l_T^{together} = \frac{1}{2} \bar{V} \left[ 1 + \frac{V_A}{V_T} \right]^{-1}$  where  $V_T \equiv n_T v_T$  and  $V_A \equiv n_A v_A$ . In turn, aggregate lobbying is  $l^{together} = \frac{1}{2} \bar{V}$  and  $\rho^{together} = \left[ 1 + \frac{V_A}{V_T} \right]^{-1}$ . On one hand, free riding plagues lobbying of at least one interest group because  $l^{alone} < l^{together}$ .<sup>26</sup> Moreover, members of the interest group with more members, say the anti-trade lobby for concreteness (i.e.  $n_A > n_T$ ), always engage in free riding.<sup>27</sup>

On the other hand, free riding may not plague lobbying by the pro-trade lobby (in general, the interest group with fewer members). To fix ideas, let  $V_T > V_A$  in addition to  $n_T < n_A$  so that, although trade liberalization creates net gains, gains are concentrated while losses are dispersed. Then  $l_T^{together} > l_T^{alone}$  if and only if  $n_A < \eta \left( n_T, \frac{v_T}{v_A} \right)$  where  $\eta \left( n_T, \frac{v_T}{v_A} \right) = n_T \left[ \frac{v_T}{v_A} (n_T - 1) \left( 2 + \frac{v_T}{v_A} \right) + n_T \right]$  is increasing in  $n_T$  and  $\frac{v_T}{v_A}$ . In other words, for given  $n_T$  and  $\frac{v_T}{v_A}$ , lobbying together *reduces* total pro-trade lobbying when the anti-trade lobby has a sufficiently large member base. Intuitively, the increased strength of the anti-trade lobby gained through lobbying together can reduce equilibrium pro-trade lobbying.

Further intuition comes from the fact that  $\rho^{together} < \rho^{alone}$  if and only if  $n_T < n_A$  which, by definition, holds in our assumed context. This creates offsetting effects in the pro-trade lobby’s FOC when lobbying together. On one hand, the marginal benefit of lobbying is proportional to the interest group valuation  $V_T$  rather than the per-member valuation  $v_T$  and, hence, stronger when lobbying together. But, on the other hand, the marginal benefit

<sup>26</sup>This result follows from  $\left[ \frac{1}{2} \left( \frac{1}{V_A} + \frac{1}{V_T} \right) \right]^{-1} > \left[ \frac{1}{2} \left( \frac{1}{v_A} + \frac{1}{v_T} \right) \right]^{-1}$ .

<sup>27</sup>One can show  $l_j^{alone} < l_j^{together}$  when  $\frac{n_j}{n_{j'}} > 1$  for  $j, j' \in \{L, T\}$ .

of lobbying is proportional to  $\rho$  which is inversely proportional to  $\left(1 + \frac{V_T}{V_A}\right)^2 = \left(1 + \frac{n_T v_T}{n_A v_A}\right)^2$ . That is, a relative size disadvantage  $n_T < n_A$  makes the marginal benefit of lobbying for the pro-trade interest group weaker when lobbying together. Thus, lobbying together may reduce equilibrium pro-trade lobbying.

Even if lobbying together overcomes the free riding problem when lobbying alone, the probability of the contest outcome can only move favorably for one interest group. But, presumably, the benefit of overcoming the free riding problem is to favorably manipulate  $\rho$ . Indeed, each group overcomes their free riding problem when lobbying together in the special case of  $n_A = n_T$ . But, in this case,  $\rho$  remains unchanged. Thus, both lobbies are worse off and, hence, each would prefer lobbying alone. As such, our analysis suggests the optimality of lobbying together depends on sufficient asymmetry of interest group characteristics.

While not a full fledged analysis, this analysis suggests our contest approach can provide interesting insights into whether interest groups endogenously choose to lobby alone or lobby together. The international trade literature has touched on this issue. [Bombardini and Trebbi \(2012\)](#) empirically show that lobbying together at the sector level is positively correlated with sector-level competitiveness. They then use an oligopolistic model to show that lobbying together increases with the degree of within-sector product substitutability. Alternatively, using an infinitely repeated game setting, [Pecorino \(2001\)](#) shows that lobbying together is easier to sustain for sectors with larger numbers of firms. Our contest-based setting also suggests that lobbying together is more likely for sectors with more firms.

This subsection has ignored the parallel nature of our parallel contest framework. Yet, interesting implications have emerged for the probability of the contest outcome  $\rho$  when simultaneously modeling between-group and within-group lobbying. Since a key point of the parallel contest framework is that the probability of the contest outcome in one country directly affects the intensity of lobbying in the other country, these interesting implications will also shape the nature of strategic interdependency created by the parallel contest.<sup>28</sup>

### 5.3 Lobbying over TA negotiations

Our above analysis takes TA negotiations as given, embodied by  $\tau_{TA}$ , and models lobbying over TA ratification uncertainty. But, alternatively, one may prefer to view TA ratification as taking place with certainty and instead model lobbying over whether TA negotiations are successful. We now explain how our model can accommodate this perspective.

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<sup>28</sup>We have assumed the TA ratification processes take place simultaneously in Home and Foreign. However, we can easily show these processes taking place sequentially does not affect the following in each country in equilibrium: expected contributions, ex-ante probability of TA implementation, and the expected payoffs for each lobby and the government. This irrelevance result extends the key results of [Fu et al. \(2015\)](#).

To begin, suppose lobby groups and governments have common expectations about the policy outcome  $\tau_{TA}$  of TA negotiations and can thus form common expectations about the probability of successful negotiations and expected payoffs. These common expectations could have been set with a white paper that outlines the broad goals of the TA or through reports about preliminary high level negotiations that have already taken place. Further, suppose that hammering out any final details and disagreements needed to successfully finalize negotiations requires sufficient good-faith negotiation effort from each country. Naturally, lobbies in each country can influence the level of good-faith negotiation effort of their country's negotiators. In turn, the CSFs  $\rho = \frac{l_T}{l_A + l_T}$  and  $\rho^* = \frac{l_T^*}{l_A^* + l_T^*}$  can govern the respective probabilities that Home and Foreign exert sufficient good-faith negotiation effort.<sup>29</sup> Then,  $\rho\rho^*$  reflects the probability of successful negotiations.

Given this discussion, the expected payoff functions and choice variable sets for governments and lobby groups, as well as the CSFs governing the probability of ratification, are identical in this alternative version of the model described here and the earlier baseline version of the model. That is, there is an isomorphism between, on one hand, viewing the TA negotiations as concluding with certainty before modeling TA ratification uncertainty and, on the other hand, modeling the TA negotiation uncertainty that precedes TA ratification going ahead with certainty.

## 5.4 International Environmental Agreements

Our parallel contest framework applies broadly beyond international trade. International agreements over the environment (e.g. the Kyoto Protocol) and arms control (e.g. the Treaty on the Prohibition of Nuclear Weapons) share the key features of our parallel contest framework: local interest groups contest each other to influence their government's ratification decision and implementing the agreement requires mutual ratification. To illustrate, we now apply our framework to international environmental agreements (IEAs).

We use a simplified two-country version of the [Marchiori et al. \(2017\)](#) environmental economics model. Home and Foreign emissions are denoted by  $e$  and  $e^*$  respectively. Home country welfare is  $W(e, e^*) = B(e) - D(e, e^*)$ . Production generates emissions with  $B(e) = \sigma e - \frac{1}{2}e^2$  capturing the benefit and  $D(e, e^*) = \omega e + \omega e^* \equiv D(e) + D(e^*)$  capturing the damage. As such, the benefits of emissions accrue locally while damages create international externalities. For given emissions, the respective gross-of-lobbying payoffs for the Home pro- and anti-environment lobbies are  $\pi_P(e, e^*) = -D(e, e^*)$  and  $\pi_A(e) = B(e)$  respectively. Analogous expressions apply for the Foreign country.

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<sup>29</sup>This CSF is a special case of that in the TA analysis where  $b = 0$ .



### 5.4.1 Unilateral environmental policy

In our TA analysis, Home unilateral tariff policy only impacted the anti-trade lobby and, hence, only the anti-trade lobby lobbied over unilateral policy. However, Home environmental policy impacts the pro-agreement lobby ( $L_P$ ) and the anti-agreement lobby ( $L_A$ ) and, hence, both lobby. Specifically, they lobby over Home status quo emissions  $e_{SQ}$  taking as given Foreign's status quo emissions  $e_{SQ}^*$  and the pre-status quo emissions,  $e_{PSQ}$  and  $e_{PSQ}^*$ , of Home and Foreign. To emphasize the key features of our framework, we simplify our IEA framework by assuming (i)  $b = 0$  so there is no lobbying leakage, (ii)  $a = 2$ , and (iii)  $e_{PSQ} = e_{PSQ}^* = \sigma$  so that pre-status quo policies maximize the national benefit of emissions.

Replacing pro-trade lobby variables with pro-environment lobby variables, the CSF in (2) applies. Given that  $e_{PSQ}$  maximizes the national benefit of emissions, both Home lobbies would oppose higher emissions and, hence, Home's status quo policy proposal satisfies  $e_{SQ} < e_{PSQ} = \sigma$ . Given the probabilities  $\rho$  and  $\rho^*$  of Home and Foreign policy changes from  $e_{PSQ}$  to  $e_{SQ}$  and from  $e_{PSQ}^*$  to  $e_{SQ}^*$ , Home lobby group expected payoffs are

$$\mathbb{E}u_P = \mathbb{E}\pi_P - l_P = \mu_P + \rho v_P - l_P \quad (36)$$

$$\mathbb{E}u_A = \mathbb{E}\pi_A - l_A = \mu_A + (1 - \rho) v_A - l_A \quad (37)$$

where  $v_P \equiv -[D(e_{SQ}, e^*) - D(e_{PSQ}, e^*)] = \omega(e_{PSQ} - e_{SQ}) > 0$  and  $v_A = B(e_{PSQ}) - B(e_{SQ}) = \frac{1}{2}(e_{PSQ} - e_{SQ})[2\sigma - (e_{PSQ} + e_{SQ})] > 0$  while  $\mu_P$  and  $\mu_A$  are constants.<sup>30</sup>

Given the general functional forms of lobby group expected payoffs in (36)-(37) follow those in the TA setting (see (15)-(16)), our TA analysis applies here. In particular,  $l_P = \frac{1}{2}\bar{v} \left[1 + \frac{v_A}{v_P}\right]^{-1}$ ,  $l_A = \frac{1}{2}\bar{v} \left[1 + \frac{v_P}{v_A}\right]^{-1}$ ,  $l = \frac{1}{2}\bar{v}$ , and  $\rho = \left[1 + \frac{v_A}{v_P}\right]^{-1} = 2\omega[\sigma + 2\omega - e_{SQ}]^{-1}$ . Importantly, these equilibrium variables are independent of  $\rho^*$ . Thus, as in the unilateral tariff setting, unilateral environmental policy remains unaffected by international political externalities because the Home government's decision to implement its policy change is independent of whether Foreign implements their policy change.

The Home government's expected payoff is  $\mathbb{E}G = l + a\mathbb{E}W$ . This can be re-written as  $\mathbb{E}G = \frac{1}{2}\bar{v} + \rho a\Delta W + \mathbb{E}W(\mathbf{e}_{PSQ})$  and yields the Home government's optimal unilateral status quo policy of  $e_{SQ} = \sigma - 2\omega(\sqrt{3} - 1) \approx \sigma - 1.464\omega$ . Since  $e_{SQ}$  is below the  $W$ -maximizing level  $e^W \equiv \sigma - \omega$ , the government trades off increased lobbying contributions from further emission reductions against lower welfare.

<sup>30</sup>Specifically,  $\mu_A = B(e_{PSQ})$  and  $\mu_P = -D(e_{PSQ}) - [\rho^* D^*(e_{SQ}) + (1 - \rho^*) D^*(e_{PSQ})]$  are independent of  $l_P$  and  $l_A$ .

### 5.4.2 IEA

The IEA policy environment differs from the unilateral policy environment for two key reasons. First, given  $e_{SQ} < \sigma$ , the anti-environment lobby can benefit from an anti-environment IEA of  $\mathbf{e}_{IEA} > \mathbf{e}_{SQ}$ . Thus, governments may indeed prefer such an anti-environment IEA over a pro-environment IEA of  $\mathbf{e}_{IEA} < \mathbf{e}_{SQ}$ . Second, the IEA goes ahead only if both governments ratify; otherwise,  $\mathbf{e}_{SQ}$  remains in place. In turn, this alters the functional form of  $v_P$  to  $v_P = |D(e_{IEA}, e_{IEA}^*) - D(e_{SQ}, e_{SQ}^*)| = \omega |(e_{IEA} + e_{IEA}^*) - (e_{SQ} + e_{SQ}^*)|$  in the IEA analysis. Nevertheless, the IEA analysis conceptually mirrors the TA analysis: a pro-environment IEA mirrors the TA liberalization analysis of Section 4.1 and the anti-environment IEA mirrors the TA protection analysis of Section 5.1.

These parallels emerge after replacing pro-trade subscript- $T$  variables from the TA analysis with pro-environment subscript- $P$  variables in the IEA analysis. First, (13) and (31) define the CSF. Second, (15)-(16) and (32)-(33) represent lobby group expected payoffs. Third, lobby group and aggregate equilibrium lobby contributions are given by (17), (18) and (19). Fourth, (20) and (34) give the equilibrium probability of an IEA. And, fifth, (21) and (35) give the Home government's expected payoff.

In principle, the Home government may prefer a pro- or anti-environment IEA. The optimal symmetric pro-environment IEA is  $e_{IEA}^P \equiv \sigma - 2\omega(5\sqrt{3} - 7) \approx \sigma - 3.321\omega$ . Reflecting the negative international environmental externality present in the environmental damage functions, the joint welfare maximizing emissions level of  $e^{WW} \equiv \sigma - 2\omega$  lies below the unilateral  $W$ -maximizing level  $e^W = \sigma - \omega$ . Thus, starting from the unilateral status quo  $e_{SQ} < e^W$ , the pro-environment IEA  $e_{IEA}^P$  pushes emissions below  $e^{WW}$ . While internalizing the international environmental externality motivates emissions reduction to  $e^{WW}$ , government incentives to extract lobbying contributions by polarizing the lobby groups generates emissions reduction further than  $e^{WW}$ . At  $e_{IEA}^P$ , the Home government trades off increased lobbying contributions against lower welfare from reducing emission levels below  $e^{WW}$ .

In contrast, the optimal symmetric anti-environment IEA is  $e_{IEA}^A \equiv \sigma - 1.052\omega$ . Naturally, this IEA exacerbates international environmental externalities by raising emissions above  $e_{SQ}$ . Nevertheless, governments extract lobbying contributions by polarizing the lobby groups. At  $e_{IEA}^A$ , the Home government trades off increased lobbying contributions against lower welfare from further increasing emission levels above  $e_{IEA}^A$ .

Given that the pro-environment IEA mitigates international environmental externalities while the anti-environment IEA exacerbates them, one might anticipate that governments achieve higher expected payoffs from the pro-environment IEA. Indeed, substituting  $e_{IEA}^P$  and  $e_{IEA}^A$  into the Home government's expected payoff reveals  $\mathbb{E}G(\mathbf{e}_{IEA}^P, \mathbf{e}_{SQ}) \approx 0.618\omega^2 >$

$\mathbb{E}G(\mathbf{e}_{IEA}^A, \mathbf{e}_{SQ}) \approx 0.032\omega^2$ .<sup>31</sup> Thus, indeed, governments prefer a pro-environment over an anti-environment IEA.

Because our environmental externalities are non-pecuniary, there are no terms-of-trade or local price externalities. Nevertheless, the international political externality stemming from the parallel contest nature of the model remains: by determining how pivotal the Home contest is, Home lobbying intensity depends on the probability of Foreign IEA ratification. Hence, Foreign emission reduction affects the Home government through changing the probability of Foreign ratification.

Further, we can isolate this externality by assuming the Home government acts as if they take the Foreign probability of IEA ratification as fixed (i.e.  $\rho^*$  is treated as a constant in (21)). This strips out the international political externality from  $e_{IEA}^P$  and yields the pro-environment IEA,  $\tilde{e}_{IEA}^P \equiv \sigma + 2\omega(1 + \sqrt{3} - 2 \cdot 3^{3/4}) \approx \sigma - 3.654\omega$ . In contrast to the positive international political externality of tariff liberalization,  $e_{IEA}^P > \tilde{e}_{IEA}^P$  implies a negative international political externality of emissions reduction. Intuitively, this stems from the anti-environment biased polarization of emissions reduction whereby  $\frac{v_A^*}{v_P^*}$  increases as Foreign emissions fall and, in turn,  $\rho^*$  falls. In contrast, we argued for pro-trade biased polarization of tariff liberalization whereby  $\frac{v_T^*}{v_A^*}$  increases with Foreign tariff liberalization and, in turn,  $\rho^*$  increases. Ultimately, the specific application determines the sign of the international political externality arising from the parallel contest.

## 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. Empirically, lobbying during the ratification phase can even exceed lobbying during the closing phase of negotiations. Motivated by these stylized facts, we develop a new two-country political economy framework that has 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

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<sup>31</sup>Technically, there is a non-negativity constraint on  $e_{IEA}^P$  so that  $e_{IEA}^P = \max\{0, \sigma - 2\omega(5\sqrt{3} - 7)\}$ . Nevertheless,  $\mathbb{E}G(\mathbf{e}_{IEA}^P, \mathbf{e}_{SQ}) > \mathbb{E}G(\mathbf{e}_{IEA}^A, \mathbf{e}_{SQ})$  even when  $e_{IEA}^P = 0$ .

linking the outcome in one contest to the outcome in a different ‘parallel’ contest, giving rise to the new class of contest that we develop in this paper and call a ‘parallel contest’.

Using a standard underlying model of international trade policy, a TA does more in our new parallel contest framework than just remove the terms-of-trade externality from unilateral tariffs. Specifically, a TA that respects the standard rule of reciprocity also creates terms-of-trade and local-price externalities. The international political externality imposed on the Home country, which combines a local-price and a terms-of-trade externality, stems from the impact of reciprocal liberalization on the probability of Foreign TA ratification through its impact on Foreign lobbying. Crucially, this uncertainty over Foreign TA ratification matters for Home because of the key feature of the parallel contest framework: implementing the TA requires ratification by both countries. Owing to the effective partial equilibrium environment, reciprocal liberalization also creates an additional terms-of-trade externality present in TA tariffs. In particular, a country’s pro-trade interest group lobbies over TA liberalization but not unilateral tariff policy because lower tariff barriers in their export market are now linked to domestic TA ratification. The creation of these externalities differentiates our parallel contest setting from the standard terms-of-trade theory of TAs.

While the effective partial equilibrium setting helps illustrate the key insights of our parallel contest framework, and is necessary for the latter terms-of-trade externality just described, our analysis is generally broader than this setting. In many settings, from a political economy perspective, governments will still balance the incentive to polarize lobby groups against the associated loss of welfare. And, the international political externality will still remain. These points can be seen from [Cole et al. \(2018\)](#) where we show that a variety of underlying trade models can be embedded within our parallel contest framework (including the Melitz model, the rent-shifting oligopoly model, and the specific-factors model). Key to using our parallel contest framework is that, first, the setting features interest groups with conflicting interests over potential collaboration between two entities and, second, this collaboration requires mutual agreement by each entity’s decision maker.

Indeed, the insights from our parallel contest framework apply broadly beyond the setting of TA ratification. We explain how viewing our analysis as modeling TA ratification uncertainty that follows the successful conclusion of TA negotiations is isomorphic to modeling uncertainty over the successful conclusion of TA negotiations that precedes TA ratification happening with certainty. We also apply our framework to an IEA. While the TA analysis relies to some extent on the pecuniary nature of terms-of-trade externalities, the IEA analysis instead features non-pecuniary externalities. Nevertheless, our international political externality still emerges: the IEA emissions reductions of the Foreign country impact its probability of ratifying the IEA which then impacts the Home country by determining how

pivotal the Home country contest has become. Future research could usefully build further in these areas of TA negotiations and IEAs.

Another direction for future research concerns the extent that members of an interest group can coordinate their lobbying. Our main analysis assumes that members of an interest group in a particular country, say the pro-trade lobby in the Home country, can perfectly coordinate their lobbying. We explore an extension that allows simultaneous lobbying within and between interest groups in a particular country. Indeed, interesting insights emerge about whether it is optimal to lobby together at the interest group level or lobby alone as individual members. This suggests fruitful opportunities for a full fledged analysis, especially one that builds on our parallel contest structure. Additionally, interesting insights would likely result from allowing imperfect coordination between like-minded lobby groups in different countries (e.g. between the pro-trade lobbies in the Home and Foreign countries). This would provide a bridge between the complete absence of coordination in our parallel contest and the perfect coordination of a Colonel Blotto contest.

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## Appendix

### A Microfounded Contest Success Function

#### A.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  $\varepsilon_i$  follow the Type I Extreme Value distribution (i.e. Gumbel distribution)

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

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  $\gamma$  is Euler’s constant,  $\varepsilon_i$  is a mean zero disturbance when  $\sigma = -\frac{\mu}{\gamma}$ .<sup>32</sup>

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

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

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<sup>32</sup>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  $\xi = 0$ .



## A.2 Contest application

For illustration, consider a TA that liberalizes tariffs such that  $\mathbb{E}h = \rho^* a \Delta W > 0$  conveys a pro-trade head start.

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

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

The government has already received the lobbying contributions  $l_A$  and  $l_T$  in Stage 2. Thus, we assume some unmodeled repeated interaction between the government and lobbies drives the dependence of the choice rule  $\tilde{G}_T \leq \tilde{G}_A$  on  $l_A$  and  $l_T$ . In any case, the  $\varepsilon_i$  disturbances capture randomness in the government's valuation of lobby contributions (e.g. the extent to which media reporting paints trade in a positive or negative light). Hence,

$$\begin{aligned}\rho &= \Pr(\tilde{G}_T > \tilde{G}_A) \\ &= \Pr(\ln(l_T + b\mathbb{E}h) - \ln(l_A) > \varepsilon_A - \varepsilon_T) \\ &= \frac{\exp(\ln(l_T + b\mathbb{E}h))}{\exp(\ln(l_T + b\mathbb{E}h)) + \exp(\ln(l_A))} \\ &= \frac{l_T + b\mathbb{E}h}{l_T + b\mathbb{E}h + l_A}.\end{aligned}$$

**Stage 2.** Regardless of  $a = 0$  or  $a > 0$ , the lobbying outcomes do not change because the functional form of  $\rho$  is unchanged.

**Stage 1.** The government's expected payoff is

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

where

$$\begin{aligned}G_T &= \ln(l_T + l_A + aW(\tau_{TA})) + \varepsilon_T \\ G_A &= \ln(l_T + l_A + aW(\tau_{SQ})) + \varepsilon_A.\end{aligned}$$

When  $a = 0$ , this reduces to

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

which is a monotonic transformation of  $\mathbb{E}G = l_T + l_A$ . Hence, the optimal TA tariffs are

unchanged from a special case of the main text in which the government only cares about lobby revenue.

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

$$\mathbb{E}(G) = \rho\rho^* \ln(l_T + l_A + aW(\tau_{TA})) + (1 - \rho\rho^*) \ln(l_T + l_A + W(\tau_{SQ})) \quad (38)$$

$$\neq \ln(l_T + l_A + \rho\rho^* a\Delta W + W(\tau_{SQ})). \quad (39)$$

The forces we identified in the main text remain but the way they trade off is somewhat different. Following the approach in (38) rather than the approach we actually follow in (39) would sacrifice comparability of our model with the prior literature.