The Evolution of International Subsidy Rules

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Abstract

Why did countries achieve a consensus to restrict export subsidies and export-promoting domestic subsidies when the World Trade Organization (WTO) began in 1995, but not decades earlier under the General Agreement on Tariffs and Trade (GATT)? This question poses a challenge for the theory of trade agreements because export promotion improves the terms of trade of importers, so subsidy restrictions reduce the welfare of importing nations. This paper argues that cross-border externalities arising from political economy and profit-shifting can explain the historical pattern of subsidy rules. Motives to restrict export promotion do not exist when trade policies are chosen noncooperatively, because import tariff revenue neutralizes any motive for export promotion. Once import tariffs fall, as in the 1950s and 1960s, then motives to restrict export promotion can arise. Governments prefer to protect domestic sales through international subsidy restraints rather than to allow consumers to benefit from unfettered subsidization. Governments could in theory have eliminated the need for subsidy rules by eliminating domestic intersectoral misallocation or by adjusting both import taxes and export subsidies consistent with the GATT principle of reciprocity, but in practice they have not done so. GATT documents and the WTO negotiating history provide support for the theory that the WTO subsidy rules address an international profit-shifting problem.

1 Introduction

The expanded restrictions on manufacturing subsidies in the World Trade Organization (WTO) since 1995 are a significant departure from the 1947 General Agreement on Tariffs and Trade (GATT). Export subsidies are prohibited in the WTO, and domestic subsidies that increase exports can be disputed. In addition, unilateral tariffs contingent on subsidies (countervailing duties) became an entrenched part of the WTO. At the outset of the GATT, nations did have legitimate recourse against one form of subsidy—domestic subsidies to import-competing industries. Such domestic subsidies can serve as an alternative instrument to protect industries and improve one's terms of trade, so the motive to restrict such subsidies has always been clear to both the GATT drafters and economists.[1] More puzzling to trade lawyers and economists are the evolving restrictions of export subsidies and the need for domestic subsidy restrictions beyond the GATT rules.

Export subsidies improve the terms of trade for importing countries and increase trade, so there is no reason to constrain them in conventional trade theory.[2] When the only cross-border effect of export subsidies is the terms-of-trade improvement of the importing country, then the export subsidies are like a gift from abroad, and there is no reason for all countries to restrict their use. Exporting nations can benefit from subsidy restrictions to avoid a prisoner's dilemma in strategic trade settings (Brander and Spencer 1985), but such restrictions reduce the welfare of importing nations, so the standard strategic trade model does not explain *consensus restrictions*.[3]

Limits on domestic subsidies can be harmful because domestic subsidies are the best instrument governments can use to address domestic distortions.[4] Bagwell and Staiger (2006) argue that the WTO subsidy rules plausibly accomplish nothing by constraining domestic subsidies that were not already constrained by GATT rules.[5] The rules could even "completely undermine" the GATT, because countries could be forced to eliminate socially

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[1] Section 2 details the historical background.

[2] For example, Janow and Staiger (2003) argue that the export subsidy prohibition runs against the GATT's fundamental purpose of increasing trade from inefficiently low levels.

[3] Bagwell and Staiger (2012b) prove that in the standard strategic trade model (two national champion Cournot firms who export to a third country), the globally optimal subsidies lower price to marginal cost and leave no motive for subsidy constraints. But as Bagwell and Staiger (2001b, 2012a) emphasize, exporters could still coerce importers into consensus restrictions. Section 2 argues that strategic trade motives fit well with 1960s plurilateral export subsidy restrictions but less well with 1980s subsidy rule negotiations.

[4] This "targeting" theory of distortions and welfare dates back to Bhagwati and Ramaswami (1963). More recently, Stiglitz (2006) and Rodrik (2011) argue that the WTO subsidy rules are particularly damaging for developing countries where market imperfections are more prevalent.

[5] There is one scenario in which Bagwell and Staiger (2006) find a justification for the WTO subsidy rules—when subsidy use is of minor importance on the efficiency frontier. Yet the authors consider this scenario to be inconsistent with the stated view of GATT members that some subsidy use is desirable.

beneficial subsidies after committing to low tariffs. For these reasons, Mavroidis, Messerlin, and Wauters (2008) denounce the subsidy agreement as "one of the least economics-informed agreements in the WTO."

The potential drawbacks of the WTO subsidy rules call for a better understanding of why the rules were adopted. This paper proposes the first theory that can explain both the existence and evolution of the restrictions on both export subsidies and export-promoting domestic subsidies. We argue that the profit-shifting motive—governments' desire to shift imperfectly competitive rents to domestic firms from foreign firms—is both historically and theoretically relevant for explaining the subsidy rules. Such profit-shifting externalities date back to Venables (1985), but the prevailing view is that the externality does not matter for the design of the world trading system.[6] Here we find that governments do not mind export-promoting policies as long as they collect noncooperative import tariff revenue from exports, but they demand subsidy restrictions after they eliminate import barriers.

To connect profit-shifting externalities to the existence and evolution of GATT/WTO subsidy rules, this paper's theory unifies and emphasizes several observations. The first observation is that when nations choose border measures noncooperatively, there is no motive to restrict export promotion (Bagwell and Staiger 2006). The motive for export promotion disappears because noncooperative import tariff revenue neutralizes any negative cross-border externality that could motivate export promotion. The second observation is that in many trade models, the efficient policies depend only on the level of net trade taxes (Bagwell and Staiger 2009, 2012b). This paper is the first to observe that different types of policy constraints could evolve depending on how countries choose to reduce net trade taxes—countries can do so through import tariff reductions or increases in export subsidies. There exists a welfare-improving policy path from noncooperative policies to efficient policies, such that export subsidy restrictions would be undesirable, but under plausible government preferences, there also exists a welfare-improving policy path such that subsidy restrictions become desirable. In particular, the policy paths that lead to subsidy restrictions are those that first reduce import tariffs—just like the actual path of policy under the GATT. A final observation is that subsidy restrictions can arise when export promotion decreases rents for specific

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[6]See Bagwell and Staiger (2010) for a survey. GATT principles like reciprocity can reduce cross-border externalities arising from imperfect competition in trade policy choices. Ossa (2011) considers production relocation externalities under monopolistic competition, and Mrazova (2011) considers profit-shifting externalities under oligopoly. The externalities disappear if countries can negotiate over both import and export policies (Bagwell and Staiger 2009, 2012b). As for domestic policies, externalities arising under certain types of imperfect competition can be addressed by GATT's market access preservation rules, leaving no need for direct contracting over domestic policies (Antras and Staiger 2012a, 2012b, DeRemer 2013).

capital, in the absence of import tariffs (Grossman and Horn 2013).[7]

The negotiating history of the GATT and WTO support the importance of profit-shifting externalities in the evolution of subsidy restrictions. Section 2 details the history. The GATT drafters understood the threat of domestic subsidies to import-competing industries, but export subsidies were subject only to reporting requirements. By the outset of WTO negotiations, countries were concerned about the cross-border effects all subsidies. The section also details the relevance of fixed costs subsidies, which the theory utilizes.

Section 3 proposes a theory to illustrate the existence and evolution of the subsidy rules. We define a tractable framework in which two symmetric countries (Home and Foreign) each have a domestic policy choice that affects the number of differentiated firms in each country. A theoretical environment where the policy choice singly determines the number of firms simplifies the analysis.[8] Entry in the differentiated sector requires the employment of a capital factor, while production requires labor in both the differentiated sector and a freely traded outside sector.[9] Governments set policy to maximize the sum of national income and an additional political-economic weight on the firm profits accruing to capital owners. The governments each choose the domestic policy and two border measures, an import policy and an export policy. A significant abstraction is the absence of a wage subsidy to the labor factor. Subsidy rules to prevent countries from shifting profits with a wage subsidy are useless because the wage subsidy itself permits governments to eliminate the monopoly distortion and the motive for profit-shifting. The stylized model here introduces a domestic subsidy (to entry costs) and an export subsidy, while still preserving a role for profit-shifting because the additional policies do not allow governments to eliminate the monopoly distortion. The paper follows most of the trade policy literature under imperfect competition by abstracting

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[7]Grossman and Horn (2013) provide an informal extension of Grossman and Helpman (1995) to justify the existence of restrictions on export subsidies.

[8]The next level of complexity would be to allow entry to require both capital and labor factors. Such a model would pin down the rental-wage ratio, and trade policies would also affect firm entry. Otherwise the paper's main results would be similar because the entry subsidy affects firm entry and the rental rate directly, and not through changes in product prices.

[9]An outside sector is typical of most trade policy literature with imperfect competition (see the surveys of Helpman and Krugman 1989 and Bagwell and Stagier 2010). Exceptions are Ervik, Ertel, and Soegaard (2012) and Colacicco (2013), who consider strategic trade policy in general oligopolistic equilibrium. These authors find that general equilibrium effects (e.g. higher wages and prices in untargeted sectors) can reverse normative conclusions in particular settings where strategic trade policy otherwise provides a unilateral benefit. In these papers, the targeted sectors still earn increased profits. The current paper's positive theory depends on governments assigning a political weight on increased profits that is sufficiently large to outweigh negative effects of policy. Additional negative general equilibrium effects then would not obviously affect results aside from increasing the minimum political weight necessary to rationalize subsidy rules.

from the ability for governments to eliminate monopoly distortions with a labor subsidy.[10] The abstraction is the simplest way to study cooperation over policies of interest while still preserving the historically-relevant role of profit-shifting.[11]

Section 4 includes the paper's main results. We first show that regardless of the weight governments place on domestic profits, countries cannot benefit from the WTO's limits on subsidies when import tariffs are close to noncooperative levels, as when the GATT was formed.[12] The Foreign subsidy increases Home import tariff revenue and it decreases the Home price index, and both effects benefit Home. Home values the decrease in its price index because when setting import tariffs, Home always benefits by gaining tariff revenue on the inframarginal import volume. In equilibrium, Home must balance this benefit by setting the price index higher than it would otherwise prefer.[13]

Countries can achieve a global consensus to impose limits on export-promoting domestic subsidies, as observed in the WTO.[14] Consider the nation Foreign, choosing subsidies unilaterally, subject to the GATT constraint that ensures Foreign's subsidies do not reduce the access Home has to Foreign's market.[15] Despite the GATT constraint, Foreign does not consider three effects of higher subsidies on Home: a decrease in Home's domestic profits, an increase in Home's consumer surplus from the subsidized sector, and an increase in Home's import tariff revenue. The net cross-border effect of the Foreign subsidy on Home can be negative, provided that Home places a sufficiently large weight on profits in the subsidized sector and Home's import tariffs are sufficiently small. A net negative cross-border effect implies that the two countries' unilateral subsidy choices are too high. When considering

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[10] For example, the seminal work of imperfect competition and trade policy by Dixit (1984) states that a marginal cost subsidy to eliminate imperfect competition distortions is unrealistic. More recent work such as Ossa (2011) and Bagwell and Staiger (2009, 2012a, 2012b) also abstract from such policies.

[11] In a more general setting without the distortion-free outside sector, the first-best will involve correcting intersectoral misallocation rather than eliminating distortions. See Gros (1987) on optimal policy in Krugman (1980) with no outside sector, or see the more general results of Epifani and Gancia (2011). Practically, governments have not corrected intersectoral misallocation. Epifani and Gancia (2011) emphasize that price-cost margins in 4-digit US manufacturing industries range from 1% to 60% between the first and 99th percentiles.

[12] The current paper does not consider other motives for domestic policy coordination when trade policies are noncooperative in the proposed framework. A companion paper DeRemer (2013) examines these motives, which are distinct from subsidy rules and outside the focus of the current paper.

[13] As mentioned earlier, Bagwell and Staiger (2006) also find that export subsidies must yield positive externalities at noncooperative trade policies. When countries set import tariffs noncooperatively in such a two-good, perfectly competitive environment, they set the local price of imported goods higher than they would otherwise prefer, as proven in Bagwell and Staiger (1999) and Bagwell and Staiger (2002, p. 60-61, 192). When a country proceeds to import subsidized products, it benefits from both the local price decrease and an improvement in its terms of trade.

[14] We focus on subsidy limits rather than bans because many models of dispute settlement (e.g. Maggi and Staiger 2011) require a cost of filing a dispute, so in practice subsidies are limited rather than banned.

[15] The constraint is a consequence of Article XXIII in the GATT. Bagwell and Staiger (2001a, 2006) model the GATT in similar fashion.

the effects of Foreign policies on Home consumption, Home prefers changes that raise the Home price index. A Pareto superior outcome for the two governments can be achieved by an agreement limiting subsidies. Subsidy restrictions thus substitute for import tariffs in protecting domestic markets from export-promoting policies.

Import tariff reductions are but one possible path toward efficient policy in the model. Another path involves raising export subsidies. If countries set export subsidies such that they ignore the terms-of-trade loss from these subsidies, then export subsidies are set above noncooperative levels, and the lower net trade barriers satisfy global efficiency conditions. Under such export subsidies, import tariffs are still large, and there is no motive for subsidy constraints. This result is consistent with prior literature which argues there is no motive for subsidy constraints when countries act as if they do not value their terms of trade. These policies have received much attention, because the GATT principle of reciprocity guides countries toward these policies (e.g. Bagwell and Staiger 2009). We can then conclude that subsidy constraints result from a departure toward alternative efficient trade policies, distinct from the policies that countries achieve through reciprocity. We suggest one reason for the failure. The theory says countries must apply reciprocity to increases in export subsidies, but in practice, the principle has been applied predominantly to import tariff reductions.

While subsidy constraints were one significant change in the WTO system, another was the structure placed on countries' ability to respond to subsidies with temporary import tariffs, known as countervailing duties. Countervailing duties originated in United States law and the U.S. used them with minimal restraint. By the WTO era, they were a legitimate part of the multilateral system and other nations used them more widely. Within the model, the legitimate use of countervailing duties complements subsidy restrictions as a tool for addressing cross-border externalities of export-promoting subsidies. First we show in the two-country case, countries can use countervailing duties as an alternative to enforcing subsidy limits. If countries impose countervailing duties to counter an undesired subsidy, then they prevent an import volume increase and they collect tariff revenue on the subsidy. The countervailing duty can fail to be an effective remedy beyond the two-country case, if countries cannot coordinate countervailing duty action. The model can easily be extended to three symmetric countries, and we show that the additional country strengthens the case for using multilateral subsidy limits rather than unilateral countervailing duties.

1.1   Relationship to Existing Literature

In explaining both the existence and evolution of the restrictions on both export subsidies and export-promoting domestic subsidies, this paper relates to several strands of literature.

The Evolution of Export Subsidy Restrictions: The closest related paper in providing a reason for the existence and evolution of subsidy rules is Bagwell and Staiger (2012a). They provide an alternative explanation for the evolution of export subsidy rules using a model with linear Cournot competition. In their model, as in Venables (1985), nations would unilaterally deviate from an efficient, free-trade equilibrium using export subsidies, so export subsidy bans are desirable at free trade. Yet at the equilibrium where both import and export policies are chosen noncooperatively, countries choose both import and export taxes and countries benefit when they exchange small reductions in these taxes. One important difference between their paper and the current paper is theirs does not consider domestic subsidies. By providing a theory for the WTO's limits on export-promoting domestic subsidies, the current paper addresses a broader debate over the appropriate scope of the WTO in regulating domestic policies.[16] A second important difference is their results depend on an atypical feature of the Cournot framework—a Foreign increase in export subsidy or reduction in export tariff gives Home a terms-of-trade loss.[17] The current paper thus shows that externalities motivating the evolution of export subsidy constraints need not depend on this feature particular to Cournot competition.

Export Subsidy Restrictions: A literature predating the WTO subsidy rules found that export subsidies can improve exporters' terms of trade in multi-good perfectly competitive environments. The case in Feenstra (1986) relies on complementarities between export goods. The case in Itoh and Kiyono (1987) relies on subsidies that turn import goods into export goods. Though neither paper explicitly considers the benefits of subsidy restrictions in a strategic game, subsidy rules would be beneficial, since subsidies deviate from first-best policies of no intervention. Neither paper considers the evolution of subsidy restrictions.

Mrazova (2011) rationalizes export subsidy restrictions in the presence of oligopoly. She argues that state capacity constraints lead governments to ban either import or export policies. The agreement with no export policies allows for harsher punishment than the agreement with no import policies, so the agreement with no export policies is self-enforcing under a wider range of circumstances. Her paper then focuses on the profit-shifting rationale for trade agreements once export subsidies are banned.

Subsidy Restrictions in the Commitment Theory of Trade Agreements: Most trade agreement theory, including the current paper, considers trade agreements motivated

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[16]Examples include Bagwell, Mavroidis and Staiger (2002), Staiger and Sykes (2011), and Bagwell and Mavroidis (2010). Bhagwati (1996) defends the GATT's capability of handling labor and environmental issues.

[17]In two-good perfect competition (Bagwell and Staiger 1999), monopolistic competition (Bagwell and Staiger 2009), or Cournot competition without free entry (Bagwell and Staiger 2012b), the export subsidy at free trade worsens the terms of trade.

by cross-border externalities, but other literature (e.g. Maggi and Rodriguez-Clare 2007) considers trade agreements that solve a commitment problem for governments who want to tie their hands from domestic political pressures. Two papers focus on the subsidy rules solving a commitment problem. Potipiti (2012) explains the existence of export subsidy restrictions. Brou and Ruta (2013) rationalize stricter rules in the WTO on subsidies for import-competing industries.[18] While not ruling out the importance of commitment motives, Section 2 offers evidence that countries negotiating the subsidy rules indeed had concerns about cross-border subsidy externalities.

Domestic Subsidy Restrictions in the Terms-of-Trade Theory: Bagwell and Staiger (2006) provide a formal analysis of whether political motives can rationalize the WTO subsidy rules. They find no rationale for constraints on export subsidies or domestic subsidies in an environment with costless application of the GATT rules.

The two-good perfectly competitive model of Bagwell and Staiger (2006) includes the three cross-border effects of Foreign export-promoting subsidies emphasized by the current paper—a positive effect on Home consumer welfare, a negative effect on Home domestic sales, and a positive effect on Home tariff revenue. The difference is that in their model, subsidies to Foreign's export sector influence all three effects solely through changes in terms of trade. The sum of the three effects is positive whenever two symmetric countries choose noncooperative import tariffs or pursue a symmetric liberalization path to lower efficient tariffs. At any point along such a symmetric liberalization path, the assumption that countries benefit from receiving a pure transfer in either good—equivalent to a terms-of-trade gain holding local prices fixed—ultimately implies that Home must benefit from a Foreign subsidy that improves Home's terms of trade.[19] In the current paper, countries benefit, all else equal, from a terms-of-trade gain—a pure transfer between treasuries in the outside good. But because Foreign export subsidies influence Home apart from the change in the relative world price of an individual good, the sign of the net cross-border effects of Foreign subsidies along the liberalization path is no longer pinned down by the assumption that countries always benefit, all else equal, from a gain in the relative world price of an individual export good.

Bagwell and Staiger (2006) also acknowledge but do not model the possibility that GATT subsidy disciplines could fail when two countries compete in third markets. They suggest that the GATT rules could be extended to three countries but do not offer any details on

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[18]Brou and Ruta (2013) argue that when subsidies to import-competing industries are inefficiently high prior to trade negotiations, nations benefit from the new WTO restrictions of subsidies causing "serious prejudice."

[19]Along the liberalization path, countries benefit from a fall in the domestic price of the imported good, all else equal, as in Bagwell and Staiger (2002, p. 60-61). When a Foreign subsidy increase improves Home's terms of trade, Home benefits from both the fall in domestic price and the direct effect of the terms-of-trade improvement.

how this could be achieved. This paper interprets the WTO subsidy rules as an approach to dealing with third-market problems when countervailing duty action is difficult to coordinate.

Countervailing Duties: Bagwell and Staiger (2006) consider the possibility that countries can impose countervailing duties to achieve or to maintain efficient policies. Since export subsidies lead to a terms-of-trade loss in their framework, there is no reason to impose export subsidies, and there is no role for countervailing duties in achieving efficient policies.

Dixit (1984, 1988) provides the seminal analysis of countervailing duties in Cournot oligopoly. There Home import tariffs can be used to claw back imperfectly competitive rents when Foreign uses an export subsidy. Countervailing duties serve the same basic purpose in the current paper, but here we distinctly focus on how countervailing duties complement other GATT/WTO rules and how the rules evolve.

Imperfect Competition and the Theory of Trade Agreements: Three recent papers have argued that imperfect competition externalities (profit-shifting or firm delocation) do not matter in imperfectly competitive environments. Bagwell and Staiger (2009) were the first to show that negotiations over import and export policies can eliminate the firm delocation externality. The firm delocation externality exists in a single-factor, free-entry environment. They find that the externality is irrelevant for trade agreements in both a Cournot environment and a monopolistically competitive environment. One key difference is the current paper considers a domestic policy choice. Another key difference is the current paper considers an empirically-relevant import tariff liberalization path toward efficient policies. This path is distinct from their policy path of reciprocal export subsidy increases which eliminate the imperfect competition externalities. Bagwell and Staiger (2012b) establish similar results in various settings where there is no free entry, so the imperfect competition externalities involve profit shifting rather than firm delocation. Also using the framework of Brander and Spencer (1985), they show that efficient policies result when a subsidy eliminates all imperfectly competitive distortions. Similarly, Campolmi, Fadinger, and Forlati (2013) show that a wage subsidy eliminates imperfect competition externalities in a monopolistically competitive framework with a single factor and free entry.[20] They show that governments do not benefit from limits on export subsidies or wage subsidies in their framework. The current paper is distinct in using a stylized environment where subsidies do not allow governments to eliminate intersectoral misallocation so we can feasibly study the profit-shifting motive for subsidy rules. The current paper is also distinct from the other three papers in using a two-factor model, in which the two factors play distinct roles in entry costs and marginal costs. The political economy in the distribution between the two factors

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[20]Campolmi, Fadinger, and Forlati (2013) are also distinct from Bagwell and Staiger (2009) and the current paper in allowing for income effects in the demand for the differentiated products.

is crucial to motivating subsidy constraints.

Domestic Subsidy Restrictions with no Nonviolation Complaint: Horn, Maggi, and Staiger (2010) and Lee (2013) both consider domestic subsidy rules in a context where an effective GATT Article XXIII nonviolation complaint is unavailable.[21] While there is legitimate debate over the effectiveness of the nonviolation complaint, the current paper follows Bagwell and Staiger (2006) in assuming its effectiveness to focus on explaining the evolution of export subsidies and export-promoting domestic subsidies.[22] Only Horn, Maggi, and Staiger (2010) explain the evolution of domestic subsidy rules, and only for subsidies to import-competing industries. They argue that once import tariffs fall and trade volumes increase, the cost of contracting over domestic subsidies to import-competing industries becomes worthwhile. Subsidy rules (for import-competing industries) then prevent countries from substituting subsidies for tariffs as the preferred policy for terms-of-trade manipulation. In contrast, the current paper explains how the new WTO subsidy rules substitute for tariffs in insulating countries from export-promoting policy.

Other Rationales for Domestic Policy Coordination: Sauré (2012) argues for domestic policy constraints when agreements are self-enforced between two countries who can contract directly on their terms of trade, while the current paper follows the literature that abstracts from the enforcement issue.

Antras and Staiger (2012a, 2012b) argue that motives for contracting over behind-the-border policies did not arise until recently, when offshoring emerged and bilateral bargaining determined more international prices. The current paper argues that profit-shifting externalities motivate WTO domestic subsidy restrictions that predated the recent rapid expansion of offshoring. The discrepancy is not just a matter of historical interest. The importance of profit-shifting externalities expands the set of questions that matter for determining the future of the WTO in regulating non-tariff measures, as laid out in Staiger (2011).

2 Historical and Legal Background

This section details salient features in the evolution of multilateral discipline on subsidies and countervailing measures relevant for the theory. Broader histories can be found in Sykes (2005), WTO (2006), and Wouters and Coppens (2010). The first subsection considers the GATT's history of regulating domestic subsidies, export subsidies, and countervailing

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[21]Horn, Maggi, and Staiger (2010) focus on contracting costs for individual instruments, so they exclude the nonviolation complaint, which is an outcome-based contract depending on several instruments. Lee (2013) focuses on government private information in motivating subsidy rules.

[22]See Staiger and Sykes (2013a, 2013b) for more nuanced takes on the effectiveness of the Article XXIII nonviolation complaint.

duties. The next subsection considers evidence of the motives behind the Uruguay Round negotiations (1986-1994) that led to the WTO's Agreement on Subsidies and Countervailing Measures (SCM). The final subsection considers how well the model's focus on entry subsidies matches WTO practice.

2.1   GATT Subsidy Rules

Negotiating parties for the GATT discussed subsidies but did not view them as an opportunistic policy that should be limited or eliminated. A 1946 UN Economics and Social Council meeting[23] presented the following view:

> One of the main features of the United States proposals on subsidies was that direct subsidies to producers would be permitted. The United States Delegation felt that subsidies were preferable to import restrictions or tariffs. Subsidies kept prices down and demand up. They were expansionist rather than contractionist measures.

The main provision constraining domestic policies under the GATT was the Article XXIII nonviolation complaint. The rule, first formally modeled by Bagwell and Staiger (2001a), "ensures that the level of market access commitments implied by tariff negotiations [in Article II] is not eroded by subsequent changes in domestic policies" (545). A 1955 GATT working party report[24] explains that the contracting parties believed that domestic subsidy regulation of Article XXIII was sufficient to require no further strengthening of domestic policy provisions:

> The Working Party considered many proposals for strengthening the present provisions of the Agreement with respect to the use of subsidies. So far as domestic subsidies are concerned, it was agreed that a contracting party which has negotiated a concession under Article II may be assumed, for the purpose of Article XXIII, to have a reasonable expectation, failing evidence to the contrary, that the value of the concession will not be nullified or impaired by the contracting party which granted the concession by the subsequent introduction of a domestic subsidy on the product concerned.

Based on the strong endorsement of Article XXIII, this paper takes as given that the Article XXIII nonviolation complaint was functional. When evaluating the WTO subsidy rules,

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[23]E/FC/T/C.II/37,UN Economics and Social Council 31 October 46 meeting.
[24]GATT document L/334, 1 March 1955.

we ask why additional rules—subsidy limits or countervailing duties—would be necessary in addition to Article XXIII.

The GATT had a longer history of limiting export subsidies than domestic subsidies, but a crucial difference from the GATT and WTO is the consensus to limit export subsidies under the WTO. Manufacturing export subsidies were originally subject to a mere reporting requirement in Article XVI. As Irwin, Mavroidis, and Sykes (2008) detail, there was some discussion of limiting export subsidies in the original GATT, but U.S. negotiators did not consider these proposals further because they did not have authority to limit export subsidies under the 1945 Reciprocal Trade Agreements Act (RTAA), which allowed the Truman Administration to implement GATT without Congressional approval. Beginning in 1962, thirteen developed countries began to limit manufacturing export subsidies while requiring no such rules for primary products (e.g. agriculture). Such an agreement is consistent with the theory of Brander and Spencer (1985), who show that manufacturing countries collude to limit subsidies at the expense of importers of manufactured goods. Indeed, the Australian delegation, representing a primary product exporter, was displeased with the plurilateral export subsidy agreement: "The Article was weak because of the glaring and invidious comparison between weak limitations on subsidies of primary products as compared with the ban on subsidies of manufacturing goods."[25] Because existing theory is adequate to explain this 1962 subsidy agreement, the current paper does not focus on it further, and instead focuses on explaining the consensus agreement to limit export subsidies that occurred in the WTO.[26]

Countervailing duties (CVDs) existed in the GATT, but they were more a blatant form of protection by the United States rather than an efficiency-enhancing remedy. Because the 1897 U.S. CVD law predated the GATT, it was grandfathered in, and unlike other countries, the U.S. was permitted to countervail without demonstrating that its domestic industry had been injured by the subsidized imports, up until 1980 (Wouters and Coppens 2010). The U.S. was the primary user of CVDs under the GATT, accounting for 110 of 128 CVDs reported to the GATT Secretariat between 1980 and 1991 (Sykes 2005). Because the U.S. applied most CVDs and applied them without an injury test, this paper considers CVDs to be just an example of a failure of import tariff cooperation, and the level of import tariff

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[25]GATT Document SR-9/41, 3 March 1955.

[26]This historical interpretation of export subsidy bans is distinct from Mrazova (2011), who uses an early proposal for Article XVI to motivate a theory in which export subsidies are always banned.

cooperation is exogenous in the current paper.[27] We focus instead on how countervailing duty laws can benefit governments in a cooperative agreement once sufficient import tariff cooperation has been achieved.

2.2 WTO Subsidy Negotiating History

A note from the GATT secretariat[28] at the outset of the negotiations provides insight into what problems subsidy rule negotiators believed they were solving:

> A number of problems have arisen in the case of production subsidies. The General Agreement does not limit their use, and the requirement not to prejudice the interests of other contracting parties is very vague. In particular it is unclear who has to make the determination of prejudice, how the prejudice should be assessed and whether the obligation to discuss the possibility of limiting the subsidization implies that the subsidizing contracting party must take action to limit the subsidy in question. The Agreement on Subsidies and Countervailing Measures has provided some disciplines as to the effects in the sense that signatories are obliged to seek to avoid causing, through the use of any subsidy, adverse effects to the interest of another signatory. It also established a procedure to determine the existence of adverse effects and to take a remedial action. To the extent that these effects have arisen in the domestic market of the importing country, they have been dealt with through the use of countervailing duties. As the importing country has an efficient deterrent against these effects, the problems result rather from possible abuse of this deterrent. However, regarding adverse effects arising in the domestic market of the subsidizing country or in the third country market, the obligations under the Agreement on Subsidies and Countervailing Measures to avoid causing such effects are hardly enforceable.

The theory in this paper matches the view of the secretariat that the purpose of the subsidy rules is to prevent subsidies from having adverse effects (cross-border externalities) in each other's markets and in the markets of third countries. In contrast to Bagwell and Staiger (2006), countervailing duties are seen as playing an essential role in the agreement. Also, the text implies that the Article XXIII nonviolation complaint is no longer seen as

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[27]This interpretation differs from Ethier (2007), who considers countervailing duty laws to be an essential feature of the noncooperative equilibrium for all countries. His justification is that CVD laws predated the GATT. But America's frequent and arbitrary application of CVDs leads the current paper to classify CVDs as a uniquely American form of tariff protection during the GATT era rather than as a globally-adopted feature of the noncooperative equilibrium.

[28]MTN.GNG/NG10/W/4, 28 April 1987.

effective at preventing "adverse effects arising in the domestic market of the subsidizing country."[29] This paper nonetheless follows Bagwell and Staiger (2001a, 2006) and assumes that Article XXIII handles adverse effects, to understand why countries would create new subsidy rules rather than improve upon Article XXIII.

2.3   Entry Subsidies and the GATT/WTO

A distinctive feature of this paper is its emphasis on problems created by subsidies that affect entry. The theory matches well with the seminal empirical countervailing duty study of Marvel and Ray (1995), who document that "many of the subsidies in question appear to have covered fixed costs." The authors interpret this stylized fact as evidence that countervailing duties are not used to address legitimate profit-shifting concerns, due to the absence of any theory of strategic motives for fixed cost subsidies. Grossman and Mavroidis (2001, 2003) argue WTO panels have failed to follow the intentions of WTO founders in regulating these subsidies, hence their title choice, "Recurring Misunderstanding of Non-Recurring Subsidies. More recently, Baylis (2009) notes the need for theory on strategic motivations for fixed cost subsidies in her survey of the countervailing duty and strategic trade policy literature.

Among the most prominent examples of fixed cost subsidies in the WTO era is the Boeing-Airbus case, in which Boeing has challenged European Union "launch aid." The EU reduces Airbus' cost of financing the development of new aircraft varieties, which cut into Boeing's market share in several markets. Naturally, there are several complications of the aircraft industry not captured by model. Boeing and Airbus are multi-product duopolists who offshore and use complex supply chains. The model nonetheless captures the core feature of the dispute—subsidies leading to the expansion of varieties.

3   The Model

The model builds on Section 7.3 of Helpman and Krugman (1989) by adding an export subsidy and a domestic entry subsidy. We further simplify by assuming symmetric technology, endowments, and preferences across the two large countries, Home and Foreign. The economy has two sectors: a monopolistically competitive sector of symmetric firms producing differentiated products and a quasilinear freely traded numeraire good. There are two factors: a labor factor mobile between the two sectors and a specific factor necessary for entry in the differentiated sector. The factors are owned by consumers who take prices and

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[29]See also Roessler and Gappah (2005) for a critique of the Article XXIII nonviolation complaint and a summary of its case history.

government policies as given and maximize utility. Firms take government policy and the consumer price index as given and maximize profits. Individual firms and consumers are too small to behave strategically.

After laying out the model, this section determines the governments' objectives as a function of Home and Foreign policy choices. The objectives allow us to derive the *cross-border externalities* of government policies. Here externalities refer to the cross-border effects of policies that a government does not internalize when it chooses policies unilaterally.

3.1 Setup

Government: The Home government chooses an ad valorem import tariff τ, an export subsidy s, and a subsidy to entry e. The Foreign government chooses a corresponding set of policies τ^*, s^*, and e^*. A negative import tariff indicates an import subsidy, and a negative export subsidy indicates an export tax, but we will primarily focus on situations when governments choose import tariffs and export subsidies. Nondistortionary transfers between government and consumers balance any budget deficit or surplus.

Government objectives assign a weight 1 to consumer surplus and a weight α to the rents accruing to the specific factor (i.e. producer surplus). Microfoundations for such government objectives come from the Grossman and Helpman (1994) model of lobbying, and Chang (2005) extends the results to a framework with monopolistic competition.[30]

For the existence of noncooperative and cooperative equilibria, we require $\alpha < \sigma$, where σ is the elasticity of substitution between differentiated products. If the political economy weight α were greater than σ, countries would give boundless export subsidies to their producers.

Consumption: Consumers in each country all have income large enough to ensure consumption Y of the numeraire good. The utility functions are

$$
\begin{aligned}
U &= \frac{1}{\theta}(D)^\theta + Y, \text{ and} \\
U^* &= \frac{1}{\theta}(D^*)^\theta + Y^*.
\end{aligned}
\tag{1}
$$

The utility functions imply an elasticity of substitution $\varepsilon = \frac{1}{1-\theta}$ between sectors. D is a CES composite good over n_h symmetric Home products and n_f symmetric Foreign products.

---

[30] The additional weight on producer profits is motivated by Hufbauer and Erb (1984, p. 8) and Baldwin (1980, p. 86), who argue that producers' sense of entitlement to their domestic markets has always been central to subsidy rules. Mavroidis, Messerlin, and Wauters (2008) observe that the WTO subsidy rules are focused on producer interests.

Imposing symmetry on the consumption of goods for each product, we have

$$D = \left(n_h c_h^{\frac{\sigma-1}{\sigma}} + n_f c_f^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}, \text{ and} \tag{2}$$

$$D^* = \left(n_h c_h^{*\frac{\sigma-1}{\sigma}} + n_f c_f^{*\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}.$$

The elasticities of substitution satisfy $\sigma > \varepsilon > 1$. For consumption variables c, subscripts h and f denote location of origin, while the superscript "*" indicates location of consumption, so c_f is Home imports and c_h^* is Foreign imports.

Marginal Production: The good Y has a unit labor requirement and is freely traded between sectors. The differentiated products have marginal labor requirement m. To ship one unit abroad requires an iceberg trade cost, additional production of the good that "melts" in transit. The trade cost is $\phi \geq 0$.

Firm Entry: Countries each have a capital endowment K specific for entry into the differentiated sector. Some consumers own capital and some do not, ensuring a motive for capital lobbying. Governments can reduce the capital requirement with an entry subsidy. The government subsidizes entry in the differentiated sector by hiring labor to produce a public good specific to the differentiated sector. The capital requirement is given by the function $k(e)$, such that k is strictly decreasing in the government subsidy e. Firm profits accrue to the owners of the specific factor. The domestic entry subsidies e and e^* determine the number of firms n_h and n_f in each country:

$$n_h = \frac{K}{k(e)}, \text{ and } n_f = \frac{K}{k(e^*)}. \tag{3}$$

The function k can be inverted to express the cost to the government of having a given number of firms, as if governments were directly choosing the number of firms:

$$e = k^{-1}\left(\frac{K}{n_h}\right) \equiv f(n_h), \text{ and} \tag{4}$$

$$e^* = k^{-1}\left(\frac{K}{n_f}\right) \equiv f(n_f).$$

A simple feasible functional form is $k(e) = \frac{K\beta}{e+\mu}$ for a scale parameter β and a shift parameter μ. Such a function $k(e)$ yields $f(n) = \beta n - \mu$ for $n \geq \frac{\mu}{\beta}$, and $\frac{\mu}{\beta}$ is the number of firms absent any entry subsidy. The model could conceivably admit a more general functional form for

k, provided that the government objectives are concave in the number firms chosen.[31] We require a restriction on the shift parameter μ that ensures countries offer positive entry subsidies at all equilibria under consideration.[32] The scale parameter for $k(e)$ is subject to an additional restriction to ensure there is a cooperative equilibrium with zero tariffs. Discussion of the restriction is postponed to Section 4.1.

The structure here allows us to consider, in a simple way, government ability to influence the extensive margin of firm entry, while at the same time not allowing free entry to eliminate any lobbying motive for firms, as would be the case in a single-factor model.[33] As discussed in Section 2.3, consideration of fixed cost subsidies is empirically justified. The simplification that government effectively chooses the number of firms also has precedent in the international competition policy literature.[34] In the current paper, the approach offers tractability for studying interactions between domestic policy choices and trade policies, and such interactions have received little attention apart from Bagwell and Staiger (2001a, 2006).

3.2   Determining Government Objectives

To evaluate the government objectives, we find the equilibrium consumption and production taking government policies as given.

Freely mobile labor implies wages are equal across sectors, and profit maximization implies the wage equals the price of the homogeneous good. Free trade in the homogeneous good implies the prices of the homogeneous good and wages are equal across countries. The wage is defined to be the numeraire.

Utility maximization implies demand for the composite good $D = P^{-\varepsilon}$, where P is the price index for the composite good and PD is the total expenditure on differentiated products. Indirect utilities V and V^* are decreasing in own price index and increasing in income I:

---

[31] The elasticity of welfare with respect to firm entry, absent $f(n)$, is $\frac{\varepsilon-1}{\sigma-1}$, so at the very least we require $f(n)$ to be more convex than $n^{(\frac{\varepsilon-1}{\sigma-1})}$, and a linear cost function meets this requirement since $\frac{\varepsilon-1}{\sigma-1} < 1$.

[32] A decrease in μ lowers the number of firms with no entry subsidies. Being a constant in $f(n)$, μ has no effect on first-order conditions and second-order conditions that determine noncooperative and constrained choices of n_h and n_f.

[33] The idea that such free entry can eliminate strategic trade motives has been well understood since Horstmann and Markusen (1986).

[34] Dixit (1984), Horn and Levinsohn (2001), and Bagwell and Staiger (2002, Ch. 9) each consider a domestic competition policy (e.g. antritrust policy) that directly determines the number of domestic firms in a Cournot market. Only Bagwell and Staiger (2002, Ch. 9) consider whether there is an additional rationale for a domestic policy agreement beyond the GATT, and they conclude the answer is no.

$$V = \frac{1}{\varepsilon - 1} PD + I = \frac{1}{\varepsilon - 1} P^{1-\varepsilon} + I, \text{ and} \tag{5}$$

$$V^* = \frac{1}{\varepsilon - 1} P^* D^* + I^* = \frac{1}{\varepsilon - 1} P^{*1-\varepsilon} + I^*.$$

The notation for prices p_h, p_f, p_h^*, and p_f^* matches the consumption variables c_h, c_f, c_h^*, and c_f^*. The price index P is standard following Dixit and Stiglitz (1977) under symmetric firms:

$$P = \left(n_h p_h^{1-\sigma} + n_f p_f^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \equiv P(n_h, n_f, p_h, p_f), \text{ and} \tag{6}$$

$$P^* = \left(n_f p_f^{*1-\sigma} + n_h p_h^{*1-\sigma} \right)^{\frac{1}{1-\sigma}} \equiv P^*(n_h, n_f, p_h^*, p_f^*).$$

Consumer maximization implies the total demands for individual products are

$$c_h = p_h^{-\sigma} P^{\sigma-\varepsilon} \equiv c_h(n_h, n_f, p_f, p_h), \; c_f = p_f^{-\sigma} P^{\sigma-\varepsilon} \equiv c_f(n_h, n_f, p_f, p_h), \tag{7}$$

$$c_f^* = p_f^{*-\sigma} P^{*\sigma-\varepsilon} \equiv c_f^*(n_h, n_f, p_h^*, p_f^*), \text{ and } c_h^* = p_h^{*-\sigma} P^{\sigma-\varepsilon}. \equiv c_h^*(n_h, n_f, p_h^*, p_f^*).$$

Market demand x_h for a Home product is the sum of domestic demand and Foreign demand, plus the iceberg transport costs:

$$x_h = c_h + (1 + \phi) c_h^* \equiv x_h(n_h, n_f, p_h, p_f, p_h^*, p_f^*). \tag{8}$$

$$x_f = c_f^* + (1 + \phi) c_f \equiv x_f(n_h, n_f, p_h, p_f, p_h^*, p_f^*).$$

Because markets are integrated, imports are marked up from domestic prices based on net cross-border costs:[35]

$$p_h^* = (1 + \phi + \tau^* - s) p_h \equiv p_h^*(\tau^*, s, p_h), \text{ and} \tag{9}$$

$$p_f = (1 + \phi + \tau - s^*) p_f^* \equiv p_h^*(\tau, s^*, p_f^*).$$

Since demand functions have a constant price elasticity, profit-maximization implies a

---

[35]The definition of the Foreign import tariff multiplying the domestic price of Home goods p_h instead of the world price of Home goods p_h^w (to be defined) follows Bagwell and Staiger (2009) but not DeRemer (2013) and Campolmi, Fadinger, and Forlati (2013). The choice of definition here leads to simpler analysis for this paper and does not materially affect results.

constant local price for domestic varieties p_h and p_f^*.

$$p_h = p_f^* = \frac{\sigma}{\sigma - 1} m \equiv p. \tag{10}$$

The prices do not depend on tariffs, as emphasized in Ossa (2011), or on firm entry, as emphasized here. Because we have shown these local prices for domestic goods are constant with respect to policy, we will omit them from all functional notation henceforth.

World prices p_h^w and p_f^w are the prices of Home and Foreign exports between borders. They depend only on the export subsidy:

$$
\begin{aligned}
p_h^w &= (1 - s)p_h \equiv p_h^w(s), \text{ and} \\
p_f^w &= (1 - s^*)p_f^* \equiv p_f^w(s^*).
\end{aligned}
\tag{11}
$$

The per unit markup $p - m = \frac{p}{\sigma}$ determines Home and Foreign domestic per firm profits π and total profits Π:

$$
\begin{aligned}
\pi_h &= (\frac{p}{\sigma})x_h, \ \pi_f = (\frac{p}{\sigma})x_f, \\
\Pi_h &= n_h \pi_h \equiv \Pi_h(n_h, n_f, p_f, p_h^*), \text{ and} \\
\Pi_f &= n_f \pi_f \equiv \Pi_f(n_h, n_f, p_f, p_h^*).
\end{aligned}
\tag{12}
$$
$$\tag{13}$$

Home government objectives can be decomposed as follows:

- Profits (with political economy weight α) $\equiv \alpha \Pi_h$

    - Domestic profits $\equiv \alpha(\frac{p}{\sigma})n_h c_h = \alpha(\frac{c_h}{x_h})\Pi_h$
    - Export profits $\equiv \alpha(\frac{p}{\sigma})(1 + \phi)n_h c_h^* = \alpha(1 - \frac{c_h}{x_h})\Pi_h$

- Consumption

    - Consumer surplus $\equiv \frac{1}{\varepsilon - 1}PD$
    - Import tariff revenue $\equiv \tau p n_f c_f$
    - Export subsidy cost $\equiv -s p n_h c_h^*$
    - Entry subsidy cost $\equiv -f(n_h)$
    - Wage income $\equiv L$

A corresponding decomposition holds for Foreign. The government objectives G and G^* are then

$$G = \alpha\Pi_h + \frac{1}{\varepsilon - 1}PD + \tau pn_f c_f - spn_h c_h^* - f(n_h) + L, \text{ and} \qquad (14)$$

$$G^* = \alpha\Pi_f + \frac{1}{\varepsilon - 1}P^*D^* + \tau^* pn_h c_h^* - s^* pn_f c_f - f(n_f) + L.$$

An important task is to separate the effects that go through prices and the number of firms. We write the Home government objective as a function of prices and firms. Note also the definition of the price indices (Equation 6) as a function of firm counts and local traded prices (once we have suppressed dependence on the constant local domestic prices), and the definition of the prices as a function of trade policies (Equations 9 and 11).

$$G(n_h, n_f, p_f, p_h^*, p_f^w, p_h^w, P, P^*) = \frac{1}{\varepsilon - 1}P^{1-\varepsilon} + n_h c_h(P)\left[\frac{\alpha p}{\sigma}\right] - f(n_h) + L \qquad (15)$$

$$n_f c_f(p_f, P)[p_f - \phi p_f^* - p_f^w] + n_h c_h^*(p_h^*, P^*)\left[\frac{\alpha p(1 + \phi)}{\sigma} + (p_h^w - p_h)\right]$$

The world objective is as follows:

$$W(n_h, n_f, p_f, p_h^*, p_f^w, p_h^w, P, P^*) = \frac{1}{\varepsilon - 1}(P^{1-\varepsilon} + P^{*1-\varepsilon}) + \frac{\alpha p}{\sigma}[n_h c_h(P) + n_f c_f(P^*)]$$

$$+ n_f c_f(p_f, P)[p_f - (1 + \phi)p] + n_h c_h^*(p_h^*, P^*)[p_h^* - (1 + \phi)p]$$

$$- f(n_h) - f(n_f) + 2L.$$

The sum of the two objectives is justified here because we consider symmetric choices throughout. W can be written in terms of net trade taxes, which we define as $t_f \equiv (\tau - s^*)$ for Foreign-produced goods and $t_h \equiv (\tau^* - s)$ for Home-produced goods.

3.3 Import Tariff Results

This section considers noncooperative and cooperative tariffs. We introduce an unobjectionable assumption that ensures the standard result that countries' noncooperative import tariffs are larger than their cooperative import tariffs. In constructing a theory of the WTO subsidy rules, this paper needs to be consistent with some basic empirical facts of trade policy, such as a noncooperative equilibrium with high import tariffs and a cooperative equilibrium with low import tariffs.

At the noncooperative equilibrium in trade policies, each country's import and export subsidy choice is unilaterally optimal. At the cooperative equilibrium, each country's net trade barriers are picked to maximize world welfare. The cooperative equilibrium depends only on net trade barriers because W only depends on net trade barriers.

We establish a first lemma that net trade taxes are higher at noncooperative trade policies than cooperative trade policies, so noncooperative trade policy choices result in too little trade. All lemmas are proven in Appendix A.2.

Lemma 1 *Consider countries with symmetric policies $\bar{e}$, $\bar{\tau}^N$, and $\bar{s}^N$, such that $\frac{dG}{d\tau} = \frac{dG^*}{d\tau^*} = \frac{dG}{ds} = \frac{dG^*}{ds^*} = 0$. For sake of comparison, consider a different pair of countries with net trade barriers $\bar{t}^c$ such that $\frac{dW}{d\tau} = \frac{dW}{d\tau^*} = \frac{dW}{ds} = \frac{dW}{ds^*} = 0$. Then $\bar{\tau}^N$, $\bar{s}^N$, $\bar{t}^c$ do not depend on $\bar{e}$, $\bar{\tau}^N > 0$, and $\bar{t}^N > \bar{t}^C$.*

The lack of dependence of the noncooperative trade policies $\bar{\tau}^N$ and $\bar{s}^N$, and fully cooperative trade barriers $\bar{t}^c$ on the level of entry subsidies (and hence the number of firms) is a consequence of CES preferences and the symmetry between countries. The policies maximizing the joint objective W involve subsidizing trade as a second-best attempt to correct the monopoly distortion, so countries would benefit when moving from noncooperative policies to policies with zero net trade taxes.[36]

Many trade policy models suffer the difficulty that cooperative trade policies could arise from either reducing import tariffs or increasing export subsidies, while we observe GATT members reducing tariffs.[37] One typical way to avoid the problem is to assume away export subsidies, but such an approach is not feasible here because we want to study the motivation for the ban on export subsidies. Instead we build on the following lemma which argues that countries will unilaterally choose export subsidies below a certain bound.

Lemma 2 *Consider arbitrary import tariff policies and entry subsidies, and export subsidy choices s and s^* satisfying $\frac{dG}{ds} = \frac{dG^*}{ds^*} = 0$ Then $s \leq \frac{\alpha}{\sigma}$ and $s^* \leq \frac{\alpha}{\sigma}$.*

The $\frac{\alpha}{\sigma}$ is the value to governments of an additional unit of firm output. When subsidies are greater than $\frac{\alpha}{\sigma}$, the increase in subsidy costs cannot possibly be worth the increase in output.[38]

---

[36] The joint objectives are also maximized with trade subsidies in the monopolistic competition model of Bagwell and Staiger (2009). Other trade policy models (e.g. Bagwell and Staiger 1999) allow the possibility that political preferences result in positive cooperative net trade barriers.

[37] See Maggi and Rodridguez-Clare (2005) for more focus on this feature of trade policy models and an approach to resolving the issue.

[38] The increase in total cost of the export subsidies consists of both an increase in the subsidy cost on the inframarginal export volume, and the additional subsidy cost on the marginal export units. The former has a negative effect on the government objective. When the subsidy is greater than $\frac{\alpha}{\sigma}$, the latter more than offsets the value to governments of the marginal unit of output. The export subsidy has no effect on the domestic market. Consequently, countries cannot unilaterally benefit from subsidies greater than $\frac{\alpha}{\sigma}$.

Lemma 2 implies that countries would not choose export subsidies above these bounds unless either they were constrained to do so, or if choosing an export subsidy above $\frac{\alpha}{\sigma}$ allowed them to choose a more desirable import policy or entry subsidy policy against some constraint. We do not consider any such constraints in this paper, so throughout we assume $s \leq \frac{\alpha}{\sigma}$ and $s^* \leq \frac{\alpha}{\sigma}$. The assumption allows us to derive later results without concern for suboptimal subsidy choices.

Ruling out the possibility of high subsidies yields an empirically sensible result on import tariffs.

Lemma 3 *Import tariffs always cause negative cross-border externalities on their trading partners ($\frac{dG^*}{d\tau} < 0$ and $\frac{dG}{d\tau^*} < 0$). If Home and Foreign choose noncooperative import tariffs to maximize their objectives, holding other policies fixed, then the noncooperative import tariffs are higher than the cooperative import tariffs that maximize W.*

A Foreign import tariff raises the equilibrium price of Home exports in the Foreign market, and the higher price leads to lower exports for Home. Provided that export subsidies do not violate the bound suggested by Lemma 2, such that the subsidy is larger than the government's valuation of export profits, then the import tariffs always exert negative cross-border externalities. The persistent negative externalities ensure that countries' unilateral tariff choices are too high.

3.4   Foreign Firm Entry Externalities

All policies create international externalities. We focus here on the externalities of a Foreign entry subsidy policy on Home. We show that Foreign entry improves Home differentiated sector consumption but worsens Home domestic and Foreign profits. Foreign entry improves Home's net trade revenue when Home uses import tariffs and export subsidies. The balance of concerns determines the effect of Foreign entry on welfare.

Foreign entry lowers the price indices of the variety-loving consumers everywhere. An elasticity of substitution σ closer to 1 implies a larger effect. We express results as log derivatives: $\frac{\widehat{y}}{\widehat{x}} \equiv \frac{d \ln y}{d \ln x} = \frac{dy}{dx}\frac{x}{y}$, the elasticity of y with respect to x.

$$\text{Consumer surplus effect} \equiv -\frac{\widehat{P}}{\widehat{n_f}} = \frac{(1-S)}{(\sigma - 1)} > 0. \tag{16}$$

Here $S \equiv \frac{n_h p c_h}{n_h p c_h + n_f p_f c_f}$, Home's ratio of domestic expenditure on differentiated products to total expenditure on differentiated products. S^* is Foreign's ratio. Since consumer surplus is inversely proportional to the price indices, the increase implies an increase in Home consumer

surplus from consuming differentiated products. The Foreign price index increase is $\frac{\widehat{P^*}}{\widehat{n_f}} = \frac{-S^*}{(\sigma-1)} < 0$.

Foreign entry unambiguously lowers Home total and per-firm profits, both domestically and abroad. A larger elasticity of substitution σ implies a larger business-stealing effect.

$$\text{Domestic profit effect} \equiv \frac{\alpha\widehat{(\frac{c_h}{x_h})\Pi_h}}{\widehat{n_f}} = \frac{\widehat{c_h}}{\widehat{n_f}} = \frac{\widehat{P}}{\widehat{n_f}}(\sigma - \varepsilon) = -\frac{(1-S)}{(\sigma-1)}(\sigma - \varepsilon) < 0. \quad (17)$$

$$\text{Export profit effect} \equiv \frac{\alpha\widehat{(1-\frac{c_h}{x_h})\Pi_h}}{\widehat{n_f}} = \frac{\widehat{c_h^*}}{\widehat{n_f}} = \frac{\widehat{P^*}}{\widehat{n_f}}(\sigma - \varepsilon) = -\frac{S^*}{(\sigma-1)}(\sigma - \varepsilon) < 0. \quad (18)$$

When $\tau > 0$ and $s > 0$, Foreign entry increases import tariff revenue and decreases export subsidy costs. Import tariff revenue increases because Foreign entry increases the total Home import volume (even though it decreases the imports per firm). Export subsidy costs decrease because Foreign entry decreases the Home per-firm export volume c_h^*. The export subsidy cost decrease has a positive effect on the Home objective.

$$\text{Import tariff revenue effect} \equiv \frac{\widehat{\tau p n_f c_f}}{\widehat{n_f}} = 1 + \frac{\widehat{c_f}}{\widehat{n_f}} = 1 - \frac{(\sigma - \varepsilon)}{(\sigma-1)}(1-S) > 0. \quad (19)$$

$$\text{Export subsidy cost effect} \equiv \frac{-\widehat{s p n_h c_h^*}}{\widehat{n_f}} = -\frac{\widehat{c_h^*}}{\widehat{n_f}} = \frac{(\sigma - \varepsilon)}{(\sigma-1)}(S^*) > 0. \quad (20)$$

The parts of the Home objective we have yet to consider are the domestic entry subsidy costs and labor income, but Foreign entry has no cross-border effect on these parts.

To summarize, the signs of the various effects of Foreign firm entry on the Home government's objective are:

- Domestic profits decrease $(-)$

- Export profits decrease $(-)$

- Export subsidy costs decrease $(+)$

- Import tariff revenue increases $(+)$

- Consumer surplus increases $(+)$

The balance of the various externalities determines whether Home benefits from Foreign entry. Like the cross-border trade policy effects derived in Lemma 1, the sign of the various

firm entry externalities do not depend on the entry subsidies and firm counts, provided that countries are symmetric. The desired international regulation of entry subsidy depends entirely on how parameters and trade policy choices affect the reaction curves for each country. The level of the noncooperative and efficient number of firms is irrelevant for determining the balance of the various externalities. Consequently, we do not need to specify a specific functional form for the firm count cost function $f(n)$ nor do we need to solve for the noncooperative or cooperative choices of n in determining whether subsidy rules are desirable.

4   Evolution of International Subsidy Rules

To establish the desire for subsidy rules, we need to show that there is need for subsidy rules beyond the restrictions on domestic policies that existed in the GATT. Like Bagwell and Staiger (2001a, 2006), this section formally models the Article XXIII nonviolation complaint, which prevents countries from benefiting from subsidies to import-competing industries to undermine import tariff reductions. We first show that when tariffs are close to noncooperative tariff levels, the GATT rules cannot be improved by adding subsidy limits, but we then show that these GATT rules can be improved by adding subsidy limits once import tariffs are close to zero. Three characteristics that motivate subsidy limits are a high government weight on domestic profits, a high substitutability between Home and Foreign goods, and a large share of differentiated goods consumed domestically. The results link the evolution of subsidy rules to tariff reductions.[39]

The fourth subsection shows that the desirability of subsidy constraints fails to hold when countries reduce net trade barriers by raising export subsidies instead of reducing tariffs. The result is of interest, because Bagwell and Staiger (2009) argue the principle of reciprocity guides nations to such efficient policies. Yet empirically we have not observed reciprocity applied to export subsidies to the same extent as import tariffs, so we can interpret the existence of subsidy rules as a failure of reciprocity applied to export subsidies in imperfectly competitive settings.

Establishing the benefit of subsidy rules here contrasts with the perfectly competitive environment of Bagwell and Staiger (2001a, 2006), but it does not fully model the institution, because the analysis does not initially consider countervailing duties. The fifth subsection considers how countervailing duty laws can be used as a substitute for subsidy limits, and

---

[39]This paper does not provide a theory explaining why countries progressed from noncooperative import tariffs in the 1940s to more cooperative levels in the 1990s, but there is already a large literature on theories of gradual tariff reductions. See Bagwell and Staiger (2002, p. 106-107) and Bagwell and Staiger (2010) for surveys.

the result contrasts with Bagwell and Staiger (2006), in whose framework countervailing duties have no role. The final subsection argues that subsidy limits can be desirable over countervailing duties in a three-country extension, when countervailing duties are difficult to coordinate.

4.1   GATT Domestic Policy Rules

This subsection formalizes the GATT domestic policy rules and the question of whether further subsidy rules can offer an improvement. We consider whether the GATT approach to international regulation of domestic policies[40] succeeds in eliminating any domestic policy externalities derived in the previous subsection. We would expect the GATT approach to eliminate at least some domestic policy externalities, since the GATT eliminates all domestic cross-border externalities in Bagwell and Staiger (2001a). We generalize their stylized model of the GATT Article XXIII nonviolation complaint. As explained in Section 2.1, such a constraint prevents countries from using domestic policies to undermine the benefits implied by tariff negotiations. The nonviolation complaint enables Home to demand a rebalancing of Foreign's policies if Foreign's domestic policy choices undermine the benefit of tariff reductions to Home. Foreign would have to grant an additional tariff cut to Home in order to abide by Article XXIII.

We use the following definition to model Article XXIII:[41]

Definition 4 *A Foreign policy mix (τ^*, s^*, e^*) is* **market-access preserving** *relative to baseline policies $(\bar{\tau}, \bar{s}, \bar{e}, \bar{\tau}^*, \bar{s}^*, \bar{e}^*)$ if and only if the new Foreign policy mix yields equal or greater Home export volume relative to the baseline policies.*

The definition must be different from Bagwell and Staiger (2001a) because theirs is not well-defined in our framework. When Bagwell and Staiger (2001a) formalize their market access constraint (p. 547), they require that Foreign policies would preserve or increase Home exports at a particular baseline world price. Their definition specifies nothing with respect

---

[40]There are also other domestic policy rules in GATT that we abstract from, such as National Treatment, considered by Horn, Maggi, and Staiger (2010).

[41]The current paper considers market access rules as they have actually been applied under the GATT—as violations to commitments under import tariffs. DeRemer (2013), in contrast, considers the theoretical possibility that market access rules could involve commitments created by export tax negotiations, which have rarely been observed under the GATT. DeRemer (2013) also finds that market access should in general be measured using composite consumption indices rather than trade volumes, but the various market access measures are equivalent in the present context. The composite good for Home exports is $n_h^{\frac{\sigma}{\sigma-1}} c_h^*$. Foreign policy affects Home exports only through changes in c_h^*, so it is immaterial here whether the market access measure is c_h^*, $n_h c_h^*$, or $n_h^{\frac{\sigma}{\sigma-1}} c_h^*$. In a more general model where Foreign policy did influence Home entry, we would want to use $n_h^{\frac{\sigma}{\sigma-1}} c_h^*$ as the market access measure.

to Home's policies, because Home's export volume does not depend on Home's policies apart from the world price of Home's exports, whereas in our framework the Home export volume also depends on the Home entry subsidy.[42] Foreign policies satisfying our definition do not erode Home export volume, holding the Home entry subsidy and both world prices fixed, so policies satisfying our definition satisfy their definition augmented by the requirement that the Home entry subsidy is fixed at the baseline level.

Building on our definition of market-access preserving, we have our model of the GATT.

Definition 5 *Define a **GATT equilibrium** to be a set of policies $(\hat{\tau}, \hat{s}, \hat{e}, \hat{\tau}^*, \hat{s}^*, \hat{e}^*)$ such that each country is choosing unilaterally optimal policies subject to the **market access constraint** defined in the program below. The Home and Foreign constraints that imply a GATT equilibrium are known as a **GATT Agreement**. Formally, the Foreign policies satisfy*

$$(\hat{\tau}^*, \hat{s}^*, \hat{e}^*) = \arg \max_{\tau^*, s^*, e^*} \ G^*(\hat{\tau}, \hat{s}, \hat{e}, \tau^*, s^*, e^*)$$

$$subject\ to\ c_h^*(\hat{\tau}, \hat{s}, \hat{e}, \tau^*, s^*, e^*) \geq c_h^*(\hat{\tau}, \hat{s}, \hat{e}, \hat{\tau}^*, \hat{s}^*, \hat{e}^*)$$

The set of GATT equilibria includes potential outcomes under GATT rules. For a given equilibrium, Foreign cannot reduce Home's exports. One GATT equilibrium is at the fully noncooperative trade policies. Tariff reductions under GATT are a movement between GATT equilibria.

To be consistent with reality, we need to ensure that if countries transition from one GATT equilibrium to a second GATT equilibrium with constraints requiring greater market access, then the second GATT equilibrium will have lower import tariffs then the first. In other words, countries will lower tariffs as part of granting each other greater market access. Countries could conceivably expand market access by reducing the entry subsidy and leaving tariffs fixed. In particular, we want to ensure the existence of a GATT equilibrium with zero import tariffs, because we derive results at a zero-tariff GATT equilibrium in Section 4.3. We require the following lemma:

Lemma 6 *There exists a set B of scale parameters β for the function $k(e)$, such that there exists a GATT equilibrium at zero import tariffs when $\beta \in B$.*

The entry requirement as function of the entry policy is the decreasing function $k(e)$ scaled by a parameter β. A higher β would lead to a higher marginal effect of the entry subsidy on firm entry, and a lower marginal cost curve for entry defined by $f'(n)$. With

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[42]The Home import tariff does not matter for Home export volume, and the Home export subsidy does not have any effect on Home export volume apart from the world price.

a sufficiently low marginal cost curve, the government utility from the marginal firm is sufficiently small. With sufficiently low utility from the marginal firm, governments prefer to grant market access by cutting the number of firms rather than by cutting import tariffs. The Lemma then ensures that β is sufficiently small so that the marginal firm is sufficiently valuable, so governments would grant market access by cutting tariffs to zero. For any level of market access above the Nash equilibrium level of market access, we can find a scale parameter such that governments would choose to cut import tariffs to zero when achieving that market access—the smaller the gap from the Nash level of market access, the smaller β we require. We assume throughout that $\beta \in B$, the set of scale parameters such that a zero-tariff GATT equilibrium exists.

Our stylized model of GATT perfectly enforcing Article XXIII is unrealistic, but appropriate for our purposes. As discussed in Section 2.1, the early history of the GATT provides strong support for such a model, in the sense that countries understood that Article XXIII could be used to prevent nations from undermining the market access granted by tariff cuts. Later rounds of negotiations suggest that Article XXIII was not as successful as GATT drafters originally had hoped, and the number of successful Article XXIII complaints was limited. When the Uruguay Round subsidy negotiations began in 1987, among the subsidies that were considered "hardly enforceable" were domestic subsidies to import-competing industries that Article XXIII could have addressed (GATT document W-4). The focus of the current section, however, is on why limits on subsidies were extended to trade-promoting subsidies not limited by Article XXIII, so we take an ideal version of Article XXIII as given.

With our definition of a GATT agreement, we can consider formally whether an agreement would benefit from further subsidy restrictions.

Definition 7 *Subsidy limits $e \leq \tilde{e}$ and $e^* \leq \tilde{e}^*$ or $s \leq \tilde{s}$ and $s^* \leq \tilde{s}^*$ **improve** a GATT equilibrium if Nash equilibrium government choices subject to both the market access constraints and subsidy limits yield a superior joint government outcome relative to Nash equilibrium choices subject only to the market access constraints.*

This definition only considers two possible forms of agreements, market access constraints and subsidy limits. Market access constraints alone can ensure efficiency in the two-good perfectly competitive framework of Bagwell and Staiger (2001a), who consider a generic domestic policy whose only cross-border effects travel through world prices. Subsidy limits

would never improve an agreement in such an environment.[43]

We next consider whether the GATT eliminates all domestic policy externalities. Consider a GATT equilibrium. The GATT market access constraint binds, because otherwise it would not prevent countries from choosing unilateral import tariffs. Subsidy limits improve the GATT equilibrium if there exists a combination of entry subsidy decreases and tariff increases along the market access constraint such that both countries are better off. Formally, such a combination exists when $\frac{dG}{dn_f}|_{dc_h^*=0} < 0$, such that an increase in Foreign firms (dn_f) combined with a Foreign tariff decrease keeps Home exports constant $(dc_h^* = 0)$.[44] Foreign's constrained maximization implies $\frac{dG^*}{dn_f}|_{dc_h^*=0} = 0$, so the change in the joint objective is $\frac{dW}{dn_f}|_{dc_h^*=0} < 0$.

In Section 3.4, we defined five cross-border externalities from Foreign firm entry. Two of these first-order effects—on Home exports and export subsidy costs—are zeroed out by the tariff change required by the to preserve Home exports in line with our model of GATT rules. Three other cross-border effects of Foreign firm entry remain:

- Domestic profits $(-)$

- Consumer surplus $(+)$

- Import tariff revenue $(+)$

Which of the three effects above dominate depends on the parameters and trade policies in later sections. The complexity here contrasts with Bagwell and Staiger (2001a), where all three effects are a function of the terms-of-trade, and countries prefer terms-of-trade gains by assumption.

To interpret the result, notice that the Foreign entry subsidy promotes both exports and import competition, the former trade-promoting and the latter trade-reducing. The GATT market access constraint eliminates the trade-reducing and import-competing effects of the subsidy and leaves only the trade-promoting effects. The remaining externalities are similar to the externalities of export subsidies.

Throughout this section, we will make heavy use of the following lemma:

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[43]The limits on contract type in the current paper differ from a literature that focuses on the efficient points that governments achieve when they act as if they do not value their ability to manipulate their terms of trade. Bagwell and Staiger (2009) determine an efficient point in a monopolistically competitive framework that involves high export subsidies and noncooperative import tariffs. Such a point is an infeasible outcome in the current paper's contracting environment, because countries would unilaterally deviate by cutting their export subsidies. Contracting over a minimum export subsidy level would allow the point to be maintained, but as DeRemer (2013) emphasizes, no such contracts have existed in the GATT/WTO.

[44]The Foreign tariff decrease that keeps Home exports constant is $-d\tau \frac{dc_h^*/d\tau}{dc_h^*/dn_f}$.

Lemma 8 *Consider a set a constraints on Foreign defined by the vector-valued function* $X(s^*, \tau^*, n_f) = 0$, *and a matching set of constraints on Home. Adding entry subsidy limits to the set of constraints improves a GATT equilibrium subject to the set of constraints* $X = 0$ *if and only if* $\frac{dG}{dn_f}|_{dX=0} < 0$ *(where* $dX = 0$ *implies that differential changes in policy must leave* X *unchanged). Adding export subsidy limits improves the GATT equilibrium if and only if* $\frac{dG}{ds^*}|_{dX=0} < 0$.

To apply Lemma 8 to the GATT equilibrium with a market access constraint, we need to argue that the market access constraint binds. When market access is bound below the Nash level, then the market access constraint binds, because Home wants to raise its tariff ($\frac{dG}{d\tau} > 0$ as shown in the proof of Lemma 3). At the Nash equilibrium, the market access constraint binds by definition.

Applying Lemma 8, subsidy limits improve a GATT equilibrium subject to the market access constraint, if the sum of the domestic profit effect, the import tariff revenue effect, and the consumer surplus effect is negative.

4.2   No Subsidy Limits at Higher Tariffs

This subsection establishes that when countries choose noncooperative tariffs, subsidy limits cannot improve a GATT equilibrium. At noncooperative tariffs, in contrast to the zero-tariff case, countries must benefit from a price index decrease. Since Foreign firm entry decreases the price index and increases import tariff revenue, countries always benefit from Foreign subsidies. The theory then provides a link between the import tariff reductions of the 1950s and 1960s under the GATT and the addition of subsidy limits on domestic export-promoting subsidies under the WTO.[45]

The noncooperative equilibrium import tariff condition $\frac{dG}{d\tau} = 0$ can be written as

$$G_P(\tau^N) = -D,$$

where G_P is the partial derivative of the Home government objective with respect to the Home price index, and the objective is defined as a function of the price index in equation (15).

This restatement of the noncooperative tariff condition reflects the tradeoff countries face when raising the import tariff. The tariff increase causes the price index to rise to the detriment of Home, and it also leads to a gain in Home's import tariff revenue on the

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[45] The relevance of the result does not rest on the claim that the GATT actually represented a fall from noncooperative tariffs all the way to zero import tariffs, since the respective results for zero and noncooperative import tariffs each hold for some neighborhood around the respective tariff choices.

inframarginal imports. For the noncooperative import tariff condition to hold, $G_P(\tau^N) < 0$ must hold. In contrast, when we derived parameter conditions under which countries desired subsidy rules in the previous subsection, we required the equivalent of $G_P(0) > 0$, so Home government actually prefers a price index increase. At the noncooperative import tariff, the net Foreign firm entry externality can be written as:

$$\frac{dG}{dn_f}\Big|_{\substack{dc_h^*=0 \\ \tau=\tau^*=\tau^N}} = G_P(\tau^N)\frac{dP}{dn_f} + \tau^N pc_f, \text{ and} \tag{21}$$

Since $G_P(\tau^N) < 0$ and $\tau^N pc_f,> 0$ at the Nash import tariffs, and $\frac{dP}{dn_f} < 0$ always, we must have $\frac{dG}{dn_f}\Big|_{\substack{dc_h^*=0 \\ \tau=\tau^*=\tau^N}} > 0$. An increase in Foreign firm entry can be decomposed into two effects: a decrease in the price index and an increase in import tariff revenue. At the noncooperative import tariffs, import tariffs are positive and the Home government prefers a marginal decrease in the price index, so the externality of Foreign firm entry is positive. The positive sign of the Foreign firm entry at noncooperative tariffs implies, by Lemma 8, the following proposition:

Proposition 1 *The GATT equilibrium at noncooperative tariffs cannot be improved by subsidy limits on domestic policies.*

The results here are similar to prior work on subsidy agreements at noncooperative tariffs. The Bagwell and Staiger (2006) study of subsidy rules uses a two-good perfectly competitive economy. In such an environment, Bagwell and Staiger (1999) have shown that a country sets the relative local price of its import good to its export good to be higher than it would otherwise prefer, because the import tariff improves its terms-of-trade. With standard preferences, this terms-of-trade improvement is reflected in higher tariff revenue on the inframarginal import volume, as in this section. When Foreign then imposes an export subsidy at the Nash equilibrium, Home benefits from both the decrease in price of the imported good, and the improvement in its terms of trade. A similar case occurs under monopolistic competition in Bagwell and Staiger (2009). In their analysis, import tariffs have no effect on the world price of an individual variety, and at Nash import tariffs, countries do not value any change in their local price. When Foreign imposes an export subsidy, there is no effect on Home welfare through the change in local price, but Home still benefits from the terms-of-trade gain. The Foreign entry subsidy effects in this paper are mechanically different from prior work, because the Foreign entry subsidy has no effect on prices of individual varieties, but as shown in DeRemer (2013), the effect is correctly interpreted as a terms-of-trade gain for Home because the world price index of Foreign exports falls. The result is similar to prior work in that the Nash tariff condition pins down the partial effect of local prices on the

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government objective, and the local price effect implies that countries benefit from a Foreign subsidy.

4.3   Subsidy Limits at Zero Tariffs

This subsection first establishes the possibility that subsidy limits could improve a GATT equilibrium in the simplest case when import tariffs are zero. We then establish a more general set of parameters such that subsidy limits improve the GATT equilibrium.

Consider a GATT equilibrium such that the resulting policies are zero import tariffs $\hat{\tau} = \hat{\tau}^* = 0$. Such an agreement exists (Lemma 6). If a unilateral increase in entry subsidies and decrease in import tariffs, holding the trading partner's export volume fixed, still results in a negative net cross-border externality, then constraining subsidies would improve the GATT equilibrium. The negative net cross-border externality results if the negative effect on domestic profits outweighs the positive effect on consumers (Lemma 8), given that there is no tariff revenue. We evaluate the externality on Home for the Foreign policy change:

$$\frac{dG}{dn_f}\Big|_{\substack{dc_h^*=0 \\ \tau=\tau^*=0}} = \left(\overbrace{-PD\frac{\widehat{P}}{\widehat{n_f}}}^{\text{Consumer Surplus Effect}} + \overbrace{\alpha\left(\frac{p}{\sigma}\right)n_h c_h \frac{\widehat{c_h}}{\widehat{n_f}}}^{\text{Domestic Profit Effect}} \right) \frac{1}{n_f}. \tag{22}$$

Using our results from Section 3.4, we have

$$
\begin{aligned}
\frac{dG}{dn_f}\Big|_{\substack{dc_h^*=0 \\ \tau=\tau^*=0}} &= \left(-PD\frac{\widehat{P}}{\widehat{n_f}} + \alpha\left(\frac{p}{\sigma}\right)n_h c_h \frac{\widehat{P}}{\widehat{n_f}}(\sigma - \varepsilon) \right) \frac{1}{n_f} \\
&= \left(PD - \alpha\left(\frac{p}{\sigma}\right)n_h c_h(\sigma - \varepsilon) \right) \left(-\frac{\widehat{P}}{\widehat{n_f}} \right) \frac{1}{n_f} \\
&= \left[1 - \alpha S(1 - \frac{\varepsilon}{\sigma}) \right] \left(\frac{(1-S)}{(\sigma - 1)} \right) \frac{PD}{n_f}.
\end{aligned}
\tag{23}
$$

The sign of $\frac{dG}{dn_f}\big|_{dc_h^*=0}$ is the same as the bracketed expression. Foreign entry decreases the Home price index. The price index change leads to an increase in consumer surplus (with unit elasticity) and fall in domestic profits (with elasticity $(\sigma - \varepsilon)$). For a government maximizing national income with $\alpha = 1$, the Home price index decrease from Foreign Home entry is always desirable. If government weighs domestic profits heavily (high α), the price index decrease is undesirable:

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$$\alpha > \frac{1}{S}\left(\frac{1}{1-\frac{\varepsilon}{\sigma}}\right) \implies \frac{dG}{dn_f}\Big|_{\substack{dc_h^*=0 \\ \tau=\tau^*=0}} < 0. \tag{24}$$

Though S is endogenous, for symmetric policies and zero tariffs the market share depends only on parameters: $S = \frac{c_h}{c_h+(1+\phi)c_f} = \frac{1}{1+(1+\phi)^{1-\sigma}}$. We then have an expression for the existence of trade rules in terms of parameters. The first proposition then follows from (24) and Lemma 8:

Proposition 2 *For $\alpha > \frac{1+(1+\phi)^{1-\sigma}}{1-\frac{\varepsilon}{\sigma}}$ there exists a GATT equilibrium at sufficiently low import tariffs that can be improved by limits on domestic entry subsidies.*

The theory implies three considerations that can motivate a GATT equilibrium limiting entry subsidies:

1. high political economy weight on profits (high α), which raises subsidies' cross-border externality on profits,

2. high domestic share of consumption (high S and high ϕ), which increases the relative importance of domestic profits compared to consumer surplus, and

3. high substitutability between differentiated goods relative to the outside good (low $\frac{\varepsilon}{\sigma}$), which increases the effects of competition from foreign entrants.

The proposition implies subsidy limits can improve a GATT equilibrium given reasonable parameter values. If $\frac{\varepsilon}{\sigma} = \frac{1}{3}$, the ratio of elasticities of substitution between the highest and lowest categories of goods in Table IV of Broda and Weinstein (2006), and the share of differentiated consumption is 75%, then we require $\alpha > 2$, which implies governments give more weight to lobbying contributions than national welfare.

Notice there must be a political economy weight greater than 1 for there to be a negative externality from the entry subsidy.[46] The domestic share of consumption (S) and the relative substitutability of the differentiated products versus the outside good ($1-\frac{\varepsilon}{\sigma}$) both scale down the loss to producers from increased foreign competition, relative to the benefit to consumers of increased foreign variety.

On another empirical matter, observe that if countries were to simply add subsidy limits to an existing agreement, we would expect both a fall in subsidies and a rise in import tariffs

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[46]Absent a political motive for governments to weight capital rents above wages, positive local production externalities could also lead to negative cross-border externalities from foreign entry. But such a possibility is outside the scope of this paper.

to preserve the prevailing market access levels. In practice, advances in subsidy rules in the Tokyo (1973-79) and Uruguay (1986-94) Rounds of trade negotiations occurred concurrently with substantial progress in nations' commitments to provide market access. For this reason, we do not actually observe a rise in import tariffs as a consequence of subsidy rules.

4.4   Extending Results to Export Subsidies

This subsection extends the results of the previous two subsections on entry-promoting subsidies to export subsidies affecting marginal cost of production. We desire such an extension to explain why there was a consensus to limit both domestic subsidies and export subsidies in the WTO.

The effect of a Foreign export subsidy increase on Home can be written as

$$
\frac{dG}{ds^*} = \left(\overbrace{PD\frac{\widehat{P}}{\widehat{p}_f}}^{\text{Consumer Surplus Effect}} - \overbrace{\alpha\left(\frac{p}{\sigma}\right)n_h c_h \frac{\widehat{c}_h}{\widehat{p}_f}}^{\text{Domestic Profit Effect}} - \overbrace{\tau p n_f c_f\left(\frac{\widehat{c}_f}{\widehat{p}_f}\right)}^{\text{Import Tariff Revenue Effect}} \right) \frac{1}{1 + \phi + \tau + s^*}.
\tag{25}
$$

We do not require notation to indicate the effects of a GATT equilibrium because the GATT equilibrium does not constrain export subsidies. Because $\frac{dG}{ds} = 0$ at the GATT equilibrium, $\frac{dG}{ds^*} = \frac{dW}{ds^*}$, so it is sufficient to show that $\frac{dG}{ds^*} < 0$ to establish that export subsidies are inefficiently high and countries would benefit from export subsidy limits.

The condition for the domestic profit effect to dominate the consumer surplus here is equivalent to the condition for domestic entry subsidies at zero tariffs in Section 4.3. The conditions are equivalent because of the close relationship between Foreign price effects and Foreign firm entry effects: $(1 - \sigma)\frac{\widehat{P}}{\widehat{n}_f} = \frac{\widehat{P}}{\widehat{p}_f}$ and $\frac{\widehat{c}_h}{\widehat{n}_f} = (1 - \sigma)\frac{\widehat{c}_h}{\widehat{p}_f}$. Consequently, the motive for subsidy limits at zero tariffs holds for either kind of trade-promoting subsidy.

At Nash import tariffs, the import tariff revenue effect precisely offsets the domestic profit effect, and all that remains is the consumer surplus benefit for the falling Foreign price. The result that $\frac{dG}{ds^*}\big|_{\tau=\tau^*=\tau^N} > 0$ at noncooperative import tariffs implies that international inefficiency results from too little subsidization at the noncooperative import tariffs:

$$
\frac{dG}{ds^*}\bigg|_{\tau=\tau^*=\tau^N} = \left(PD\frac{\widehat{P}}{\widehat{p}_f}\right)\frac{1}{1 + \phi + \tau + s^*} > 0.
\tag{26}
$$

By Lemma 8, we can state the following:

Proposition 3 *Propositions 2 and 1 extend to export subsidies.*

Proposition 3 completes our explanation for why the rationale for subsidy limits and their evolution applies to both domestic entry subsidies and export subsidies.

4.5 The Failure of Reciprocity in Setting Export Subsidies

The paper so far has emphasized how import tariff reductions improve welfare but also lead to subsidy restriction motives. Such a policy path is consistent with empirical reality—GATT nations first bound import tariffs, then sought to constrain subsidies. Are there alternative paths of policy that could lead to different policy constraints?

We can easily show that if countries were to reduce net trade barriers by expanding export subsidies, then this policy path also can lead to net trade barriers that satisfy the trade policy efficiency conditions. Suppose countries choose export subsidies $\frac{\alpha}{\sigma}$ and choose import tariffs noncooperatively. At this level of export subsidies, countries are indifferent to changes in trade output, since the politically-weighted profit balances out the subsidy costs. Countries are choosing export subsidies as if they ignored the resulting terms-of-trade loss. We can see from the comparative static conditions in Appendix A.1.1, that (1) Foreign import tariffs have no effect on Home welfare, and (2) Foreign export subsidies shift rents in zero-sum fashion.[47] The two results imply that the border measures satisfies the trade policy efficiency conditions. Yet since import tariffs are at noncooperative levels, applying Proposition 1 we still have no motive for subsidy constraints.

In establishing the undesirability of subsidy constraints when governments ignore the terms-of-trade effects of their policy choices, the current paper is consistent with the results of Bagwell and Staiger (2009). They show that the GATT principle of reciprocity guides countries toward the policies countries would choose when they act as if they do not value their terms of trade. The policy path assumed in the previous section—which involves reductions in import tariffs and no increases in export subsidies—is then a departure from the GATT principle of reciprocity. Empirically, the departure from the principle is transparent: for the principle to work in this setting, countries must raise export subsidies reciprocally to be consistent with the principle. In reality, we observe the policy being applied to import tariff reductions.[48] We can then interpret the WTO subsidy rules as the consequence of a departure from the principle of reciprocity in an imperfectly competitive setting.

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[47]The effect of the Foreign export subsidy on Home is $\frac{dG}{ds} = \frac{-p_h^* n_h c_h^*}{(1+\phi+\tau^*-s)}$. The effect of the Foreign export subsidy on Foreign, provided the noncooperative import tariff condition is satisfied, is $\frac{dG^*}{ds^*} = \frac{p_h^* n_h c_h^*}{(1+\phi+\tau-s^*)}$.

[48]In all work discussing the history of reciprocity in the GATT, such as Bagwell and Staiger (1999, 2002), there is no mention of reciprocity applied to export subsidy increases.

4.6   Countervailing Duties

The previous subsections have considered how countries can improve upon GATT rules by bounding subsidies at cooperative levels. An alternative way to ensure efficient subsidies is by permitting a countervailing duty response to a subsidy. We show that if countries impose duties such that they eliminate the negative policy externalities of the subsidies, then the duties can ensure efficient subsidy choices. If α satisfies the conditions laid out in Proposition 2 so there is a problem with subsidies being too high in the absence of more rules, then countries can achieve efficient policies using countervailing duties instead of subsidy limits at the zero-tariff equilibrium. The evolution story described in the previous subsection still holds: since countries are already choosing their best response import tariffs when import tariffs chosen noncooperatively, countries obviously cannot achieve greater cooperation with countervailing duties.

To model these issues we introduce the following extension of our prior definition of the GATT equilibrium:

Definition 9 *Define a **GATT equilibrium with countervailing duties** to be a set of policies $(\hat{\tau}, \hat{s}, \hat{e}, \hat{\tau}^*, \hat{s}^*, \hat{e}^*)$ such that each country is choosing unilaterally optimal policies subject to the market access constraint defined in the program below, and such that any subsidy that undermines a trading partner's domestic sales is mechanically met with an import tariff ($\bar{\tau}$ for Home) that restores domestic sales volume to the baseline level. The Home and Foreign constraints that imply a GATT equilibrium are known as a **GATT agreement with countervailing duties**. Formally, the Foreign policies satisfy*

$$(\hat{\tau}^*, \hat{s}^*, \hat{e}^*) = \arg \max_{\tau^*, s^*, e^*} \; G^*(\bar{\tau}, \hat{s}, \hat{e}, \tau^*, s^*, e^*)$$

$$subject \; to \; c_h^*(\hat{\tau}, \hat{s}, \hat{e}, \tau^*, s^*, e^*) \;\; \geq \;\; c_h^*(\hat{\tau}, \hat{s}, \hat{e}, \hat{\tau}^*, \hat{s}^*, \hat{e}^*)$$
$$and \; c_h(\bar{\tau}, \hat{s}, \hat{e}, \tau^*, s^*, e^*) \;\; = \;\; c_h(\hat{\tau}, \hat{s}, \hat{e}, \hat{\tau}^*, \hat{s}^*, \hat{e}^*)$$

A set of policies is a GATT equilibrium with countervailing duties if countries would not deviate from a baseline level of subsidization given the following two constraints. First, any subsidy is met with a countervailing duty response from the trading partner that preserves the trading partner's domestic sales. Second, as in the earlier GATT equilibrium definition, imposing a domestic subsidy requires an import tariff reduction that preserves the trading partner's export volume.

The maximum level of countervailing duty implied by the definition is consistent with practice under the WTO. For an export subsidy, the countervailing duty ($\bar{\tau} - \hat{\tau}$, the tariff in

excess of the baseline rate) that satisfies the second constraint above equals the amount of export subsidy beyond the baseline subsidy $(s^* - \hat{s}^*)$, where the baseline export subsidy could be zero. The laws for a countervailing duty of an entry subsidy are less straightforward. But as Grossman and Mavroidis (2003) detail, one interpretation is that the countervailing duty should undo the effect of the undesirable subsidy, and such a requirement is met here.

We introduce the following formalism that parallels Section 4.1:

Definition 10 *Subsidy limits* $e \leq \tilde{e}$ *and* $e^* \leq \tilde{e}^*$ *or* $s \leq \tilde{s}$ *and* $s^* \leq \tilde{s}^*$ ***improve*** *a GATT equilibrium with countervailing duties if Nash equilibrium government choices subject to both the market access constraints, the countervailing duties, and the subsidy limits yield a superior joint government outcome relative to Nash equilibrium choices subject only to the market access constraints and countervailing duties.*

We prove that the zero-tariff GATT equilibrium (which exists by Lemma 6) with countervailing duties cannot be improved by subsidy limits. Recall from Section 4.2 that the first-order effect of Foreign firm entry on Home welfare subject to the market access constraint is

$$\frac{dG}{dn_f}\Big|_{dc_h^*=0} = G_P(\tau)\frac{dP}{dn_f} + \tau p c_f. \tag{27}$$

Because a countervailing duty that preserves Home domestic sales also preserves the Home price index, the $G_P \frac{dP}{dn_f}$ term above is eliminated by the combination of a differential entry subsidy increase and countervailing duty. It follows that $\frac{dG}{dn_f}\Big|_{\substack{dc_h^*=0 \\ dP=0}} = 0$ for $\tau = 0$ and $\frac{dG}{dn_f}\Big|_{\substack{dc_h^*=0 \\ dP=0}} > 0$ for $\tau > 0$. We can then decompose any discrete increase in Foreign entry into an integral over such differential increases in the subsidies, and conclude that the discrete increase in Foreign entry must have a nonnegative effect on Home government welfare. We then have the following proposition by Lemma 8:

Proposition 4 *A GATT equilibrium with countervailing duties at non-negative import tariffs cannot be improved by subsidy limits.*

The success of countervailing duties in theory then begs the question of why countries would ever have subsidy limits in addition to countervailing duties. The next subsection presents one explanation: the potential for subsidies to create problems for countries competing in third markets.

4.7 Third Country Competition

As we discussed in Section 2.2, a reason why countries would favor using subsidy limits over countervailing duties is competition in third countries. The case for using subsidy limits in a three-country scenario in this model depends on the difficulty of countries coordinating countervailing duty action. The baseline model can easily be extended to a third symmetric country. Here we consider a scenario where Home can impose a countervailing duty on Foreign's entry subsidy, but the third country exogenously does not impose a countervailing duty on Foreign. We denote the third country's production with subscript g and also use the superscript g to denote final destination and government choices of the third country. We already discussed in the previous subsection how at zero tariffs, there is no first-order effect of Foreign subsidization on Home, without considering the third country effects. The only effect of the Foreign subsidy on Home via the third country is through the change in the third country's price index, which affects Home's export volume and Home's export subsidy cost:

$$
\frac{dG}{dn_f}\Big|_{\substack{dc_h^*=0 \\ dc_h^g=0 \\ dP=0 \\ \tau=\tau^*=\tau^g=0}} = G_{P^g}\frac{dP^g}{dn_f}
$$

$$
\text{where } G_{P^g} \equiv (\frac{\alpha}{\sigma}-s)n_h\frac{dc_h^g}{dP^g}.
$$

We know $\frac{dc_h^g}{dP^g}>0$ because an increase in the third-country price index is a decrease in Foreign competition and improved exports, and by Lemma 2, and we know that $s<\frac{\alpha}{\sigma}$, because countries will never subsidize exports so much that they would prefer a decrease in export volume. Consequently, $G_{P^g}>0$, so countries benefit from an increase in the Foreign price index. Since Foreign firm entry decreases the third country's price index, we have $\frac{dP^g}{dn_f}<0$. Intuitively, the Home government is worse off in the third market because the increased Foreign competition has an adverse effect on its exports.

The effect of Foreign entry on the third country is equal to the effect of Foreign entry on Home derived in Equation (23). The third country suffers from the entry subsidy and does not impose the countervailing duty. There is no effect on the third country's exports to Home because Home's countervailing duty preserves Home's price index.

The Lemma 8 result, that a negative externality implies countries benefit from subsidy rules, can easily be extended from two countries to the three-country setting. We have shown that both Home and the third country suffer a negative effect from Foreign firm entry. Subject to the market access and countervailing duty constraints, Foreign sets its

policy so there is no first-order effect of a change in entry subsidy. By setting a subsidy limit below the Foreign level absent any such limit, Home and the third country gain a first-order benefit and the world objective improves. We then have the following proposition:

Proposition 5 *In a three-country economy, a GATT equilibrium with Home countervailing duties at zero import tariffs can be improved by subsidy limits.*

We also need to verify that by including a third country, we have not overturned our previous result that subsidy rules are undesirable at the Nash policy choices. In Appendix A.3, we derive the external effect of Foreign entry on Home in Foreign's market absent the possibility of the nonviolation complaint. This effect equals the external effect of Foreign entry on Home in the third market, where the nonviolation complaint is unavailable, so the proposition below follows:

Proposition 6 *In the three-country economy, Home's welfare cannot be improved from the Nash equilibrium by subsidy limits if* $\alpha < \frac{\varepsilon}{1-\frac{\varepsilon}{\sigma}}\frac{1}{S^N}$.

Notice this upper bound of α in Proposition 6 is greater than the lower bound of α in Proposition 2 that ensured countries desire subsidy limits (because $\varepsilon > 1$), so there does exist an interval of α such that countries would seek subsidy rules at zero import tariff levels but not at noncooperative import tariff levels. Using the parameter values from Section 4.3, the α upper bound is 8, far larger than any estimated α in the empirical literature, so the theory is still consistent with the stylized fact that there are no subsidy rules at noncooperative tariffs.

Why are there some high α values for which Home would desire subsidy agreements at noncooperative policy in the three-country case but not in the two-country case? When Foreign subsidizes in the two-country case, the nonviolation complaint protects Home from losing any exports to Foreign, and Home has set import tariffs sufficiently high so that Home benefits from the price index decrease. In the three-country case, Home is also adversely affected by the Foreign subsidy decreasing the third country's price index. Strong political economy motives (high α) could in theory lead this third-country effect to dominate, leading to motives for subsidy limits even at noncooperative policy.

5   Conclusion

This paper counters the claim that the WTO subsidy rules have no economic rationale whatsoever. It resolves the puzzle of why countries would seek to constrain trade-reducing

policies at the time of the GATT, yet implement barriers to trade-promoting policies 40 years later. It is important to provide a theory for understanding the WTO subsidy rules, when such a large body of literature argues the subsidy rules are nonsensical. Much of the trade literature argues that the GATT struck the right balance in regulating both trade policies and domestic policies, but the current paper argues that the world trading system has faced problems that the GATT could not address.

In providing a theoretical example of the evolution of subsidy restrictions, the paper uses several stylized assumptions. There is a particular mode of competition, a restriction on governments' domestic marginal cost subsidy, a quasilinear outside sector, and factors of production that separately influence fixed costs and marginal costs. While this model is ideal for providing a simple example of the evolution of subsidy restrictions, more work is necessary to establish the theoretical robustness of these results. Of all these restrictions, allowing a wage subsidy would most clearly allow governments to eliminate imperfect competition problems and the need for subsidy constraints, yet the failure to correct intersectoral misallocation is an empirical fact. Trade agreement models where governments endogenously cannot correct intersectoral misallocation would be an interesting area for future research.

The results suggest that subsidy rules are motivated by externalities other than the terms-of-trade externality that is dominant in the literature. The result does not contrast with the growing literature arguing that terms-of-trade considerations are indeed empirically relevant. Yet it remains an open question whether countries have set trade policy to eliminate cross-border imperfect competition externalities, as in the theory of Bagwell and Staiger (2009, 2012a, 2012b). This paper suggests the answer is no, so imperfect competition externalities cannot be ignored when interpreting the WTO. Also, the results matter for understanding future negotiations over non-tariff measures.

The model provides a positive theory for the WTO subsidy rules. From the normative perspective that countries should maximize national income, the model does not provide a result distinct from prior work, since there is no motive for subsidy rules absent political economy motives. The positive theory is still valuable in explaining why countries form sub-optimal agreements. If there are additional reasons why governments should value domestic production outside the scope of the model, then this paper is a step towards a model of how such considerations would be important in motivating subsidy rules.

While we have mainly considered the history of domestic policies in manufacturing trade to validate the theory, the negotiations over services provide an additional potential application. As Francois and Hoekman (2010) observe, "Much more work is also required to understand the political economy of services policies and reform. It is not clear that for international transactions that involve factor movement (i.e. trade in service) the standard

explanations in the literature—first and foremost the terms of trade rationale—necessarily apply." A defining feature of services trade is that domestic regulations rather than border measures are what matter for market access, so the framework developed here is promising for the analysis of such trade barriers. The theory can explain the observation that services liberalization would be unilateral in some industries but require coordination in others, because a balance of various externalities determines the type of policy constraints in the current paper.

This paper improves our positive understanding of the international coordination of subsidies, but the actual decision-making process to file subsidy disputes and countervailing duties is more complex than in the model. How does the political process map the winners and losers from subsidization into the actual decision-making? To what extent do bureaucrats have the necessary information to make appropriate decisions about subsidies? More research is necessary to understand how international coordination of subsidies could be improved, and whether international subsidy rules should be eliminated altogether, as Sykes (2010) proposes.

A   Appendix

A.1   Comparative Statics

This appendix section derives comparative statics for government policies. Totally log-differentiating the price index equations and the demand equations yield all the comparative statics for prices and firms:

$$
\begin{bmatrix} \hat{P} \\ \hat{P}^* \end{bmatrix} = \frac{1}{1-\sigma} \begin{bmatrix} S & 1-S \\ 1-S^* & S^* \end{bmatrix} \begin{bmatrix} \hat{n}_h \\ \hat{n}_f \end{bmatrix} + \begin{bmatrix} (1-S_h)\hat{p}_f \\ (1-S_f^*)\hat{p}_h^* \end{bmatrix}, \tag{28}
$$

$$
\begin{aligned}
\hat{x}_h &= \frac{c_h}{x_h}\hat{c}_h + (1 - \frac{c_h}{x_h})\hat{c}_h^*, \\
\hat{x}_f &= (1 - \frac{c_f}{x_f})\hat{c}_f + \frac{c_f}{x_f}\hat{c}_f^*, \text{ and}
\end{aligned} \tag{29}
$$

$$
\begin{bmatrix} \hat{x}_h \\ \hat{x}_f \end{bmatrix} = (\sigma - \varepsilon) \begin{bmatrix} \frac{c_h}{x_h} & 1 - \frac{c_h}{x_h} \\ (1 - \frac{c_f}{x_f}) & \frac{c_f}{x_f} \end{bmatrix} \begin{bmatrix} \hat{P} \\ \hat{P}^* \end{bmatrix} - \sigma \begin{bmatrix} (1 - \frac{c_h}{x_h})\hat{p}_h^* \\ (1 - \frac{c_f}{x_f})\hat{p}_f \end{bmatrix}. \tag{30}
$$

Here $\hat{a} = d\log a = da/a$.

The entry subsidies e and e^* singly determine the firm counts n_h and n_f, respectively.

The connection between the trade policy instruments and prices is that each trade policy instrument affects only one price. Totally differentiating the traded price equations yields

$$
\begin{aligned}
dp_f &= p(d\tau_h + d\tau_f), \text{ and} \\
dp_h^* &= p(d\tau_h^* + d\tau_f^*).
\end{aligned}
\tag{31}
$$

To see a connection between the effects of Foreign entry and Foreign export subsidies, notice that log changes in one have proportional effects to log changes in the other, for the Home price index, Home domestic sales, and expenditure shares: $(1 - \sigma)\frac{\widehat{P}}{\widehat{n}_f} = \frac{\widehat{P}}{\widehat{p}_f}$, $(1 - \sigma)\frac{\widehat{c_h}}{\widehat{n}_f} = \frac{\widehat{c_h}}{\widehat{p}_f}$, and $(1 - \sigma)\frac{\widehat{p_f n_f c_f}}{\widehat{n}_f} = \frac{\widehat{p_f n_f c_f}}{\widehat{p}_f}$.

Foreign price increases always raise Home sales and lower Foreign sales:

$$
\begin{aligned}
\frac{\widehat{c_h}}{\widehat{p}_f} &= (\sigma - \varepsilon)(1 - S) > 0, \text{ and} \\
\frac{\widehat{c_f}}{\widehat{p}_f} &= \sigma - (\sigma - \varepsilon)(1 - S) > 1.
\end{aligned}
\tag{32}
$$

A.1.1 Trade Policy Comparative Statics

This subsection provides comparative statics for changes in Home or Foreign government policies on Home welfare. Symmetric results hold for Foreign.

The effect of a Foreign tariff increase on Home is

$$
\frac{dG}{d\tau^*} = \frac{(\frac{\alpha}{\sigma} - s)pn_h c_h^* \frac{\widehat{c_h^*}}{p_h^*}}{(1 + \phi + \tau^* - s)}.
\tag{33}
$$

The effect of an increase in Home's own export subsidy is

$$
\frac{dG}{ds} = \frac{(s - \frac{\alpha}{\sigma})pn_h c_h^* \frac{\widehat{c_h^*}}{p_h^*} - p_h^* n_h c_h^*}{(1 + \phi + \tau^* - s)}.
\tag{34}
$$

The effect of an increase in Foreign export subsidies on Home is

$$
\frac{dG}{ds^*} = \frac{p_f n_f c_f - \alpha(\frac{p}{\sigma})n_h c_h \frac{\widehat{c_h}}{\widehat{p}_f} - \tau p n_f c_f \frac{\widehat{c_f}}{\widehat{p}_f}}{(1 + \phi + \tau - s^*)}.
\tag{35}
$$

The effect of an increase in Home's own tariff is

$$\frac{dG}{d\tau} = \frac{\alpha(\frac{p}{\sigma})n_h c_h \widehat{\frac{c_h}{p_f}} + \tau p n_f c_f \widehat{\frac{c_f}{p_f}}}{(1 + \phi + \tau - s^*)}. \tag{36}$$

The effect of an increase in trade barriers $t = \tau - s^* = \tau^* - s$ on world welfare is

$$\frac{(1 + t + \phi)}{2}\frac{dW}{dt} = \alpha\frac{p}{\sigma}n\left(\left[c_h(\widehat{\frac{c_h}{p_f}}) + (1 + \phi)c_h^*(\widehat{\frac{c_h^*}{p_h^*}})\right] + tpn_h c_h^*(\widehat{\frac{c_h^*}{p_h^*}}). \tag{37}$$

A.2   Lemma Proofs

Lemma 1 *Consider countries with symmetric policies $\bar{e}$, $\bar{\tau}^N$, and $\bar{s}^N$, such that $\frac{dG}{d\tau} = \frac{dG^*}{d\tau^*} = \frac{dG}{ds} = \frac{dG^*}{ds^*} = 0$. For sake of comparison, consider a different pair of countries with net trade barriers $\bar{t}^C$ such that $\frac{dW}{d\tau} = \frac{dW}{d\tau^*} = \frac{dW}{ds} = \frac{dW}{ds^*} = 0$. Then $\bar{\tau}^N$, $\bar{s}^N$, $\bar{t}^C$ do not depend on $\bar{e}$, $\bar{\tau}^N > 0$, and $\bar{t}^N > \bar{t}^C$.*

Proof. $\bar{\tau}^N$, $\bar{s}^N$, and $\bar{t}^c$ do not depend on $\bar{e}$ because under symmetric policies, firm counts are the same, and drop out of all the first-order conditions.

$\tau^N > 0$: Define $\bar{\tau}^N$ to be the Nash tariff and denote other symmetric policies similarly. $\bar{\tau}^N = -\frac{\alpha}{\sigma}\frac{c_h}{c_f}\widehat{\frac{c_h}{p_f}}/\widehat{\frac{c_f}{p_f}} > 0$, because $\widehat{\frac{c_h}{p_f}} > 0$ and $\widehat{\frac{c_f}{p_f}} < 0$ (a Foreign price increase improves Home's sales and lowers Home's imports).

$\bar{t}^N > \bar{t}^C$: Substituting the Nash policy conditions $(\frac{dG}{ds} = 0)$ and $(\frac{dG}{dt} = 0)$ into the externality equations we get $\frac{dG}{ds^*} > 0$ and $\frac{dG}{d\tau^*} < 0$ (see Appendix Section A.1.1), which implies countries can benefit from cooperatively reducing trade barriers from Nash policies. ∎

Lemma 2 *Consider arbitrary import tariff policies and entry subsidies, and export subsidy choices s and s^* satisfying $\frac{dG}{ds} = \frac{dG^*}{ds^*} = 0$ Then $s \leq \frac{\alpha}{\sigma}$ and $s^* \leq \frac{\alpha}{\sigma}$.*

Proof. The export subsidy first-order condition (setting equation 34 to 0) implies $\bar{s} = \frac{\alpha}{\sigma} + \frac{p_h^*}{p}\widehat{\frac{c_h^*}{p_h^*}}$. Since $\widehat{\frac{c_h^*}{p_h^*}} < 0$, $\bar{s} < \frac{\alpha}{\sigma}$. ∎

Lemma 3 *Import tariffs always cause negative cross-border externalities on their trading partners $(\frac{dG^*}{d\tau} < 0$ and $\frac{dG}{d\tau^*} < 0)$. If Home and Foreign choose noncooperative import tariffs to maximize their objectives, holding other policies fixed, then the noncooperative import tariffs are higher than the cooperative import tariffs that maximize W.*

Proof. The import tariff externality expression (33) implies the externality has the same sign as $s - \frac{\alpha}{\sigma}$, but Lemma **2** implies $s < \frac{\alpha}{\sigma}$, and $\frac{dG^*}{d\tau} < 0$ and $\frac{dG}{d\tau^*} < 0$ follows. For the Nash policies to maximize W, it must also be true that $\frac{dG}{d\tau} + \frac{dG^*}{d\tau} = 0$, so $\frac{dG}{d\tau} > 0$. $\frac{dG}{d\tau} = 0$ at the Nash tariff, and sign($\frac{dG}{d\tau}$)=sign($\alpha(\frac{p}{\sigma})c_h\widehat{\frac{c_h}{p_f}} + \tau p c_f \widehat{\frac{c_f}{p_f}}$). $\alpha(\frac{p}{\sigma})c_h\widehat{\frac{c_h}{p_f}} > 0$ and $p c_f \widehat{\frac{c_f}{p_f}} < 0$, so a lower tariff than the Nash tariff is necessary to induce a positive $\frac{dG}{d\tau}$. ∎

Lemma 6: *There exists a set B of scale parameters β for the function $k(e)$, such that there exists a GATT equilibrium at zero import tariffs when $\beta \in B$.*

Proof. Define M to be a nations's total export volume, the number of firms multiplied by the per-firm export volume. Let $\bar{M} > \bar{M}^N$ be a symmetric export volume greater than the export volume at Nash policies. We show we can find a β such that there is a GATT equilibrium at zero import tariffs with export volume $\bar{M}$, and by varying $\bar{M}$, this maps out the set B of β values such that we know a zero-tariff GATT equilibrium exists. Let $\bar{\tau}, \bar{s},$ and $\bar{e}$ be the policies countries choose at the GATT equilibrium with export volume $\bar{M}$. We can scale the function $k(e)$ so that countries choose zero import tariffs. Write $k(e) = \beta_k \kappa(e)$ for some $\beta_k > 0$ yet to be determined, and κ is a function that satisfies our restrictions for k, and let κ have scale parameter β_κ. The condition for the constrained optimal choice of e can then be written as $F(\bar{\tau}, \bar{s}, \bar{e}) = \beta_k$, for some function $F(\bar{\tau}, \bar{s}, \bar{e})$, which is strictly positive because κ is positive, and both consumer welfare and total profits are increasing in the entry subsidy. The market access constraint gives us e as a function of $\bar{\tau}$ and the unilateral export condition gives us $\bar{s}(\bar{\tau}, \bar{e}(\bar{\tau}))$. If we choose $\beta_k = F(0, \bar{s}(0, \bar{e}(0)), \bar{e}(0))$, then the resulting function k has scale parameter $\beta = \beta_k \beta_\kappa$, the choices of s and e are optimal subject to the market constraint, and the policies $(0, \bar{s}(0, \bar{e}(0)), \bar{e}(0))$ determine a GATT equilibrium with zero tariffs. ∎

Lemma 8: Consider a set a constraints on Foreign defined by the vector-valued function $X(s^*, \tau^*, n_f) = 0$, and a matching set of constraints on Home. Adding entry subsidy limits to the set of constraints improves a GATT equilibrium subject to the set of constraints $X = 0$ if and only if $\frac{dG}{dn_f}|_{dX=0} < 0$ (where $dX = 0$ is the constraint that differential changes in policy leave X unchanged). Adding export subsidy limits improves the GATT equilibrium if and only if $\frac{dG}{ds^*}|_{dX=0} < 0$.

Proof. At the GATT equilibrium with firms $\hat{n}_f$, $\frac{dG^*}{dn_f}|_{dX=0} = 0$. Since $\frac{dG}{dn_f}|_{dX=0} < 0$, $\frac{dW}{dn_f}|_{dX=0} < 0$. As discussed in Section 3.1, the reduced-form cost function $f(n)$ is such that G^* is concave in n_f. By concavity in n_f, there must exist $\bar{n}_f < \hat{n}_f$ in the neighborhood of $\hat{n}_f$ such that at $\bar{n}_f$, $\frac{dW}{dn_f}|_{dX=0} < 0$, $\frac{dG}{dn_f}|_{dX=0} < 0$, and $\frac{dG^*}{dn_f}|_{dX=0} > 0$. As the Foreign government objective is increasing and concave in n_f within the constraint set $n_f \leq \bar{n}_f$, the GATT equilibrium with constraint $n_f \leq \bar{n}_f$ must bind at $\bar{n}_f < \hat{n}_f$ and countries will achieve greater welfare since $\frac{dW}{dn_f}|_{dX=0} < 0$ within the interval $(\bar{n}_f, \hat{n}_f)$. A parallel proof applies for the Home tariff choices, and a similar proof applies for the export subsidy choices. When considering the subsidy limits applied to both countries, each country suffers no first-order effect from the imposition of a differentially tighter constraint on itself, while achieving the first-order gain from the constraint on the trading partner. To establish the converse, notice that if the

constrained derivative ($\frac{dG}{dn_f}|_{dX=0} < 0$ or $\frac{dG}{ds^*}|_{dX=0} < 0$) is nonnegative, then subsidy limits would either (1) not bind and have no effect or (2) bind and decrease each government's objective. ■

A.3 Inefficiency at Noncooperative Tariffs

The combined effects of Foreign firm entry, derived in Section 3.4, are

$$
n_f \frac{dG}{dn_f} = p_f n_f c_f \frac{1}{\sigma - 1} + \left[\alpha(\frac{p}{\sigma}) n_h c_h \frac{\widehat{c_h}}{\widehat{n_f}} + \tau p n_f c_f \left(1 + \frac{\widehat{c_f}}{\widehat{n_f}} \right) \right] + \left[(\alpha(\frac{p}{\sigma}) n_h c_h^* - s p n_h c_h^*) \frac{\widehat{c_h^*}}{\widehat{n_f}} \right].
$$

The first term is the effect on consumer surplus, the first set of brackets contains the effects in the domestic market (Home profits and tariff revenue), and the second set of brackets contains the effects in the third market (export profits and export policy costs). There are no effects in the Foreign market due to Article XXIII.

We can express the Foreign firm externality in log price changes using results from Appendix A.1:

$$
n_f(\sigma-1) \frac{dG}{dn_f} = p_f n_f c_f - \left[\alpha(\frac{p}{\sigma}) n_h c_h \frac{\widehat{c_h}}{\widehat{p_f}} + \tau p n_f c_f \left(1 + \frac{\widehat{c_f}}{\widehat{p_f}} \right) \right] - \left[(\alpha(\frac{p}{\sigma}) n_h c_h^* - s p n_h c_h^*) \left(\frac{\widehat{c_h^*}}{\widehat{p_f^*}} \right) \right].
$$

The first bracketed expression is comparable to the Home unilateral import policy condition, while the second is comparable to the Home unilateral export policy condition. Substituting in the noncooperative values of τ and s yields

$$
\frac{dG}{dn_f} = \left(p_f n_f c_f + \left[\alpha(\frac{p}{\sigma}) n_h c_h \frac{\widehat{c_h}}{\widehat{p_f}} / \frac{\widehat{c_f}}{\widehat{p_f}} \right] + \left[p_h^* n_h c_h^* \frac{\widehat{c_h^*}}{\widehat{p_f^*}} / \frac{\widehat{c_h^*}}{\widehat{p_h^*}} \right] \right) \frac{1}{n_f(\sigma - 1)}. \tag{38}
$$

The first bracketed expression is negative. Home still loses domestic profits from Foreign firm entry as in the zero-tariff case of the previous section, but the losses have been scaled down by the price elasticities of import demand ($\frac{\widehat{c_f}}{\widehat{p_f}}$ and $\frac{\widehat{c_h^*}}{\widehat{p_h^*}}$) which both equal $-\sigma - (\sigma - \varepsilon)(1 - \bar{S}) < -1$.

To sign $\frac{dG}{dn_f}$, first compare the consumer gain $p_f n_f c_f$ to the second bracketed expression. For symmetric policies $p_f n_f c_f = p_h^* n_h c_h^g$. Because own price effects are stronger than cross-price effects, $-\frac{\widehat{c_h^*}}{\widehat{p_f^*}} / \frac{\widehat{c_h^*}}{\widehat{p^*}} < 1$, the consumer gain dominates. Further simplifying,[49]

---

[49] We use the symmetry result that import price elasticities for each country are the same and we calculate that $1 + \frac{\widehat{c_h^*}}{\widehat{p_f^*}} / \frac{\widehat{c_h^*}}{\widehat{p_h^*}} = \varepsilon / \left(-\frac{\widehat{c_h^*}}{\widehat{p_h^*}} \right)$.

$$\frac{dG}{dn_f} = \left(p_f n_f c_f \varepsilon - \alpha(\frac{p}{\sigma}) n_h c_h \frac{\widehat{c_h}}{\widehat{p_f}} \right) \frac{1}{\left(-\frac{\widehat{c_f}}{\widehat{p_f}} \right) n_f (\sigma - 1)}.$$

We can sign $\frac{dG}{dn_f}$ as follows:

$$\frac{dG}{dn_f} > 0 \iff \alpha < \frac{\varepsilon\sigma}{\sigma - \varepsilon} \frac{1}{\bar{S}^N}.$$

References

Antras P. and R.W. Staiger (2012a), "Trade Agreements and the Nature of Price Determination," *American Economic Review Papers and Proceedings*, May.

Antras P., and R.W. Staiger (2012b), "Offshoring and the Role of Trade Agreements," *American Economic Review*.

Bagwell, K. and P. C. Mavroidis (2010), "Too Much, Too Little... Too Late?" in K. Bagwell, G. A. Bermann, and P. C. Mavroidis (eds.), *Law and Economics of Contingent Protection in International Trade*, New York: Cambridge University Press.

Bagwell, K. and R. W. Staiger (1999), "An Economic Theory of GATT," *American Economic Review*, 89, 215-48.

Bagwell, K. and R. W. Staiger (2001a), "Domestic Policies, National Sovereignty, and International Economic Institutions," *Quarterly Journal of Economics*, May, 116, 519-62.

Bagwell, K. and R. W. Staiger (2001b), "Strategic Trade, Competitive Industries, and Agricultural Trade Disputes," *Economics and Politics*, 13, 113-128.

Bagwell, K. and R. W. Staiger (2002), *The Economics of the World Trading System*, Cambridge: MIT Press.

Bagwell, K. and R. W. Staiger (2006), "Will International Rules on Subsidies Disrupt the World Trading System," *American Economic Review*, 96, 877-895.

Bagwell, K.,and R. W. Staiger (2009),"Delocation and Trade Agreements in Imperfectly Competitive Markets," NBER Working Paper No. 15444.

Bagwell, K. and R. W. Staiger (2010), "The WTO: Theory and Practice," *Annual Reviews of Economics*, 2.

Bagwell, K. and R. W. Staiger (2012a), "The Economics of Trade Agreements in the Linear Cournot Delocation Model," *Journal of International Economics*, 88, 32-46.

Bagwell, K. and R. W. Staiger (2012b), "Profit Shifting and Trade Agreements in Imperfectly Competitive Markets," *International Economic Review*, 53(4), 1067-1104.

Bagwell, K., P. C. Mavroidis and R. W. Staiger (2002), "It's A Question of Market Access," *American Journal of International Law*, 96, 56-76.

Baldwin, R. (1980), "The Economics of the GATT," in *Issues in International Economics*, Peter Oppenheimer ed., London: Oriel Press.

Baldwin, R. (1987), "Politically Realistic Objectives and Trade Policy," *Economic Letters* 24, 287-90.

Baylis, K. (2009), "Countervailing Duties," in J. D. Gaisford and W. A. Kerr (eds.), *Handbook of International Trade Policy*, Edward Elgar Publishing.

Bhagwati, J. and R. E. Hudec, eds. (1996), Fair Trade and Harmonization: Prerequisites for Free Trade? Volume 1 (Economic Analysis), Cambridge: MIT Press.

Bhagwati, J. (1996), "The Demands to Reduce Domestic Diversity among Trading Nations," in J. Bhagwati, and R. E. Hudec, eds., *Fair Trade and Harmonization: Prerequisites for Free Trade? Volume 1 (Economic Analysis)* Cambridge: MIT Press.

Bhagwati, Jagdish and V.K. Ramaswami (1963), "Domestic Distortions, Tariffs and the Theory of Optimum Subsidy," *Journal of Political Economy* 71 (1), 44-50.

Brander, J. A. and B. J. Spencer (1985), "Export Subsidies and International Market Share Rivalry," *Journal of International Economics*, 18. 83-100.

Broda C. and D. Weinstein (2006), "Globalization and the Gains from Variety," *Quarterly Journal of Economics* 121, 541-85.

Brou, D. & Ruta, M. (2013). A Commitment Theory of Subsidy Agreements. The B.E. Journal of Economic Analysis & Policy, 14(1), pp. 239-270.

Campolmi A., H. Fadinger, and C. Forlati (2013), "Trade Policy: Home Market Effect versus Terms-of-Trade Externality," mimeo. (accepted for publication in *Journal of International Economics)*, September.

Chang, P.-L. (2005), "Protection for Sale Under Monopolistic Competition", *Journal of International Economics*, 66 (2), 509-526.

Colacicco R. (2013), "Strategic Trade Policy in General Oligopolistic Equilibrium," FIW Working Paper No. 126.

DeRemer, D. (2013), "Domestic Policy Coordination in Imperfectly Competitive Markets," ECARES Working Paper No. 2013-46.

Diebold, W. (1993-1994), "Reflections on the International Trade Organization," 14 N. Ill. U. L. Rev. 335.

Dixit, A. (1984), "International Trade Policy for Oligopolistic Industries," *Economic Journal*, 94 supplement, 1-16.

Dixit. A. (1988), "Anti-Dumping and Countervailing Duties Under Oligopoly," *European Economic Review* 32, 55-68.

Dixit, A. and J. Stiglitz (1977), "Monopolistic Competition and Optimal Product Diversity," *American Economic Review*, 67, 297-308.

Epifani, P. and G. Gancia (2011). Trade, markup heterogeneity and misallocations. *Journal of International Economics*, 83(1), 1–13.

Ethier, W. J. (2007), "The Theory of Trade Policy and Trade Agreements: A Critique," *European Journal of Political Economy*, 23 (3): 605–623.

Ervik I. S., D. Etzel, and C. Soegaard (2012), "Welfare Effects of Trade Policy in General Oligopolistic Equilibrium," mimeo., November.

Feenstra, R.C. (1986), "Trade Policy with Several Goods and 'Market Linkages,'" *Journal of International Economics*, 20(3-4), 249-267.

Flam, H. and E. Helpman (1987), "Industrial Policy Under Monopolistic Competition," *Journal of International Economics*, 22(1-2): 79-102.

Francois J. and Hoekman B. (2010), "Services Trade and Policy," *Journal of Economic Literature*, 48, 642-692.

Goldberg P., and G. Maggi (1999), "Protection for Sale: An Empirical Investigation," *American Economic Review*, 89(5), 1135-1155.

Gawande K. and U. Bandyopadhyay (2000), "Is Protection for Sale? Evidence on the Grossman-Helpman Theory of Endogenous Protection," *Review of Economics and Statistics*, 82:1, 139-152.

Gros, D. (1987), "A note on the optimal tariff, retaliation, and the welfare loss from tariff wars in a framework with intraindustry trade," *Journal of International Economics*, 23, 357-367.

Grossman, G. M. and E. Helpman (1994), "Protection for Sale," *American Economic Review*, 84, 833-50.

Grossman, G. M. and E. Helpman (1995), "Trade Wars and Trade Talks," *Journal of Political Economy*, 103(4), 675.

Grossman, G. M. and H. Horn (2013), "Why the WTO? An Introduction to the Economics of Trade Agreements," in H. Horn and P. Mavroidis (eds.), *Legal and Economic Principles of World Trade Law*, Cambridge University Press: 9-67.

Grossman, G. M. and P. Mavroidis (2001), "US - Lead and Bismuth II United States - Imposition of Countervailing Duties on Certain Hot - Rolled Lead and Bismuth Carbon Steel Products Originating in the United Kingdom: Here Today, Gone Tomorrow? Privatization and the Injury Caused by Non - Recurring Subsidies', in H. Horn and P. Mavroidis (eds),

The American Law Institute Reporters' Studies on WTO Case Law - Legal and Economic Analysis, Cambridge University Press, 183-213.

Grossman, G. M. and P. Mavroidis (2003), 'United States - Countervailing Measures Concerning Certain Products from the European Communities: Recurring Misunderstanding of Non-Recurring Subsidies', in Horn, H. and Mavroidis, P. (eds), *The American Law Institute Reporters' Studies on WTO Case Law - Legal and Economic Analysis*, Cambridge University Press: 381-390.

Helpman E., and P.R. Krugman (1989), *Trade Policy and Market Structure*, Cambridge, MIT Press.

Horn, H., G. Maggi, and R.W. Staiger (2010), "Trade Agreements as Endogenously Incomplete Contracts," *American Economic Review*, 100 (1), 394-419.

Horn. H, and J. Levinsohn (2001), "Merger Policies and Trade Liberalization," *The Economic Journal*, 111 (470), 244-276.

Horstmann I.J. and J.R. Markusen (1986), "Up the Average Cost Curve: Inefficient Entry and the New Protectionism," *Journal of International Economics*, 20 (3-4), 225-247.

Hufbauer G.C. and J. Shelton-Erb (1984), *Subsidies in International Trade*, Cambridge: MIT Press.

Irwin, D. A., P. C. Mavroidis, A.O. Sykes (2008), *The Genesis of the GATT*. New York: Cambridge University Press.

Itoh, M. and K. Kiyono (1987), "Welfare-Enhancing Export Subsidies," *Journal of Political Economy*, 95 (1), 115–37.

Janow, M.E., and R.W. Staiger (2003), "US-Export Restraints" in H. Horn and P.C. Mavroidis (eds.), *The WTO Case Law of 2001: The American Law Institute Reporters' Studies*, Cambridge University Press, Cambridge.

Krugman, P. R. (1980), "Scale Economies, Product Differentiation, and the Pattern of Trade," *American Economic Review*, 70 (5), 950-9.

Lee, G. M. (2013), "Optimal International Agreement and Treatment of Domestic Subsidy," mimeo., May.

Maggi G., Rodriguez-Clare A. (2005), "Import Tariffs, Export Subsidies and the Theory of Trade Agreements," mimeo, July.

Maggi G., Rodriguez-Clare A. (2007) , "A Political Economy Theory of Trade Agreements," *American Economic Review*, 97, 1374-1406.

Maggi G. and R.W. Staiger (2011). "The Role of Dispute Settlement Procedures in International Trade Agreements," *Quarterly Journal of Economics*, 126, 475–515.

Marvel H., and E. Ray (1995), "Countervailing Duties," *Economic Journal*, 105, 1576-93.

Mavroidis P.C., P.A. Messerlin, and J.M. Wauters (2008), *The Law and Economics of Contingent Protection in the WTO*, Northampton: Edward Elgar Publishing.

Mitra D., D.D. Thomakos, and M. Ulubaşoğlu (2006), "Can We Obtain Realistic Parameter Estimates for the Protection for Sale' Model?" *Canadian Journal of Economics*, 39(1),187-210.

Mrazova, M. (2011), "Trade agreements when profits matter," mimeo, February.

Ossa, R. (2011), "A New Trade Theory of GATT/WTO Negotiations," *Journal of Political Economy*, 199(1): 122-152.

Potipiti, T. (2012), "Import Tariffs and Export Subsidies in the WTO: A Small Country Approach, UN ARTNet Working Paper Series No. 119, September.

Rodrik, D. (2011), *The Globalization Paradox*, New York: Norton.

Roessler F. and P. Gappah, (2005) "A Re-appraisal of Non-violation Complaints Under the WTO Dispute Settlement Procedures," in Macrory, Appleton and Plummer (eds.) *The World Trade Organization, Legal, Economic and Political Analyses, Vol. I*, Springer.

Sauré P., (2012), "Domestic Policies in Self-Enforcing Trade Agreements," mimeo., September.

Staiger R. W. and A. O. Sykes (2011), "International Trade, National Treatment and Domestic Regulation," *Journal of Legal Studies*, 40(1), 149-203.

Staiger R. W. and A.O. Sykes (2013a), "How Important can the Non-Violation Clause be for the GATT/WTO?" NBER working paper No. 19526, July.

Staiger R. W. and A.O. Sykes (2013b), "Non-Violations," mimeo., July.

Staiger R. W. (2011), "Non-tariff Measures and the WTO," mimeo.

Stiglitz, J.E. (2006), *Making Globalization Work*, W.W. Norton.

Sykes, A. O. (1989), "Countervailing Duty Law: An Economic Perspective," 89 *Columbia Law Review* 199-263.

Sykes, A. O. (2005), "The Economics of WTO Rules on Subsidies and Countervailing Measures," in P.F.J. McCrory, A.E. Appleton, and M.G. Plummer (eds.), *The World Trade Organization: Legal, Economic, and Political Analysis, Vol. 2*, Springer.

Sykes A. O. (2010), "The Questionable Case for Subsidies Regulation: A Comparative Perspective," *Journal of Legal Analysis*, 2 (2), 473-523.

Venables, A. J. (1985), "Trade and Trade Policy with Imperfect Competition: The Case of Identical Products and Free Entry," *Journal of International Economics*, 19, 1-20.

Venables, A. J. (1987), "Trade and Trade Policy with Differentiated Products: A Chamberlinian-Ricardian Model," *The Economic Journal*, 97(387), 700.

World Trade Organization (2006), "Subsidies, Trade and the WTO," *World Trade Report 2006.*

World Trade Organization (2009), "Trade Policy Commitments and Contingency Measures," *World Trade Report 2009.*

World Trade Organization (2012), "Trade and Public Policies: A Closer Look at Non-Tariff Measures in the 21st Century," *World Trade Report 2012.*

Wouters J.and D. Coppens (2010), "An Overview of the Agreement on Subsidies and Countervailing Measures—Including a Discussion on the Agreement on Agriculture," in K. Bagwell, G.A. Bermann, and P.C. Mavroidis (eds.), *Law and Economics of Contingent Protection in International Trade*, New York: Cambridge University Press.