

Camouflaged Trade Agreements

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Abstract

We show that generalized customs unions (CUs), in which members choose different external tariff rates while still maximizing total member welfare, are always welfare-superior to both standard CUs with common external tariffs and free trade areas (FTAs). Since generalized CUs are indistinguishable to FTAs in practice, our analysis implies that some observed FTAs may, in fact, be CUs in disguise. This possibility offers one explanation for the design of the WTO's rules on regional trade agreements. Our results also suggest that empirical estimates of the different impacts of FTAs and CUs may be subject to a trade-agreements-misclassification bias.

KEYWORDS: Customs Union, Common External Tariff, Free Trade Area, Trade Agreement, World Trade Organization.

JEL Classification: F12, F13, F15.

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1 Introduction

The literature on trade agreements (TAs) overwhelmingly focuses on the formation of free trade areas (FTAs) and customs unions (CUs) - the two types of TAs most commonly observed in practice. In this paper, we focus on a number of fundamental, indeed, existential, questions about TAs and their role in world trade that have received minimal attention. In particular, we call into question the widely held assumption that, in practice, FTAs are overwhelmingly preferred to CUs.

Since Viner's (1950) seminal work, the defining characteristics of FTAs and CUs have remained largely unchallenged and, so far, immutable.¹ Both FTAs and CUs involve preferential trade between members. However, while FTA members are free to levy different external tariffs on excluded countries, CU members must choose a common external tariff (CET). Consequently, a FTA requires rules of origin to support the different external tariff rates levied by members.² Members of a CU, on the other hand, must agree on a system of income transfers to share the CET revenue raised. This paper argues that the standard definition of CUs used in the literature is problematic. Not only can it give a misleading impression of the behavior of CU members, it also fails to capture the true nature of the choice prospective members face between joining a FTA or a CU.

We first ask: from the point of view of CU members, what constitutes an optimal CU? Allowing for lump sum transfers between members, we demonstrate that when (asymmetric) CU members choose jointly optimal *but different* external tariff rates, they are better off than if they are compelled to levy a CET. In what follows, we refer to this alternative CU design as the *Generalized* CU (GCU); any CU characterized by a CET is labeled a *Standard* CU (SCU).³ If members are symmetric, then the *Generalized* and *Standard* CUs converge. However, even the slightest degree of member asymmetry renders a SCU sub-optimal.⁴ Incidentally, note that, just as in a FTA, but in contrast to a SCU, a GCU requires rules of origin to support the different external tariff rates levied by member countries.

Since there exists an alternative CU design that is welfare-superior for members, why are CETs observed in practice?⁵ One answer to this question is that the World Trade Organization (WTO) requires it. *Article XXIV* of the General Agreement on Tariffs and Trade (GATT) stipulates that "each of the members of the union" must apply "substantially the same duties and other regulations

¹See Freund and Ornelas (2010) for a comprehensive and state-of-the-art review of the literature on TAs.

²Rules of origin determine the duty-free status of goods that originate in non-member nations but are traded within the TA. Without such rules, all imports would enter the TA area via the member with the lowest external tariff rate, before being on-sold duty free to their final destination. In this case, the TA would effectively become a CU with the lowest external tariff the effective CET.

³The assumption that CU members levy a CET on excluded countries is all-pervasive in the literature. See, for example, Kemp and Wan (1976), Riezman (1985), Bagwell and Staiger (1997), Syropoulos (2002, 2003), Ornelas (2007) and Facchini et al. (2012).

⁴In general, it is not even necessarily true that zero internal tariffs are optimal. We do not pursue this issue further here.

⁵CETs form an important part of the architecture of the European Union and Mercosur among other observed CUs.

of commerce ... to the trade of territories not included in the union.” In theory, as well as in practice, this clause has been interpreted as requiring CU members to levy a CET.

But, this just begs a supplementary question; namely, why does the WTO impose the CET restriction on CU members? We demonstrate that a GCU results in external tariff rates that are higher in trade-weighted terms than those levied by its Standard counterpart. This yields a potential “smoking gun” that explains the codification of CET choice in the WTO’s trade rule book. After all, *Article XXIV* of the GATT explicitly states that “the purpose of a CU or of a FTA should be to facilitate trade between the constituent territories and not to raise barriers to the trade of other contracting parties with such territories.” By obliging CU members to choose a CET, their monopoly power in trade policy can be neutered somewhat.

Note that WTO rules do not preclude the formation of GCUs. Indeed, from the perspective of *Article XXIV*, a GCU and a FTA are indistinguishable from one another; in each case members levy different external tariff rates on non-members, supporting these differential rates with rules of origin. This insight raises an intriguing possibility: that many of the FTAs actually observed in practice are, in fact, GCUs “in camouflage”.

Two further questions now arise. First, since GCUs are welfare superior (for members) to SCUs, why do we observe the latter in practice? Second, if, as we claim, GCUs are less trade-facilitating than their Standard counterparts, why are they not explicitly prohibited by the WTO?

The simple answer to the first of these questions is that member countries will implement a GCU if they can avoid sanction for violating the CET requirements of *Article XXIV*. On the other hand, they will implement a SCU when the CET requirements of *Article XXIV* can be legally enforced. For example, consider the following situation. Assume that member welfare rankings over different types of TAs are common knowledge; that is, all players, including the WTO, can observe them. Though observable, however, say these welfare rankings are not verifiable; that is, they cannot be proved in law. At the same time, whether or not members are levying a CET is verifiable, but whether or not the observed different external tariff rates are indeed the optimal ones for the observed TA cannot be verified.

If the combination of the observability of the members’ TA ranking and the verifiability of the absence of a CET are together sufficient to satisfy the legal burden of proof, then the ranking of a SCU versus a FTA by prospective members becomes pivotal. In particular, if members prefer a SCU to a FTA, then they will (have to) respect *Article XXIV* and levy a CET. If they did not, the WTO (and, indeed, all players) would immediately infer that a GCU has been implemented and legally sanction members on the basis of the observed inconsistency between their preference for a SCU (among WTO-

compliant TA types) and the verifiable absence of a CET.⁶ If, on the other hand, members prefer a FTA to a SCU, they will implement a GCU in defiance of *Article XXIV*. In this case, members are safe from legal sanction since their observed preference for a FTA (among WTO-compliant TA types) is consistent with the verifiable absence of a CET.

Of course, there are numerous alternative explanations for why prospective members may choose not to implement a GCU in spite of its welfare dominance over other TA types. For example, members may deem a GCU too costly for political reasons or on the basis of excessive transactions costs associated with negotiations between prospective members.⁷ Since our main aim here is simply to demonstrate the potential for GCUs to exist (and be mistaken for FTAs) we leave these important extensions for future work.

Regarding the second question, ideally the WTO would like to proscribe GCUs while at the same time allowing FTAs to form. In practice, however, this is difficult to achieve. As just argued, even when the combination of observed member TA rankings and the verifiable absence of a CET is sufficient to satisfy the legal burden of proof, the WTO still cannot distinguish in a legally meaningful way between a GCU and a FTA. As a result, the WTO would either have to prohibit both GCUs and FTAs or neither. We demonstrate, however, that FTAs can yield significant benefits for world welfare and so proscribing both types of TA would be inappropriate. Instead, the WTO satisfies itself with regulating a CU's external tariffs as an indirect way of regulating the process by which CU members choose to derive them. Incidentally, note the irony in *Article XXIV* of the GATT. The fact that countries are permitted to establish FTAs facilitates the camouflaging of GCUs and, in this way, undermines the WTO's ability to limit the monopoly power of prospective CU members. This is despite the fact that FTAs confer less monopoly power on member countries than either a GCU or a SCU.

This paper makes two main contributions to the literature on trade agreements. First, it shows that observed FTAs may, in fact, be GCUs in disguise. We show this by first demonstrating that GCUs, in which members jointly choose optimal *but different* external tariff rates, are always superior to SCUs as well as FTAs. But, since FTAs and GCUs are indistinguishable in practice, this implies that what "looks like" a FTA may, actually, be a GCU. This possibility has never been entertained previously in the TA literature.

Second, the paper addresses the apparent paradox between the predicted primacy of CUs and the observed dominance of FTAs. Specifically, the regionalism literature has recently begun to focus on

⁶Remember that in our model GCUs welfare dominate all other TA types everywhere.

⁷Horn et al. (2010) develop a model of TAs in which contracting is costly and, as a result, the optimal agreement is incomplete. Their specific focus is to explain the structure of tariff bindings in the GATT/WTO. They do not seek to apply their model to the formation of discriminatory TAs, nor do they seek to justify the structure of *Article XXIV* of the GATT.

explaining why, contrary to the predictions of traditional theory, FTAs are overwhelmingly preferred to CUs in practice.⁸ In this paper we show that, consistent with the predictions of traditional theory (but, in our model, due to the superiority of GCUs and their indistinguishability from FTAs), the role of CUs in world trade may be much more significant than is currently believed.

The paper also makes several secondary contributions. First, it generalizes the recent literature on endogenous TA formation.⁹ A key goal of this strand of the TAs literature is to predict what types of TAs (if any) will form, given country characteristics. In contrast to the existing literature, this paper makes the decision of CU members to levy a CET (not just the rate chosen) endogenous.¹⁰

Second, the paper provides a possible explanation of the WTO's role in regulating TA formation. In the literature, the rules as set out in *Article XXIV* are invariably taken to be exogenous and are rarely, if ever, justified. In what follows we demonstrate that the WTO's CET constraint may be motivated by a desire to curtail the monopoly power of CU members. However, we also show that prospective members may not feel compelled to levy a CET. They will only do so if they believe that disregarding *Article XXIV* will lead to legal sanction. This last point emphasizes the folly of assuming that a CET is a non-negotiable characteristic of all CUs.

Third, this paper sounds a cautionary note on empirical testing of TAs. Recently, there have been attempts to measure the different impact that FTAs and CUs have on the trading environment.¹¹ In light of our analysis, there is a significant risk that in such empirical work TAs are incorrectly classified as FTAs rather than (G)CUs. As a result, any trade and policy effects resulting from a camouflaged GCU may be wrongly attributed to FTAs.

Finally, the paper identifies a dual role for FTAs in TA formation. Not only do FTAs provide countries with an additional option for coalition formation, they can also, if required, act as a convenient “fig leaf” that can be used to hide the true intentions of CU members in external tariff choice.

2 The Model

Consider a world of three countries in which TAs can form. Assume that one country, Country 3 here, is “passive” in the sense that it does not sign TAs. Countries 1 and 2, on the other hand, are “active”; they may negotiate a bilateral TA if they wish. Further, assume that countries 1 and 2 can choose

⁸See, for example, Richardson (1994) and Facchini, Silva and Willmann (2012).

⁹The seminal contribution to this literature is due to Riezman (1985).

¹⁰Consideration of an additional type of TA in models of endogenous coalition formation also has the potential to significantly influence the nature of the equilibrium coalition structure; for example, the contents of the core. In this case, in particular, the introduction of GCUs as an additional type of TA has the potential to be especially disruptive to coalition formation. This is because GCUs are likely to be used as a direct substitute for FTAs - a fact that may not be readily apparent in practice due to the superficial similarity between these two TA types.

¹¹See, for example, Estevadeordal et al. (2008), Magee (2008) and Roy (2010).

between three alternative types of bilateral trade blocs - a FTA, a SCU, or a GCU.¹² Define the set of three possible TA types as $Y = (fta, scu, gcu)$.¹³ Consistent with WTO rules, all TA types comply with the most-favored nation (MFN) principle in the sense that the external tariff rate levied by an individual member must be applied equally to all non-members.

The three countries engage in a multi-stage trade policy game. In stage one, countries 1 and 2 choose a TA, $y \in Y$ and associated lump sum transfers, K_i^y , $i = 1, 2$. In stage two, given the TA that has formed, all three countries choose their tariffs, t_{ij} , $i, j = 1..3$, where t_{ij} denotes the tariff that Country i pays Country j , and where $t_{ii} = 0$. In stage three, given the previously chosen TA and tariffs, the firms in the three countries choose their outputs in each market. These outputs are denoted by q_{ij} , the quantity that firm i sells in Country j . For simplicity, we assume that there is one firm domiciled in each country.¹⁴ Country i 's firm is referred to as firm i . Finally, we assume that all elements of the game are common knowledge.¹⁵ But, though observable, member TA welfare rankings are not verifiable by the WTO. Moreover, while the WTO can verify whether or not members are levying a CET, it cannot verify that the observed tariff rates themselves correspond to the observed TAs.

Country j 's demand function is given by:¹⁶

$$p_j = D(Q_j; a_j), \quad j = 1..3,$$

where $Q_j = \sum_{i=1}^3 q_{ij}$ is the aggregate output sold in Country j , $\partial D(Q_j; a_j) \partial Q_j < 0$ and $a_j > 0$ is a demand shift parameter with $\partial D(Q_j; a_j) \partial a_j > 0$. We assume that the markets are segmented, so consumers in the three countries may face different prices. The technology of the firms in the three countries is captured by their marginal (and average) costs c_i , $i = 1..3$.

2.1 Stage 3: Output Choice

In stage 3, the three firms choose their outputs simultaneously in a Cournot game given the chosen tariffs and the TA. Given the demand functions defined in the section above and the tariff rates chosen

¹²It can be shown that the total welfare of countries 1 and 2 is lower when they stand alone than under any TA. For simplicity, therefore, we do not explicitly refer to the stand alone case in the following discussion.

¹³The assumption that Country 3 is passive means that we do not have to consider the case of global free trade. This simplifies the analysis significantly as, otherwise, we would have to consider all possible coalition structures among the three countries, not just those involving countries 1 and 2. It turns out, however, that in this model, global free trade dominates all other TA types. Therefore, by abstracting from global free trade we implicitly assume that the grand coalition cannot form for some reason exogenous to our modeling framework.

¹⁴Assuming multiple firms yields little additional insight for our purposes while making the analysis more cumbersome.

¹⁵Introducing any asymmetric or incomplete information (over parameters and social welfare functions, for example) will make it easier for members to camouflage their coalition formation intentions and, hence, will strengthen our results.

¹⁶It is also possible to introduce further demand differences by taking the demand functions themselves to be different, i.e., $D_j \neq D$ for all j , but we do not pursue this here.

by each country, the profit firm i makes from selling in Country j is given by:

$$\pi_{ij} = [D(Q_j; a_j) - c_i - t_{ij}]q_{ij} \equiv \pi_{ij}(q^j, t_{ij}; a_j, c_i), \quad i, j = 1..3, \quad (1)$$

where $q^j = (q_{1j}, q_{2j}, q_{3j})$ is the vector of quantities sold in Country j .

Since markets are segmented, the Nash equilibrium quantities in Country j are obtained by the simultaneous solution to the three countries' profit maximization problems given by:

$$\max_{q_{ij}} \pi_{ij}(q^j, t_{ij}; a_j, c_i), \quad i = 1..3. \quad (2)$$

We assume that the $\pi_{ij}(q^j, t_{ij}; a_j, c_i)$ functions are strictly concave in q_{ij} (thus giving rise to continuous best reply functions). Let the Nash Equilibrium quantities in Country j , be denoted by the vector $q^{*j} = q^{*j}(t^j; a_j, c)$, where $t^j = (t_{1j}, t_{2j}, t_{3j})$ is the vector of tariffs levied by Country j and $c = (c_1, c_2, c_3)$. Note that while q^{*j} depends on the *vectors* c and t^j , it only depends on Country j 's demand parameter a_j (and not $a_{h \neq j}$). Let the corresponding Nash equilibrium profits, be denoted as:

$$\pi_{ij}^*[t^j; a_j, c] \equiv \pi_{ij}[q^{*j}(t^j; a_j, c), t_{ij}; a_j, c_i], \quad i = 1..3. \quad (3)$$

Whereas (not surprisingly) $\pi_{ij}^*[t^j; a_j, c]$ is decreasing in c_i and t_{ij} , it is increasing in $c_{h \neq i}$, and $t_{h \neq i, j}$.

2.2 Stage 2: Tariff Choice

In stage 2, the countries choose their tariffs given the TA in stage 1. We define the net welfare of Country i (welfare minus lump sum transfers) as the sum of consumer surplus, producer surplus and tariff revenue. Using the Nash equilibrium quantities derived above, we can explicitly write Country i 's (net) welfare in stage 3 as:

$$w_i(t; a, c) \equiv \int_0^{Q_i^*} [D(X; a_i) - D(Q_i^*; a_i)] dx + \sum_{j=1}^3 \pi_{ij}^*[t_j; a_j, c] + \sum_{j \neq i} q_{ji}^*(t_i; a_i, c) t_{ji}, \quad (4)$$

where $t \equiv (t^1, t^2, t^3)$ is the vector of all tariffs, a is the vector of all the a_i terms and $Q_i^* = \sum_{j=1}^3 q_{ji}^*$.

2.2.1 Tariff Choice: Free Trade Area

In order to be able to examine the choice of tariffs, we must consider the tariff restrictions implied by the different possible TAs. If countries 1 and 2 form a FTA in the first stage, then $t_{12} = t_{21} = 0$.

Moreover, the MFN rule requires that $t_{13} = t_{23}$ (and, of course, $t_{ii} = 0$). Given these restrictions, we can define the feasible set of tariffs facing countries 1 and 2, when they form a FTA, as T_i^{fta} , $i = 1, 2$, namely,

$$T_1^{fta} \equiv \{t^1 : t_{21} = 0, t_{11} = 0\} \quad (5)$$

$$T_2^{fta} \equiv \{t^2 : t_{12} = 0, t_{22} = 0\}. \quad (6)$$

With *fta*, each FTA member, therefore, chooses only one tariff.

Since Country 3 does not sign a TA, it's restrictions are the same for any $y \in Y$ chosen by countries 1 and 2: they are simply given by the MFN rules. Thus, if we define the feasible set of tariffs facing Country 3, when countries 1 and 2 have an agreement $y \in Y$, as T_3^y , then we have:

$$T_3^y \equiv T_3 \equiv \{t^3 : t_{13} = t_{23}, t_{33} = 0\} \text{ for all } y \in Y. \quad (7)$$

Hence, Country 3 also chooses only one tariff.

Given the tariff restrictions facing all countries (all the restrictions listed in equations (5) - (7)), the overall feasible set of (all) tariffs is given by (the intersection of the feasible sets in equations (5) - (7)):

$$T^{fta} \equiv T_1^{fta} \cap T_2^{fta} \cap T_3.$$

In other words, it is given by,

$$T^{fta} \equiv \{(t^1, t^2, t^3) : t_{12} = t_{21} = 0, t_{13} = t_{23}, t_{11} = t_{22} = t_{33} = 0\}.$$

Each country will maximize its welfare given the combined set of restrictions that follow from the agreement $y \in Y$. The three countries' net welfare maximization problems are, therefore, given by:

$$\max_{t^i} \{w_i(t^1, t^2, t^3; \gamma) : t^i \in T^{fta}\}, \quad i = 1..3,$$

where $\gamma \equiv (a, c)$ is the vector of all demand and cost parameters.

Alternatively, we can satisfy the restrictions in (5) - (7) by substituting them directly into each country's welfare function. First, define the single tariff that is chosen by each of the three countries when countries 1 and 2 form a FTA in the first stage as:

$$t_1^{fta} \equiv t_{31}, \quad t_2^{fta} \equiv t_{32}, \quad t_3^{fta} \equiv t_{13} = t_{23}. \quad (8)$$

Implicit in our definition of a FTA is the assumption that the rules of origin required to support the

different external tariff rates levied by countries 1 and 2 on the excluded Country 3 are completely effectively enforced and that, consequently, there is no trade deflection between the FTA members.

Using these definitions and substituting the restrictions directly into the countries' welfare functions, we get:

$$w_i^{fta} \equiv w_i^{fta}(t_1^{fta}, t_2^{fta}, t_3^{fta}; \gamma) \equiv \{w_i(t^1, t^2, t^3; \gamma) : t^i \in T^{fta}, \text{ definitions (8)}\}, i = 1..3. \quad (9)$$

In other words, the w_i^{fta} functions are the original w_i functions, but with all the constraints (and definitions (8)) imposed; they are functions of three tariffs, rather than all the tariffs. The three countries' net welfare maximization problems can now be written as:

$$\max_{t_i^{fta}} \{w_i^{fta}(t_1^{fta}, t_2^{fta}, t_3^{fta}; \gamma)\}, i = 1..3.$$

We assume that, for each country $i = 1..3$, the net welfare function, w_i^{fta} , is strictly concave in its own tariff, t_i^{fta} (consequently, all best reply functions are continuous).

The following very useful property of the net welfare functions can now be obtained:

Lemma 1 *Each country's net welfare function, $w_i(t_1^{fta}, t_2^{fta}, t_3^{fta}; \gamma)$, is additively separable in all tariffs.*

Proof. This follows directly from the following: (i) market segmentation implies that the three Nash Equilibrium quantities in Country i depend only on the tariff levied by Country i (t_i^{fta}), (ii) this, in turn, implies that Country i 's profits from selling in each market depend only on tariffs in that market (iii) consumer surplus in Country i (which depends on total output sold in Country i) depends on the tariff levied by Country i , (iv) by definition, the welfare of Country i is additive in its components; the sum of consumer surplus, profits and tariff revenues. ■

As a result of this separability we have the following special property of the best reply functions:

Lemma 2 *The tariffs t_1^{fta} , t_2^{fta} , t_3^{fta} are strategically neutral: we can solve for each t_i^{fta} separately.*

Proof. Separability in tariffs implies that: $\partial^2 w_i^{fta}(t^{fta}; \gamma) / \partial t_i^{fta} \partial t_{j \neq i}^{fta} = 0$, so tariffs are strategically neutral and we can solve for each t_i^{fta} separately.¹⁷ ■

The explicit expressions for $w_i^{fta}(t^{fta}; \gamma)$, can be easily calculated, for example, for the linear demand functions, $p_j = a_j - Q_j$, $j = 1..3$ (where $a_j > 0$), used in Sections 3.2 and 3.3 below.¹⁸

¹⁷Note that the same applies to all TAs, including both types of CU.

¹⁸These expressions can be provided upon request.

Let the Nash equilibrium tariff in Country i be denoted as $t_i^{*fta}(\gamma)$, $i = 1..3$.¹⁹ The corresponding Nash equilibrium net welfare in each country is then given by:

$$w_i^{*fta}(\gamma) \equiv w_i(t^{*fta}(\gamma); \gamma), \quad i = 1..3, \quad (10)$$

where $t^{*fta}(\gamma) = [t_1^{*fta}(\gamma), t_2^{*fta}(\gamma), t_3^{*fta}(\gamma)]$ is the vector of equilibrium tariffs.²⁰

2.2.2 Tariff Choice: Standard and Generalized Customs Unions

If countries 1 and 2 form a SCU in the first stage, in addition to free trade between them ($t_{12} = t_{21} = 0$), they also levy a CET on Country 3 ($t_{31} = t_{32}$). Letting T_{12}^{scu} be the feasible set of tariffs facing countries 1 and 2 when they form a SCU, we have:

$$T_{12}^{scu} \equiv \{(t^1, t^2) : t_{12} = t_{21} = 0, t_{31} = t_{32}, t_{11} = t_{22} = 0\}. \quad (11)$$

Since Country 3 does not sign a TA, its restrictions are the same as they were in the *fta* case (that is, $t_{13} = t_{23}$, $t_{33} = 0$), so its feasible set of tariffs is still given by $T_3 \equiv \{t^3 : t_{13} = t_{23}, t_{33} = 0\}$. With *scu*, therefore, the SCU members choose only one tariff and similarly, Country 3 also chooses only one tariff.

Given the tariff restrictions facing Country 3 and the SCU countries, the overall feasible set of (all) tariffs is given by (the intersection of the two feasible sets (7), (11)):

$$T^{scu} \equiv T_{12}^{scu} \cap T_3.$$

In other words, it is given by,

$$T^{scu} \equiv \{(t^1, t^2, t^3) : t_{12} = t_{21} = 0, t_{31} = t_{32}, t_{11} = t_{22} = t_{33} = 0, t_{13} = t_{23}\}. \quad (12)$$

If countries 1 and 2 form a GCU in the first stage, they do not necessarily levy a *common* external tariff on Country 3. In other words, now we may have $t_{31} \neq t_{32}$. Letting T_{12}^{gcu} be the feasible set of

¹⁹For example, in the linear demand case mentioned above the Nash Equilibrium tariffs are given by: $t_i^{*fta}(a, c) = \frac{1}{7}a_i - \frac{1}{21}c_i + \frac{1}{3}c_j - \frac{3}{7}c_3$, $i, j = 1, 2, i \neq j$ and $t_3^{*fta}(a, c) = \frac{1}{10}(3a_3 - \sum_{i=1}^3 c_i)$.

²⁰The Nash equilibrium welfare, for Country i , can be calculated for the linear demand example as the following quadratic function (in the demand and cost parameters): $w_i^{*fta} = \sum_{i=1}^3 \sum_{j=1}^3 \beta_{ij}^{ifta} c_i c_j + \sum_{i=1}^3 \sum_{j=1}^3 \delta_{ij}^{ifta} c_i a_j + \sum_{i=1}^3 \psi^{ifta} a_i^2$, where the values of the parameters β , δ and ψ can be provided upon request.

tariffs facing countries 1 and 2 when they form a GCU, we have:

$$T_{12}^{gcu} \equiv \{(t^1, t^2) : t_{12} = t_{21} = 0, t_{11} = t_{22} = 0\}. \quad (13)$$

As in the *scu* case above, the feasible set of tariffs facing Country 3 is still given by T_3 . Hence, with *gcu*, the members choose two tariffs, but Country 3 still chooses only one tariff. Thus, while GCU members have more trade policy degrees of freedom relative to SCU members, they have the same trade policy degrees of freedom as in the *fta* case.

Given the tariff restrictions facing Country 3 and the GCU countries, the overall feasible set of (all) tariffs is given by (the intersection of the two feasible sets (7), (13)):

$$T^{gcu} \equiv T_{12}^{gcu} \cap T_3.$$

In other words, it is given by,

$$T^{gcu} \equiv \{(t^1, t^2, t^3) : t_{12} = t_{21} = 0, t_{11} = t_{22} = t_{33} = 0, t_{13} = t_{23}\}. \quad (14)$$

Notice that:

$$\begin{aligned} T^{scu} &\subset T^{gcu} \\ T^{gcu} &\equiv T^{fta}. \end{aligned}$$

In other words, while T^{scu} is the “smallest” set, T^{gcu} and T^{fta} are identical. As will be shown later, this can explain why a GCU can be camouflaged as a FTA.

We assume that in both the *scu* and *gcu* cases countries 1 and 2 jointly choose their optimal tariffs by maximizing (a social welfare function which is simply) the sum of their welfare:²¹

$$w(t^1, t^2, t^3; \gamma) \equiv \{w_1(t^1, t^2, t^3; \gamma) + w_2(t^1, t^2, t^3; \gamma)\} \quad (15)$$

As is clear, the joint welfare maximization internalizes all existing externalities. Country 3, on the other hand, maximizes its welfare function as before. Thus, the countries’ problems in case $y = scu, gcu$ can be written as:

$$\max_{t^1, t^2} \{w(t^1, t^2, t^3; \gamma) : (t^1, t^2) \in T^y\}, \quad y = scu, gcu \quad (16)$$

²¹Since $K_1^{cu} + K_2^{cu} = 0$, it follows that the sum of the two countries’ welfare is the same as the sum of their net welfare. Maximizing a weighted sum of welfare yields similar results.

$$\max_{t^3} \{w_3(t^1, t^2, t^3; \gamma) : t^3 \in T^y\}, \quad y = scu, gcu$$

Alternatively, as we did in the *fta* case, we can satisfy the restrictions in (7), (12) and (14) by substituting them directly into the objective functions. To do this, define the tariffs to be chosen by the SCU and Country 3, in the *scu* case as:

$$t^{scu} \equiv t_{31} = t_{32}, \quad t_3^{scu} \equiv t_{13} = t_{23} \quad (17)$$

Similarly, define the vector of tariffs to be chosen by the GCU and Country 3's tariff in the *gcu* case as:

$$t^{gcu} = (t_1^{gcu}, t_2^{gcu}) \equiv (t_{31}, t_{32}), \quad t_3^{gcu} \equiv t_{13} = t_{23} \quad (18)$$

Once again, as in the *fta* case, we implicitly assume that GCU rules of origin are completely effectively enforced and that, consequently, there is no trade deflection between the GCU members.

Then, using these definitions and substituting the restrictions directly into the objective functions, we get in the *scu* case:

$$\begin{aligned} w^{scu}(t^{scu}, t_3^{scu}; \gamma) &\equiv \{w(t^1, t^2, t^3; \gamma) : (t^1, t^2) \in T^{scu}, \text{ definitions (17)}\} \\ w_3^{scu}(t^{scu}, t_3^{scu}; \gamma) &\equiv \{w_3(t^1, t^2, t^3; \gamma) : t^3 \in T^{scu}, \text{ definitions (17)}\}, \end{aligned} \quad (19)$$

and in the *gcu* case:

$$\begin{aligned} w^{gcu}(t^{gcu}, t_3^{gcu}; \gamma) &\equiv w^{gcu}(t^{gcu}, t_3^{gcu}; \gamma) \equiv \{w(t^1, t^2, t^3; \gamma) : (t^1, t^2) \in T^{gcu}, \text{ definitions (18)}\} \\ w_3^{gcu}(t^{gcu}, t_3^{gcu}; \gamma) &\equiv \{w_3(t^1, t^2, t^3; \gamma) : t^3 \in T^{gcu}, \text{ definitions (18)}\}. \end{aligned} \quad (20)$$

Again, the welfare functions in equations, (19) and (20) are the original welfare functions, but with all the constraints (and definitions (17) and (18), respectively) imposed: rather than being a function of all tariffs, w^{scu} and w_3^{scu} are functions of two tariffs, whereas w^{gcu} and w_3^{gcu} are functions of three tariffs (remember that $t^{gcu} = (t_1^{gcu}, t_2^{gcu})$). Note however, that since $T^{gcu} \equiv T^{fta}$ (all the restrictions are the same) we have the same welfare *functions* in the *fta* and *gcu* cases.²²

The problems in (16) can, therefore, be written as:

$$\max_{t^y} \{w^y(t^y, t_3^y; \gamma)\}, \quad \text{and} \quad \max_{t_3^y} \{w_3^y(t^y, t_3^y; \gamma)\}, \quad y = scu, gcu$$

²²That is, if we hold tariffs to be the same in both cases (taken as t_1, t_2, t_3) then: $w_1^{gcu}(t_1, t_2, t_3; \gamma) + w_2^{gcu}(t_1, t_2, t_3; \gamma) = w_1^{fta}(t_1, t_2, t_3; \gamma) + w_2^{fta}(t_1, t_2, t_3; \gamma)$. See Appendix A.2.

We assume that objective functions w^y and w_3^y , $y = scu, gcu$, are strictly concave in t^y, t_3^y , respectively (resulting in continuous best reply functions).

Once again, as in the *fta* case above it can be easily shown that:

Lemma 3 For $y = scu, gcu$: (i) $w^y(t^y, t_3^y; \gamma)$ and $w_3^y(t^y, t_3^y; \gamma)$ are additively separable in tariffs, (ii) the tariffs t^y, t_3^y are strategically neutral: we can solve for each t^y, t_3^y separately.

Proof. As in Lemmas 1 and 2. ■

Let the Nash equilibrium tariffs for $y = scu, gcu$ be denoted as $\{t^{*y}(\gamma), t_3^{*y}(\gamma)\}$.²³ The corresponding Nash equilibrium welfare in each country and in the CU are therefore, respectively, given by:²⁴

$$\begin{aligned} w_i^*(y, \gamma) &\equiv w_i^y[t^{*y}(\gamma), t_3^{*y}(\gamma); \gamma], \quad i = 1, 2 \\ w_3^*(y, \gamma) &\equiv w_3^y[t^{*y}(\gamma), t_3^{*y}(\gamma); \gamma], \\ w^*(y, \gamma) &\equiv w_1^y[t^{*y}(\gamma), t_3^{*y}(\gamma); \gamma] + w_2^y[t^{*y}(\gamma), t_3^{*y}(\gamma); \gamma] \end{aligned}$$

2.3 Stage 1: The Choice of TA

To examine the choice of TAs, let us extend the definition of total Country 1 and 2 welfare to the *fta* case. Thus, we write the total welfare of countries 1 and 2, for *any* TA, $y \in Y \equiv \{fta, scu, gcu\}$, as:

$$w^*[y; \gamma] \equiv \{w_1^*(y, \gamma) + K_1^y\} + \{w_2^*(y, \gamma) + K_2^y\} = w_1^*(y, \gamma) + w_2^*(y, \gamma).$$

The countries select a TA by comparing the total welfare corresponding to the three elements of Y . Specifically, let y^* be the chosen (equilibrium) agreement, Then,

Lemma 4 The agreement y^* is chosen if and only if for all $y \in Y$: $w^*(y^*; \gamma) > w^*(y; \gamma)$ for all $y \neq y^*$.

Proof. (i) If $W(y^*; \gamma) > W(y; \gamma)$ for all $y \neq y^*$, there must be corresponding transfers, given by $K_i^{y^*}$, where $K_1^{y^*} + K_2^{y^*} = 0$, such that $w_i^*(y^*; \gamma) + K_i^{y^*} > w_i^*(y; \gamma)$, thus y^* is preferred to any another agreement.²⁵ (ii) If y^* is chosen, it must be better than any other agreement for both countries. In other words, we must have: $w_1^*(y^*; \gamma) + K_1^{y^*} > w_1^*(y; \gamma)$ and $w_2^*(y^*; \gamma) + K_2^{y^*} > w_2^*(y; \gamma)$ for all $y \neq y^*$,

²³The explicit expressions for these equilibrium tariffs in the linear case are: $t^{*scu}(a, c) = \frac{1}{19}(2a_1 + 9c_1 - 4) + \frac{b}{19}(a_1 - 16c_1 + 7)$, $t_3^{*gcu}(a, c) = \frac{2a_1 + 2c_1 + 5a_1 - 3bc_1 + 5 - 2}{23/2 - 2}$, $t_3^{*gcu}(a, c) = \frac{2 - 7c_1 + 13bc_1 - 6/2}{23/2 - 2}$, $t_3^{*y}(a, c) = \frac{1}{10}(2a_3 - c_1)$.

²⁴The Nash equilibrium welfare for can now be easily calculated for the case of linear demands. It is given by a quadratic equation that is similar to the one in the *fta* case, with the superscript changed to *scu* and *gcu* instead of *fta*. This is available upon request.

²⁵But, on the other hand, there are no transfers, K_i^y , where $K_1^y + K_2^y = 0$, such that $w_i^*(y; \gamma) + K_i^y > w_i^*(y^*; \gamma)$.

where $K_1^{y^*} + K_2^{y^*} = 0$. Hence, $W[y^*; \gamma] = w_1^*(y^*; \gamma) + w_2^*(y^*; \gamma) = w_1^*(y^*; \gamma) + K_1^{y^*} + w_2^*(y^*; \gamma) + K_2^{y^*} > w_1^*(y; \gamma) + w_2^*(y; \gamma) = W[y; \gamma]$, for all $y \neq y^*$.²⁶ ■

3 Results

In this section we use the model introduced in Section 2 to show that: (i) the optimal CU for member countries is, in fact, a GCU, (ii) camouflaged CUs are likely to arise when member country demands are asymmetric and (iii) the WTO should encourage the creation of FTAs and SCUs since they produce the best (world) welfare outcomes.

3.1 The Welfare Dominance of a GCU

The following propositions show that, from the point of view of prospective member countries, a GCU dominates both a SCU and a FTA.

Proposition 1: $gcu \succ scu$ for all a and c , but $gcu \sim scu$ iff the countries are symmetric.

Proof. See Appendix A.1. ■

Proposition 2: $gcu \succ fta$ for all a and c .

Proof. See Appendix A.2. ■

Intuitively, Proposition 1 is based on the fact that members of a GCU face a larger feasible tariff set ($T^{scu} \in T^{gcu}$), so they can choose identical tariffs - and, hence, a SCU - if they wish. In fact, this is never the case; members strictly prefer a GCU to a SCU except when they are symmetric, in which case they are indifferent between the two. While this intuition is correct for single-decision-maker problems it is, in general, a little simplistic in the context of strategic games, as is the case here. Specifically, in Proposition 1, we compare the *Nash equilibrium* welfare outcomes of different TAs (strategic games) in which the non-member country can respond optimally to the external tariff choices of members. Nevertheless, the simple intuition is, in fact, correct in our strategic games framework, because (as demonstrated in Section 2) Country 3's optimal tariffs are independent of the TA choice made by countries 1 and 2.

Regarding Proposition 2, a GCU strictly welfare dominates a FTA because, apart from the internalization of the tariff externality implicit in joint welfare maximization by GCU members, a GCU and a FTA are otherwise identical ($T^{gcu} = T^{fta}$).²⁷

²⁶It is useful to note that while the choice of agreement is always unique, the transfers are not uniquely determined. Since our objective is to identify the optimal TA this is not a major problem here.

²⁷Note that the same is not true for the comparison between a SCU and a FTA. In this case, when a CET is chosen, the internalization benefits of joint welfare maximization are offset by the costs associated with the "distance" the CET

3.2 When will GCUs be Observed?

Unfortunately, while it was sufficient to demonstrate the welfare dominance of a GCU over both a SCU and a FTA, the general modeling framework introduced in Section 2 does not permit us to derive a complete welfare ranking among all TA types. In particular, we need to add structure to our general model in order to obtain a welfare ranking of *scu* and *fta*. As we demonstrate below, the ranking of *scu* vis-à-vis *fta* can be crucial for determining whether or not prospective members will choose to implement a GCU or a SCU.

In what follows, we simply assume linear demand; that is, $D(Q_j; a_j) = a_j - Q_j$, $j = 1..3$, where $a_j > 0$ is a demand parameter and $Q_j = \sum_{i=1}^3 q_{ij}$ is the aggregate output sold in Country j . The following proposition identifies the conditions under which we can expect to observe a GCU as opposed to a SCU.

Proposition 3: *Consider a world in which consumer demand is linear and $c_j = c$, $\forall j$. In this case, the ranking of TAs by prospective members is either: (i) $gcu \succ fta \succ scu$ if $\frac{a_1 a_2 - (a_1 + a_2)c + c^2}{(a_1 - a_2)^2} < \frac{713}{1024}$ or (ii) $gcu \succ scu \succ fta$ if $\frac{a_1 a_2 - (a_1 + a_2)c + c^2}{(a_1 - a_2)^2} > \frac{713}{1024}$ for all a, c .*

Proof. See Appendix A.3. ■

Proposition 3 confirms that, indeed, for our linear demand curve example (and for all values of the demand and cost parameters), a GCU welfare-dominates all other TA types²⁸. Moreover, as demonstrated in Proposition 3(i), the more asymmetric are prospective member country demands the more likely it is that prospective members will prefer to form a FTA rather than a SCU. In this case, members may be able to get away with implementing a GCU in defiance of *Article XXIV* if, for example, their preference for a FTA (among WTO-compliant TA types) is observable and the absence of a CET is verifiable, but the distinction between GCU and FTA tariffs is not verifiable. If, together, these (consistent) observations are sufficient to satisfy the legal burden of proof in a court of law, we have the case of camouflaged CUs.

On the other hand, Proposition 3(ii) implies that if the demands of countries 1 and 2 are sufficiently similar, they will prefer to form a SCU rather than a FTA. In this case, prospective members may (depending on the required legal burden of proof) decide to respect *Article XXIV* and levy a CET even though a GCU is still their preferred TA type. To see this, consider the situation in which their preference for a SCU (among WTO-compliant TA types) is observable, the absence of the CET is verifiable and members decide not to levy a CET. The WTO (and excluded countries) would immediately infer that a GCU has been implemented. To the extent that the observed inconsistency between

lies from either member's preferred unilateral external tariff rate. For this reason, the welfare ranking of *scu* versus *fta* is ambiguous as demonstrated in the next section.

²⁸Remember that standing alone is always the worst option and so, for simplicity, has been excluded from the analysis.

their preference for a SCU (among WTO-compliant TA types) and the verifiable absence of a CET is sufficient proof in court, then legal sanction will be imposed. Thus, in this case, members cannot get away with implementing a GCU in defiance of *Article XXIV* and consequently, a SCU will be chosen.

These two cases are shown in Figure 1. For the purpose of this exercise, assume that $c_j = \frac{1}{2} \forall j$. Figure 1 identifies the regions in demand-parameter space in which a SCU or a GCU will be observed, under the conditions discussed above. The regions at the extremities of Figure 1 (high a_1 , low a_2 and vice versa), in which *fta* is preferred to *scu*, correspond to the case of camouflaged CUs; that is, a GCU with a more-than-passing resemblance (in law) to a FTA may be implemented in spite of *Article XXIV*. In the central regions of Figure 1 (in the vicinity of the diagonal), *scu* is preferred to *fta*; *Article XXIV* can potentially be used to ensure that a SCU is established. Along the diagonal, countries 1 and 2 are identical; the GCU and SCU equilibria coincide.

Propositions 2 - 3 and Figure 1 highlight one weakness of the modeling framework adopted in this paper; namely, FTAs are never the most preferred type of TA. If we were to interpret these results literally, therefore, we would conclude that all FTAs observed in reality are GCUs - an outcome which we consider to be highly unlikely in practice. A more reasonable interpretation of our results is that there exist factors exogenous to our model (uncertainty, political considerations, or transactions costs, for example) that may make a FTA preferable to a GCU from the point of view of prospective member countries.

3.3 Why Does the WTO Require CU Members to Levy a CET?

The following proposition shows how the equilibrium external tariffs levied by countries 1 and 2 vary with the type of TA they form.

Proposition 4: *Consider a world in which consumer demand is linear and $c_j = c, \forall j$. Without loss of generality, also assume that $a_1 > a_2$. In this case, the ranking of equilibrium external tariffs levied by prospective TA members is: $t_1^{gcu} > t_1^{fta} > t^{scu} > t_2^{gcu} > t_2^{fta}$.²⁹*

Proof. See Appendix A.4. ■

Proposition 4 shows that, for each type of TA (excluding SCU, of course), the larger of the two prospective member countries (Country 1 here) sets a higher external tariff rate than the smaller country (Country 2). Moreover, in terms of the magnitude of external tariff rates levied by prospective members, the CET ranks exactly in the middle. In other words, for any TA type other than SCU, the external tariffs levied by the large and small member nest the CET associated with the SCU.

²⁹Taking into account the case when countries stand alone (*sa*), the ranking becomes: $t_1^{sa} > t_1^{gcu} > t_1^{fta} > t^{scu} > t_2^{sa} > t_2^{gcu} > t_2^{fta}$.

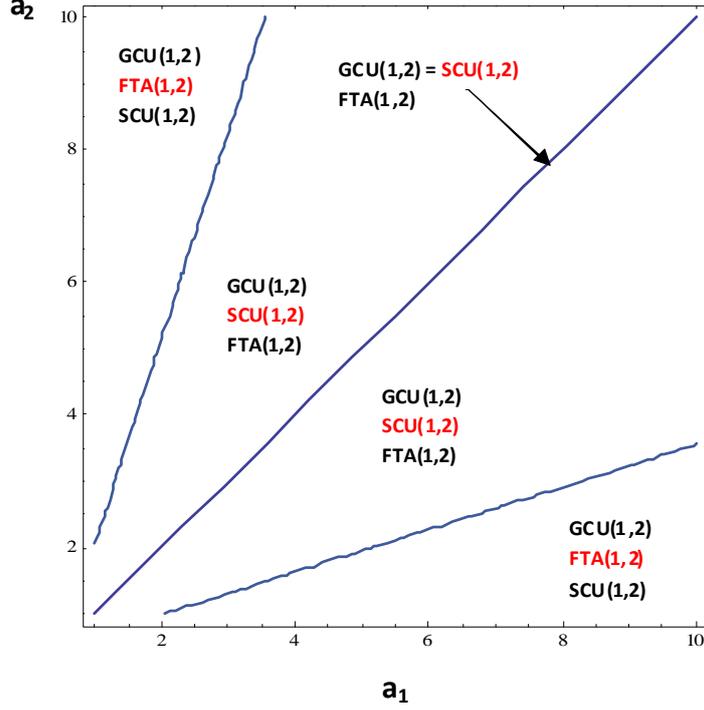


Figure 1: Member country preferences over trade agreement types when $c = \frac{1}{2}$.

Proposition 4 also reveals that the relatively large prospective member chooses the highest external tariff rate when it is a member of a GCU and the lowest external tariff rate (the CET, in fact) when it is a member of a SCU. On the other hand, the relatively small prospective member chooses its highest external tariff rate under SCU (when it chooses the CET jointly with its larger partner) and the lowest external tariff rate under a FTA. Proposition 4, therefore, suggests that by insisting that CU members levy a CET, the WTO restrains the monopoly power of the larger member while permitting that of the smaller member to increase.

Given that *Article XXIV* states that TAs are “not to raise barriers to the trade of other contracting parties,” it would make sense that the WTO would seek to encourage those TA types that yield the lowest external tariff rates. Unfortunately, Proposition 4 does not provide much insight into this issue since members’ individual external tariff rates under GCU and FTA nest the CET. However, an alternative interpretation of *Article XXIV* may be that the WTO seeks to encourage TAs that minimize the *trade-weighted* external tariffs of prospective member countries. To show this, denote the trade-weighted external tariffs as t_{TW}^y , $y = (fta, gcu, scu)$.³⁰ Then, we have the following proposition.

Proposition 5 *Consider a world in which consumer demand is linear and $c_j = c \forall j$. Without loss of generality, also assume that $a_1 > a_2$. Provided that a_1, a_2 are sufficiently similar, the ranking of the*

³⁰See Appendix 5.6 for the precise definition.

trade-weighted equilibrium external tariffs levied by prospective TA members is: $t_{TW}^{gcu} > t_{TW}^{scu} = t^{scu} > t_{TW}^{fta}$. If a_1, a_2 are sufficiently different, the ranking becomes: $t_{TW}^{gcu} > t_{TW}^{fta} > t_{TW}^{scu} = t^{scu}$.³¹

Proof. See Appendix A.5. ■

Proposition 5 shows that a GCU results in external tariff rates that are higher in trade-weighted terms than those levied by either a SCU or a FTA. This provides some circumstantial evidence to justify the structure of *Article XXIV*. In particular, in the absence of global free trade, the WTO should encourage the creation of FTAs or SCUs since one of these TA types will result in the lowest tariff rates being levied on non-members.³²

Trade-weighted external tariffs provide some evidence as to the welfare impact of different types of TAs on non-member countries. But, of course, the WTO is interested in the welfare of all countries, not just that of non-members. In order to get a more complete picture of the overall welfare impact of TAs we measure the total world welfare that results in equilibrium under each TA type. This is the subject of the next proposition.

Proposition 6 *Consider a world in which consumer demand is linear and $c_j = c \forall j$. Without loss of generality, also assume that $a_1 > a_2$. Provided that a_1, a_2 are sufficiently similar, ranking TA types according to the total world welfare they imply in equilibrium yields: $fta \succ scu \succ gcu$. If a_1, a_2 are sufficiently different, the ranking becomes: $scu \succ fta \succ gcu$.³³*

Proof. See Appendix A.6. ■

Proposition 6 bolsters the results obtained in Proposition 5. If the WTO wishes to maximize world welfare, it should discourage standing alone while encouraging the formation of SCUs and FTAs since the latter yield the highest world welfare. At the same time, the CET constraint ensures a higher world welfare outcome than is achieved by a GCU. The difficulty for the WTO, of course, arises from the fact that it may have no practical way of differentiating in a legally verifiable way between a FTA and a GCU. Conditional on a CU being formed, the CET constraint leads to a superior outcome in terms of world welfare. The irony is that the mere ability to form a FTA (which can maximize world welfare in the absence of global free trade) undermines the welfare-enhancing role of the CET. Countries can form a GCU which, by its nature, is camouflaged to look like a FTA.

³¹The trade-weighted equilibrium external tariffs levied by countries 1 and 2 are highest when they choose to stand alone. This is true for all a_1, a_2 .

³²The WTO should, at all costs, discourage countries from standing alone since we can easily show that this is when external tariffs are highest (even higher than under a GCU). This observation provides a possible justification for the presence of *Article XXIV* in the first place, despite the fact that it represents a stark departure from the MFN principle which forms one of the foundations of the GATT. Any discriminatory TA, even a GCU, is preferable to standing alone.

³³Standing alone yields the lowest world welfare for all a_1, a_2 .

Finally, Propositions 5 and 6 also provide a possible clue for why the WTO does not try to explicitly proscribe GCUs. Since GCUs and FTAs are, for all practical purposes, likely to be indistinguishable from one another, the WTO must either prohibit both or neither. But, as Propositions 5 and 6 demonstrate, prohibiting FTAs is undesirable given the relatively low external tariffs and relatively high world welfare they entail. In addition, from the point of view of minimizing the external tariff burden on non-members, a GCU is better than “nothing” (that is, standing alone).

4 Conclusion

We have argued in this paper that many of the FTAs observed in practice may, in fact, be CUs in disguise. This has been achieved by introducing the notion of a GCU - characterized by different external tariff rates - that contrasts with the standard definition of a CU - characterized by a CET - that, until now, has dominated the literature as well as practical policy making. The main insight is that, in practice, it may not be possible to distinguish between a GCU and a FTA in a legally verifiable way.

We demonstrated that, given the choice, prospective members will always prefer a GCU to either a SCU or a FTA. However, in practice, situations may arise in which members are restricted from implementing a GCU by *Article XXIV* of the GATT which requires that CU members harmonize their trade policy vis-à-vis excluded countries. This may occur, for example, if prospective members prefer a SCU to a FTA. If, additionally, this ranking is observable, the absence of a CET is verifiable and together these observations are sufficient to satisfy the legal burden of proof in a court of law, then a SCU will form. Alternatively, if prospective members prefer a FTA to a SCU, a GCU may be implemented in defiance of *Article XXIV* if there is no legally verifiable way to distinguish between a GCU and a FTA.

Having demonstrated that GCUs can, in fact, be observed, our next task was to rationalize the contents of *Article XXIV* of the GATT. We showed that, by obliging CU members to levy a CET, the WTO reduces their monopoly power (relative to a GCU) in trade-weighted terms. However much it would like to, the WTO cannot explicitly proscribe GCUs in practice because of their close resemblance to FTAs. Consequently, the WTO would have to either prohibit both GCUs and FTAs or neither; the latter approach is preferable given the world welfare benefits associated with FTAs that we have demonstrated here.

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A Appendix

A.1 Proof of Proposition 1:

Part (i): By definition (suppressing the parameters):

$w^{gcu}(t^{*gcu}, t_3) \equiv \max_{t^1, t^2} \{w(t^1, t^2, t^3) : (t^1, t^2) \in T^{gcu}\} \geq w(t^1, t^2, t^3)$ for all $(t^1, t^2) \in T^{gcu}$ and any t^3 .

$w^{scu}(t^{*scu}, t_3) \equiv \max_{t^1, t^2} \{w(t^1, t^2, t^3) : (t^1, t^2) \in T^{scu}\} \geq w(t^1, t^2, t^3)$ for all $(t^1, t^2) \in T^{scu}$ and any t^3 . But, since $T^{scu} \in T^{gcu}$, $\max_{t^1, t^2} \{w(t^1, t^2, t^3) : (t^1, t^2) \in T^{gcu}\} \geq \max_{t^1, t^2} \{w(t^1, t^2, t^3) : (t^1, t^2) \in T^{scu}\}$, for all t^3 .

However, given the separability of the objective functions, we know that the solution for t^y and t_3^y do not depend on each other. Specifically, the solution for t_3^y does not depend on t^{*y} , for $y = scu, gcu$. Hence, the solution for t_3^{*gcu} must be the same for SCU and GCU: $t_3^{*scu} = t_3^{*gcu} = t_3^*$. Thus, in the above inequality we must have: $w^{gcu}(t^{*gcu}, t_3^*) \equiv \max_{t^1, t^2} \{w(t^1, t^2, t_3^*) : (t^1, t^2) \in T^{gcu}\} \geq \max_{t^1, t^2} \{w(t^1, t^2, t_3^*) : (t^1, t^2) \in T^{scu}\} \equiv w^{scu}(t^{*scu}, t_3^*)$. That is: $gcu \succ scu$ for all a and c .

Part (ii): If the countries are symmetric we have: $a_1 = a_2, c_1 = c_2$. With perfectly symmetric countries the solution must be symmetric (the standard property of all bargaining problems). Thus we must have a common tariff levied on Country 3. The solutions, therefore, become the same as in the SCU case: $t_{31}^{*gcu} = t_{32}^{*gcu} = t^{*cu}$.

A.2 Proof of Proposition 2:

By definition: $w^{gcu}(t_{31}^{*gcu}, t_{32}^{*gcu}, t_3) = w_1^{gcu}(t_{31}^{*gcu}, t_{32}^{*gcu}, t_3) + w_2^{gcu}(t_{31}^{*gcu}, t_{32}^{*gcu}, t_3) \equiv \max_{t^1, t^2} \{w_1(t^1, t^2, t^3) + w_2(t^1, t^2, t^3) : (t^1, t^2) \in T^{gcu}\} \geq w_1(t^1, t^2, t^3) + w_2(t^1, t^2, t^3)$ for all $(t^1, t^2) \in T^{gcu}$ and any t^3 . But, since $T^{gcu} \equiv T^{fta}$ we have $(t_1^{*fta}, t_2^{*fta}) \in T^{fta} \equiv T^{gcu}$. Hence, $w_1^{gcu}(t_{31}^{*gcu}, t_{32}^{*gcu}, t_3) + w_2^{gcu}(t_{31}^{*gcu}, t_{32}^{*gcu}, t_3) \geq w_1^{gcu}(t_1^{*fta}, t_2^{*fta}, t_3) + w_2^{gcu}(t_1^{*fta}, t_2^{*fta}, t_3)$, for all t^3 .

But, again, since the solution for tariffs are obtained independently, t_3^y is the same for all $y = fta, scu, gcu$, we have: $t_3^{*gcu} = t_3^{*fta} = t_3^*$. Furthermore, the solutions for $t_{31}^{*gcu}, t_{32}^{*gcu}$ are unaffected by t_3^* .

Now, note however, that since $T^{gcu} \equiv T^{fta}$ (all the restrictions are the same) we have the same welfare functions in the fta and gcu cases. Namely, if we hold tariffs to be the same in both cases (taken as t_1, t_2, t_3) then: $w_3^{fta}(t_1, t_2, t_3; \gamma) = w_3^{gcu}(t_1, t_2, t_3; \gamma)$ and $w^{gcu}(t_1, t_2, t_3; \gamma) \equiv w_1^{gcu}(t_1, t_2, t_3; \gamma) + w_2^{gcu}(t_1, t_2, t_3; \gamma) = w_1^{fta}(t_1, t_2, t_3; \gamma) + w_2^{fta}(t_1, t_2, t_3; \gamma) \equiv w^{fta}(t_1, t_2, t_3; \gamma)$. Thus, in the above inequality we must have: $w^{gcu}(t_{31}^{*gcu}, t_{32}^{*gcu}, t_3^{*gcu}) = w_1^{gcu}(t_{31}^{*gcu}, t_{32}^{*gcu}, t_3^*) + w_2^{gcu}(t_{31}^{*gcu}, t_{32}^{*gcu}, t_3^*) \geq w_1^{gcu}(t_1^{*fta}, t_2^{*fta}, t_3^{*fta}) + w_2^{gcu}(t_1^{*fta}, t_2^{*fta}, t_3^{*fta}) = w_1^{fta}(t_1^{*fta}, t_2^{*fta}, t_3^{*fta}) + w_2^{fta}(t_1^{*fta}, t_2^{*fta}, t_3^{*fta}) \equiv w^{fta}(t_1^{*fta}, t_2^{*fta}, t_3^{*fta})$.

That is: $gcu \succ fta$ for all a, c . ■

A.3 Proof of Proposition 3

Let $w_i^*(sa)$ be the equilibrium welfare of country i when countries 1 and 2 decide to stand alone. It is straightforward to show that (suppressing the parameters) for all a, c : $w^*(gcu) \geq w^*(scu)$; $w^*(gcu) > w^*(fta)$; $w^*(gcu) > w^*(sa)$; $w^*(scu) > w^*(sa)$; $w^*(fta) > w^*(sa)$. In addition: $w^*(scu) > w^*(fta)$ if $\frac{a_1 a_2 - (a_1 + a_2)c + c^2}{(a_1 - a_2)^2} > \frac{713}{1024}$. ■

A.4 Proof of Proposition 4

It is straightforward to show that when $a_1 > a_2$: $t^{scu} < t_1^{gcu}$, $t^{scu} > t_2^{gcu}$, $t_1^{gcu} > t_1^{fta}$, $t_2^{gcu} > t_2^{fta}$, $t_1^{fta} > t^{scu}$, $t_2^{fta} < t^{scu}$, $t_1^{sa} > t_1^{fta}$, $t_2^{sa} > t_2^{fta}$, $t_1^{sa} > t^{scu}$, $t_2^{sa} < t^{scu}$, $t_1^{sa} > t_1^{gcu}$ and $t_2^{sa} > t_2^{gcu}$. These inequalities taken together, yield the tariff ranking in Proposition 3.3. ■

A.5 Proof of Proposition 5

Define: $t_{TW}^{gcu} = \left[\frac{q_{31}}{(q_{31} + q_{32})} * t_1^{gcu} \right] + \left[\frac{q_{32}}{(q_{31} + q_{32})} * t_2^{gcu} \right]$, $t_{TW}^{fta} = \left[\frac{q_{31}}{(q_{31} + q_{32})} * t_1^{fta} \right] + \left[\frac{q_{32}}{(q_{31} + q_{32})} * t_2^{fta} \right]$ and $t_{TW}^{sa} = \left[\frac{q_{31}}{(q_{31} + q_{32})} * t_1^{sa} \right] + \left[\frac{q_{32}}{(q_{31} + q_{32})} * t_2^{sa} \right]$. It is straightforward to show that when $a_1 > a_2$ we have: $t_{TW}^{gcu} > t^{scu}$, $t_{TW}^{gcu} > t_{TW}^{fta}$, $t_{TW}^{gcu} < t_{TW}^{sa}$, $t_{TW}^{fta} < t_{TW}^{sa}$ and $t^{scu} < t_{TW}^{sa}$. Moreover, $t^{scu} > t_{TW}^{fta}$ if a_1, a_2 are sufficiently similar. These inequalities taken together, yield the tariff ranking in Proposition 5. ■

A.6 Proof of Proposition 6

It is straightforward to show that when $a_1 > a_2$: $(w_1^{gcu} + w_2^{gcu} + w_3^{gcu}) < (w_1^{scu} + w_2^{scu} + w_3^{scu})$; $(w_1^{gcu} + w_2^{gcu} + w_3^{gcu}) > (w_1^{sa} + w_2^{sa} + w_3^{sa})$; $(w_1^{gcu} + w_2^{gcu} + w_3^{gcu}) < (w_1^{fta} + w_2^{fta} + w_3^{fta})$; $(w_1^{scu} + w_2^{scu} + w_3^{scu}) > (w_1^{sa} + w_2^{sa} + w_3^{sa})$ and $(w_1^{fta} + w_2^{fta} + w_3^{fta}) > (w_1^{sa} + w_2^{sa} + w_3^{sa})$. Moreover, $(w_1^{scu} + w_2^{scu} + w_3^{scu}) < (w_1^{fta} + w_2^{fta} + w_3^{fta})$ if a_1, a_2 are sufficiently similar. These inequalities taken together yield the welfare ranking in Proposition 6. ■