Harmonizing External Quotas in an FTA: A Step Backward?

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Harmonizing External Quotas in an FTA: A Step Backward? *

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Abstract

This paper explores how political-economy forces shape quantitative barriers against the rest of the world in an FTA. We show that whereas the dilution of lobbying power in an FTA typically leads to a relaxation of external quotas, this result is likely to be overturned as integration deepens. In particular, we show that cooperation among member countries on the level of their external quotas, cross-border lobbying by import-competing interests in the free-trade area, and the consolidation of national external quotas into a single one, all lead to stiffer restrictions against imports from the rest of the world. We also show that unlike tariffs, endogenous quotas are not crucially affected by the presence of rules of origin.

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1 Introduction

If the Uruguay Round's delivery was somewhat laborious, the multilateral trading system has emerged from it stronger then ever. In contrast to the gloom that prevailed when a few powerful farming interests seemed capable of holding up the whole process, the level of confidence in the effectiveness of multilateral trade-liberalization rounds is now sufficient to envisage a new "millenium round". At the same time, regionalism is also thriving: the European Union is —so far successfully— managing unprecedented "deepening" and enlargement, while MERCOSUR and other regional agreements are faring better than earlier South-South agreements. Is the second of these trends (regionalism) reinforcing or sapping the first (multilateralism)? A voluminous and growing literature has so far failed to provide a final answer (see the recent surveys by Winters, 1996; Frankel, 1997; Panagariya, 1998; see also the earlier edited volumes by de Melo and Panagariya, 1993, and Anderson and Blackhurst, 1993). If a wealth of theoretical arguments suggest potential sources of conflict between regionalism and multilateralism, sources of complementarity have also been identified, and both the empirical and historical evidence are somewhat ambiguous.[1] As long as the debate is not finally settled one way or another —and it may never be: in Frankel's words (1997, p. 226), "trading blocs have both building-block attributes and stumbling-block attributes"— further work is needed on particular aspects of the interaction between regional trade liberalization and the incentives to seek protection against non-members. In this perspective, the present paper examines the effect of quota harmonization within a trading bloc on the endgenous level of the bloc's external quotas.

Arguably, quantitative restrictions (QRs) are —at least in the industrial world— more significant barriers to trade than tariffs, as the latter have been cut through successive rounds of trade liberalization. Thus, QR harmonization is an important step in the deepening of regional integration. In Europe, for instance, progressive QR harmonization was undertaken as part of the 1992 Single Market program and involved the dismantling of national QRs that member countries had hitherto maintained under the umbrella of Article 115 of the Treaty of Rome (see Schuknecht, 1992). In the automobile sector, drastic harmonization led the European Commission to negotiate with Japan the complete phase-out by 1999 of a web of bilateral quotas and VERs, including the extremely restrictive Italian and French ones. In the much-publicized case of bananas, by contrast, harmonization took a more protectionist turn, as Germany was unable to retain the free-trade regime that it has secured under the special "banana protocol" of the Treaty of Rome. The European banana regulation led to a series of complaints, first at the GATT, then at the WTO,

[1] On the empirical evidence, see Frankel (1997) and references therein: on the historical evidence, see Irwin (1993).

which the European Union lost (see e.g. Schohe, 1997). The automobile and bananas examples show just how diverse the outcomes of QR harmonization can be. The question of this paper is whether, in general, the harmonization of national QRs in a trading bloc and their ultimate consolidation into a single area-wide external QR should be expected to reinforce or weaken the political pressure for protection against non members.

In the case of tariffs, whether internal free trade (in the form of an FTA or customs union) would reduce or enhance political pressure for external protection was first explored formally by Richardson (1993). He argued that following regional trade liberalization, import-competing sectors would shrink in the member countries where they were most inefficient: in turn, a smaller economic size would reduce these sectors' political power, weakening their ability to obtain external protection. Thus, FTAs could be expected to lead to a reduction of barriers against non members. We proposed a generalization of Richardson's analysis in Cadot, de Melo and Olarreaga (1996), where we assessed the political-economy forces released by regional trade liberalization under FTAs and customs unions. Like Richardson's, our analysis highlighted —among other forces— the role of competition for tariff revenue within an FTA, which can lead, in the absence of rules of origin, to corner equilibria in which all member countries eliminate not only internal but also external trade barriers. But as tariff-revenue competition is unlikely to play a crucial role in actual policy-making —at least in industrial countries— its importance in the game-theoretic analysis of tariff equilibria is a somewhat unappealing feature. QRs are more well-behaved in this regard as they do not create the kind of discontinuity in payoffs which are encountered with tariffs. That is, whereas a country reducing its external tariff to just below that of its FTA partner will see its imports (and consequently tariff revenue) jump up by a discrete amount, the same does not apply to QRs, as the point of equality of external QRs has no special significance. Thus, the analysis of QRs is both more relevant in practice and analytically better suited to the understanding of strategic interaction between FTA partners.

We tackle this question using the Grossman-Helpman (1994) model of influence activities, in which lobbies representing owners of specific factors in a Ricardo-Viner economy face the government with contribution schedules conditioned on the vector of trade-policy instruments (here, the vector of quotas in import-competing sectors). Under Bernheim and Whinston's (1986)"truthfulness" restriction, the derivative of a lobby's contribution function is the derivative of the industry's profit function; thus, the political equilibrium is directly related to some of the economy's fundamentals (e.g. import-demand elasticities, levels of domestic output, or the fraction of quota rents retained by the importing country). We consider first the pure effect of the elimination of internal trade barriers in an FTA on the external quotas of member countries. That is, we suppose at this stage that member countries keep independent external quotas and set them noncooperatively (the import-competing good's domestic *price* is common to the free-trade area, though, because barriers to internal trade have been removed). In this context, we show that member countries endogenously choose to relax their external quotas compared to their pre-FTA levels. The reason is that in an FTA, the effect of a given change in a member country's external quota on the import-competing good's domestic producer prices is lesser than before the FTA's formation, because the domestic price is determined in a larger area after the FTA's formation. This cuts the marginal benefit of the quota change for the import-competing lobby, thereby reducing the incentive to lobby. However, as integration deepens, taking the form of a cooperative determination of external quotas, and ultimately of their consolidation into a single one, we show that this pro-free trade effect is reversed. The reason is that cooperation and deeper integration enable lobbies to internalize a "protection spillover" (namely, when member country i tightens its external quota under pressure from its domestic import-competing lobby, the price rises in the whole area, benefitting import-competing lobbies in other member countries as well), leading to *tighter* external quotas.

The paper is organized as follows. Section 2 sets up the model; section 3 derives basic results that hold in the context of symmetric countries. Section 4 extends the model to asymmetric countries and explores the role of rules of origin. Section 5 concludes.

2 The model

Three countries, A, B and C, produce and consume three tradable goods, labelled respectively one, two and three, and a nontradable, labelled zero, which serves as numeraire. Each country is the least-cost producer —and hence the exporter— of one of the three tradables: A of one, B of two, and C of three, so that international trade follows the "Meade pattern" (Meade, 1955); however, none is specialized in either production or consumption. All tradable-good sectors use specific capital and intersectorally mobile labour, while the nontradable-good sector uses only labour under constant return to scale; thus, the wage rate is fixed at the level of its productivity in the nontradable sector. Consumers in all countries have identical preferences represented by the quasi-linear and additive function

$$U = c_0 + \sum_{k=1}^{3} u(c_k), \tag{1}$$

where the function u satisfies the usual properties.

To avoid the complexities arising when terms of trade are endogenous (see e.g. Grossman and Helpman, 1995a), we assume that all countries are small;[2] moreover, the rest of the world, which we call "C", is itself an aggregate of small countries; thus, strategic interaction is limited to A and B, in which trade policy is determined *à la* Grossman-Helpman (1994). That is, lobbies representing the residual claimants of import-competing sectors (there are two of them in each country) simultaneously face their government with "truthful" (Bernheim and Whinston, 1986) political contribution schedules conditioned on the vector of trade-policy instruments.[3] The government, acting as the lobbies' common agent, chooses its trade policy in order to maximize a weighted average of political contributions and aggregate welfare. Trade policy consists of nondiscriminatory quotas on import goods (goods two and three in A and goods one and three in B); by "nondiscriminatory", we mean that import licenses do not restrict the origin of imported goods subject to quotas. Export taxes and subsidies are ruled out.

In this setup, each lobby is concerned exclusively with the protection it can obtain for itself, regardless of the protection simultaneously sought by other sectors, so that the common agency problem degenerates into a simpler collection of separate principal-agent relationships.[4] All world prices are assumed to be unity. Let $\mathbf{p}^i = (p_0^i, ..., p_3^i)$ be the vector of domestic prices in country i; as each country exports one tradable good, two of the elements of $\mathbf{p}^i$ must be unity —namely, p_0^A and p_1^A in A, and p_0^B and p_2^B in B. Let $\mathbf{q}^i$ be the two-dimensional vector of i's import quotas: thus, $\mathbf{q}^A = (q_2^A, q_3^A)$ and $\mathbf{q}^B = (q_1^B, q_3^B)$; let also K^i be the set of i's import goods. Because preferences are additive and quasilinear and the wage rate is fixed, unconstrained expenditure and revenue functions can be used, with the understanding that the domestic price of good k is a function of the import quota. For country i, these two functions are respectively $E^i(\mathbf{p}^i, W^i)$ and $R^i(\mathbf{p}^i, \ell^i)$, where W^i is i's welfare and ℓ^i its labour endowment. Finally, $m_k^i(p_k^i)$ is country i's import-demand function in sector k. Assuming that a uniform fraction $b \in (0,1)$ of quota rents is retained by importing countries, the government's problem is:

$$\max_{q^i} V^i \equiv \sum_{k \in K^i} C_k^i(q_k^i) + aW^i \tag{2}$$

s.t.

[2]Our results would be reinforced if terms-of-trade effects were included in the analysis. As Kennan and Riezman (1990) showed, when several countries importing the same good form a customs union, they internalize a terms-of-trade externality, leading them to raise the customs union's external tariff; by the same argument, they would choose *tighter* quotas under a QR regime.

[3]We assume that specific-factor ownership is sufficiently concentrated to ensure that lobbies disregard the effect of trade barriers on the price index; moreover, labour is not represented in the lobbying process. See Cadot, de Melo and Olarreaga (1997) for a discussion and extensions.

[4]For models with lobby interaction and second-best policy formulation, see Helpman and Grossman (1994) and Cadot et al. (1997). For the problem at hand, such issues are peripheral.

$$E^i(\mathbf{p}^i, W^i) \;=\; R^i(\mathbf{p}^i, \ell^i) + b \sum_{k \in K^i} (p^i_k - 1)\, q^i_k, \tag{3}$$

$$m^i_k(p^i_k) = q^i_k \quad \forall\, k \in K^i, \tag{4}$$

where a is a constant assumed common to all countries. Along (4), $dq^i_k = (m^i_k)' dp^i_k$, whereas, along (3), $dW^i = [(b-1)q^i_k/(m^i_k)' + b(p^i_k - 1)]\; dq^i_k$. (The last expression makes use of the fact that $\partial E^i/\partial W^i = 1$ under quasi-linear preferences and the fact that the price of the good entering the utility function additively is taken as the numeraire.) Substituting these, using the fact that $m^i_k = q^i_k$, and applying Bernheim and Whinston's (1986) "truthfulness" property whereby $\partial C^i_k/\partial q^i_k = \partial \pi^i_k/\partial q^i_k$, we obtain the first-order condition corresponding to problem (2)–(4):

$$\frac{\partial V^i}{\partial q^i_k} \equiv \frac{\partial \pi^i_k}{\partial q^i_k} + a\frac{\partial W^i}{\partial q^i_k} = \frac{y^i_k - a(1-b)q^i_k}{(m^i_k)'} + ab(p^i_k - 1) = 0. \tag{5}$$

As $ab(p^i_k - 1) > 0$, it follows that, at the optimum,

$$\hat{\phi}^i_k \equiv [y^i_k - a(1-b)q^i_k]/(m^i_k)' < 0. \tag{6}$$

Expression $\hat{\phi}^i_k$ will be useful later on when comparing quota levels before and after an FTA. The second-order condition is $[(y^i_k)'/(m^i_k)' + a(2b-1) - 2\hat{\phi}^k_i(m^i_k)'']/(m^i_k)' < 0$: it is verified provided that $(m^i_k)''$ is positive and sufficiently large and that the fraction of quota rents retained by the importing country, b, is at least one-half (these are sufficient conditions). For instance, with linear demand and supply functions (see section 4.2), if $b = 1$ then $a \geq 1/2$ is sufficient to ensure that the second-order condition is met. We assume from now on that the second-order condition is satisfied.

Let $\hat{q}^i_k$ be the solution to (5); its comparative-statics properties are straightforward. Given that the second-order condition holds, $\partial \hat{q}^i_k/\partial a$ has the sign of the cross-partial derivative

$$\frac{\partial^2 V^i}{\partial q^i_k \partial a} = -\frac{(1-b)q^i_k}{(m^i_k)'} + b(p^i_k - 1) > 0.$$

In accordance with intuition (since A and B, being small countries, have nothing to gain, in aggregate, from trade protection) a higher value of the weight on welfare in the government's objective function leads to a relaxation of the optimum quota. Conversely, a parametric increase in the level of good k's domestic output y^i_k would lead to a *tightening* of the quota on good k: this is because an increase in the domestic output of good k raises sector k's incentive to lobby for a higher domestic price —or, equivalently, for a tighter quota.

3 External quotas in an FTA

Suppose now that A and B form an FTA whereby A eliminates its quota on imports of good two from B, while B eliminates its quota on imports of good one from A. Meanwhile, both determine their external quotas on imports of good three from C independently, at a new level which reflects the change in trade flows triggered by the FTA. Two questions arise: First, if A and B determine their quotas noncooperatively, how does the presence of regional free trade affect the optimal level of their quotas on the area's import good (good three)? Second, would cooperation in the determination of A and B's national quotas —a step forward in regional integration— make them more or less protectionist *vis à vis* the rest of the world? These two questions are tackled in the following two sections.

As far as external quotas are concerned, the action is confined to sector three, which competes in A and B with imports from the rest of the world. Therefore, the game played after the formation of an FTA has only four players: the lobbies representing sector three in A and B respectively, and the two governments. In the first stage, the lobbies set their contribution schedules; in the second stage, the two governments set external quotas that are best responses *vis à vis* each other given their domestic lobby's contribution schedule. In the game's simplest form, the import-competing lobby of each member country takes the other member's policy decision as given. Therefore, q^j enters as a parameter in the contribution function of i's lobby, but i's lobby does not attempt to influence it. As integration deepens, each country's lobby may carry out influence activities in the partner country or, alternatively, members may cooperate to harmonize their external quotas. Ultimately, economic integration may lead to a complete harmonization of external trade barriers, with lobbies in both countries merged into one big lobby spanning the entire area. Each of these possibilities is considered in the following sections.

3.1 Non-cooperative FTA

When two countries form an FTA, their ability to keep external trade barriers at unequal levels creates opportunities for arbitrage, as goods originating from the rest of the world can be imported into the low-protection country and then reexported to its more protectionist partner, undermining the effectiveness of the latter's external protection. Because of this, FTAs are generally riddled with rules of origin preventing the trans-shipment of imported goods through the area's internal borders. When external protection takes the form of tariffs, such rules of origin are crucial because, in their absence, unlimited quantities of imports could be brought in from the rest of the world for arbitrage purposes (see Krueger, 1993, and Cadot, de Melo, and Olarreaga, 1996). By contrast, when external protection takes the form of quantitative restrictions, rules of origin are less crucial, because the quantities of foreign goods available for arbitrage are, in any case, limited. Because such rules introduce significant complications into the analysis, we relegate their analysis to section 4.

Once A and B liberalize trade in sectors one and two, the only remaining trade-policy issue is the determination of external quotas (affecting imports from C) in sector three. In that sector, the optimization problem faced by the government of each member country is somewhat similar to what it was before the FTA, except that good three has now a single price p_3 in the whole free-trade area, so that constraint (4) must be suitably modified. Without general-equilibrium interaction in either welfare or political contributions, the government's maximization problem involves only variables pertaining to the area's import-competing sector (sector three). This enables us to eliminate sector subscripts, keeping only country superscripts. Accordingly, country i's government ($i = A, B$) solves

$$\max_{q^i} \; V^i \equiv C^i(q^i) + aW^i \tag{7}$$

s.t.

$$E^i(\mathbf{p}^i, W^i) = R^i(\mathbf{p}^i, \ell^i) + b(p-1)q^i, \tag{8}$$

$$m^A(p) + m^B(p) = q^A + q^B. \tag{9}$$

The first-order condition for problem (7)–(9) implicitly defines country i's reaction function in (q^i, q^j) space:

$$\frac{\partial V^i}{\partial q^i} = \frac{y^i - a(m^i - bq^i)}{(m^A)' + (m^B)'} + ab(p-1) = 0. \tag{10}$$

Let $\bar{q}^i(q^j)$ be the solution to (10). Note that all strategic interaction between A and B takes place through the adjustment of the area's common price p.[5] Condition (10) differs from (5) in two (related) ways. First, m^i can be in excess of q^i in (10) if i also imports from its FTA partner, or less than q^i if i reexports to its FTA partner. Second, because (4) has been replaced, in (7), by the aggregate relation (9), the first term's denominator is now the price derivative of the *aggregate* import-demand function. Let us call this first term $\bar{\phi}^i$, by analogy with (6).

We can now tackle the first question, namely how the FTA affects quota policy towards the rest of the world. Suppose that A and B are symmetric in the import-competing sector (we maintain this simplifying assumption throughout this section, and relax it in

[5]It is shown in the appendix that q^A and q^B are strategic complements whenever $a > 1$; however, the results below do not hinge on whether they are strategic complements or substitutes.

section 4.2). Under the second-order condition, the two objective functions V^A and V^B are globally strictly concave in own strategies (i.e. in q^A and q^B respectively); therefore, (10) characterizes the game's unique pure-strategy equilibrium.[6] Moreover, this unique equilibrium is symmetric, so after the FTA's formation, A and B have identical imports and domestic prices, and (10) simplifies to

$$\frac{\partial V^i}{\partial q^i} = \frac{y^i - a(1-b)q^i}{(m^A)' + (m^B)'} + ab(p-1) = 0, \tag{11}$$

which can be readily compared to (5). We will show that the equilibrium characterized by (11) entails larger (looser) quota levels than before the FTA. To see this, let bars denote variables evaluated at their post-FTA values, and suppose that $\hat{q}^i = \bar{q}^i$. Then $\hat{q}^A + \hat{q}^B = \bar{q}^A + \bar{q}^B$, so $\hat{p}^A = \hat{p}^B = \bar{p}$, and the only difference between (5) and (11) is that, for any value of q^i, $\hat{\phi}^i(q^i) < \bar{\phi}^i(q^i)$ (because the latter's denominator is larger in absolute value and both are negative numbers); but this implies that $\hat{q}^i < \bar{q}^i$, a contradiction. Thus, $\hat{q}^i \neq \bar{q}^i$: moreover, as $\partial^2 V^i / \partial (q^i)^2 < 0$ at $\hat{q}^i$, it follows that $\hat{q}^i < \bar{q}^i$. Therefore, we have:

Proposition 1 *If A and B are symmetric in the area's import-competing sector, the formation of an FTA without rules of origin leads them to relax their external quotas.*

Proposition 1 shows that regional trade liberalization creates a force working to reduce the level of the area's trade barriers against the rest of the world. The reason is as follows. A tighter quota benefits the import-competing lobby only inasmuch as it leads to a higher domestic price. Prior to the formation of an FTA, the link between the national quota and the domestic price in sector three was described by (4), along which, omitting again industry subscripts, $dp^i = dq^i/(m^i)'$. After the FTA's formation, the relationship between quota and domestic price (the domestic price is now common to the entire area) is described by (9), along which $dp = dq^i/[(m^A)' + (m^B)']$. Clearly, the marginal benefit of a tighter quota is reduced in an FTA, because the common domestic price, being determined in a larger area, is less sensitive to changes in a member country's individual quota. This reduces the optimal level of the quota.

This result can be related to earlier ones by Richardson (1994) and Panagariya and

[6] See Friedman (1986), p. 43. Strictly speaking, (10) characterizes only the equilibrium of the second-stage subgame whose strategic variables are the external quotas; a full characterization of the game's equilibrium would also involve the contribution schedules. However, "truthfulness" pins down the contribution schedules up to a constant (whose role is to determine how the economic rents generated by the quotas are shared between the government and the lobbies). As the policy outcome is unaffected by the rent-sharing issue, we will not provide here a complete characterization of the contribution schedules (see Grossman and Helpman, 1994; or Cadot, de Melo and Olarreaga, 1997).

Findlay (1996). Both papers argue that the power of domestic lobbies is diluted more effectively in a CU than in an FTA because in the former, lobbies need to capture a larger political constituency in order to influence policy decisions. Here, the power of the import-competing lobby is diluted even in an FTA, but the source of the dilution is economic rather than political. Proposition one is also in accordance with the results of Richardson (1993) and Cadot et al. (1996). Both papers showed that, in the absence of rules of origin, tariff-revenue competition in an FTA would give rise to a sort of "Bertrand paradox" in which the only noncooperative tariff equilibrium would be the outright elimination of external tariffs by both member countries. Whereas the real-life importance of tariff-revenue competition can be debated, we show here that a weaker version of the result —namely, that an FTA without rules of origin weakens lobbying pressure— still holds true in a setting where member countries have only quotas and have accordingly no revenue-driven incentive to undercut each others' trade barriers.[7]

3.2 Quota harmonization and integration

Consider first the possibility of cross-country influence activities within the area. If j's import-competing lobby can undertake influence activities in i, the political equilibrium in i is determined by

$$\frac{\partial \pi^i}{\partial q^i} + \frac{\partial \pi^j}{\partial q^i} + a\frac{\partial W^i}{\partial q^i} = 0. \tag{12}$$

Let $\tilde{q}^i$ solves (12); as $\partial \pi^j / \partial q^i = y^j / m' \leq 0$, (12) implies that $\tilde{q}^i$ must be lower than $\bar{q}^i$ whenever $y^j > 0$. Thus, we have:

Proposition 2 *Cross-country influence activities within the FTA lead member countries to tighten their external quotas compared to their Nash equililibrium value.*

We turn now to inter-governmental cooperation, an arguably deeper degree of integration. The cooperative solution for i's external quota is defined by

$$\frac{\partial (V^i + V^j)}{\partial q^i} = \frac{\partial V^i}{\partial q^i} + \frac{\partial V^j}{\partial q^i} = 0 \quad \text{for} \quad i = A, B. \tag{13}$$

The question is again whether cooperation leads member governments to relax or tighten their external quotas compared to their Nash equilibrium values. The answer to this question hinges on the cross-partial derivative of the function V^j with respect to q^i, which measures the externality exerted by i's quota (through its influence on the area's

[7] Technically, the quota game of this paper has continuous payoff functions and is in this sense more akin to a Cournot game, whereas tariff games have, like Bertrand games, discontinuous payoffs.

common price for the import-competing good) on j's objective function. If it is positive at the Nash equilibrium, cooperation would lead i to relax its quota; if it is negative, it would lead i to tighten its quota. This cross-partial derivative is equal to

$$\frac{\partial V^j}{\partial q^i} = \frac{dV^j}{dp}\frac{\partial p}{\partial q^i} = \frac{y^j - a(1-b)q^j}{(m^A)' + (m^B)'} \equiv \bar{\phi}^j,$$

which is negative at $(\bar{q}^i, \bar{q}^j)$; thus,

$$\left.\frac{\partial(V^i + V^j)}{\partial q^i}\right|_{\bar{q}^i, \bar{q}^j} = \bar{\phi}^i + \bar{\phi}^j + ab(p-1) < \bar{\phi}^i + ab(p-1) = 0, \tag{14}$$

implying that the cooperative level of i's quota should be lower (i.e. *stricter*) than its Nash equilibrium level:

Proposition 3 *Cooperation on the FTA's external quotas leads member countries to tighten them compared to their Nash equilibrium value, albeit by less than cross-border lobbying alone does.*

Intuitively, an increase in i's external quota has four distinct effects, three of which apply both domestically and across the border, and one of which applies only domestically. First, an increase in q^i reduces the domestic output and hence the political contribution of sector 3 in both countries. Second, it also raises consumer surplus in both countries. Third, it reduces the wedge between good three's domestic price in the area and its world price, thereby reducing quota rents in both countries. In addition (this is the fourth effect), an increase in q^i raises the import quantities over which the diminished quota rents are collected; unlike the previous three ones, this effect is purely domestic. At country i's optimum, because the last effect is positive, the domestic component of the previous three ones, taken together, must be negative; but as they apply equally to i and j, if they are negative for i, so are they for j. Hence, the externality exerted by an increased q^i on V^j is negative at the optimum, and cooperation leads to a *tightening* of quotas, as stated in Proposition 3.

Proposition 3's result also holds if the two economies merge completely and consolidate their external quotas into a single one. To see this, observe that if they do, the "consolidated" or harmonized quota is determined by the usual first-order condition, but with aggregate variables replacing national ones. Because A and B are symmetric and expression (14) is linear in country-specific variables (y^i and q^i), aggregation leaves it unaffected. (This invariance holds irrespective of the bargaining rule used to share the rents of the common external quota.) Therefore, if A and B merge their external quotas into a single one, the outcome of deep integration is no different from that of simple inter-governmental cooperation.[8]

4 Extensions

4.1 Rules of origin

This section extends the characterization of the noncooperative external-quota equilibrium of section 3 to FTAs with rules of origin. In an FTA with endogenous external *tariffs*, if goods imported from the rest of the world could transit through a member country with a low external tariff into one with a higher external tariff, the latter would see its protection flounder. Because trans-shipment brings tariff revenue, each country in such a setting has an incentive to undercut the external tariff of its partners, creating a sort of prisoner's dilemma leading to the complete elimination of external tariffs by all member countries. While being efficient from a welfare point of view, this outcome is, of course, not the one preferred by import-competing lobbies. Rules of origin, which prevent the trans-shipment of goods through the area's internal borders, prevent this type of arbitrage, and therefore play a crucial role in the political equilibrium (see Cadot, de Melo and Olarreaga, 1996). We show here that rules of origin play no such role in an FTA with endogenous quantitative restrictions, as the unique symmetric equilibrium of Proposition 1 retains its properties when rules of origin are imposed.

Although the equilibrium is symmetric, a full characterization of payoff functions requires asymmetric quota pairs (with unequal prices) to be considered. *Ceteris paribus*, consumer price differentials can arise in an FTA with rules of origin only if national external quotas are set at sufficiently unequal levels. To see this, suppose that $p^A > p^B$, and let $c^i(p^i)$ be country i's consumption of the import-competing good and $y^i(p^i)$ its domestic output. As the functions c^i and y^i are identical in A and B, we will omit superscripts on them. When $p^A > p^B$, B's producers ship their entire output $y(p^A)$ to A, but rules of origin prevent goods imported from C into B from being trans-shipped to A. Thus, A's domestic price p^A must satisfy the market-clearing equation

$$q^A = c(p^A) - 2y(p^A). \tag{15}$$

Note that a necessary condition for the existence of a positive quota q^A satisfying (15) is that $c(1) > 2y(1)$, i.e. that the import-penetration ratio $m(1)/c(1)$ be in excess of one half at free trade. As B's consumption is met entirely through imports from C, B's domestic

[8]This result also holds for endogenous tariffs when countries are symmetric but not when they are asymmetric; see Cadot, de Melo and Olarreaga, 1996).

price p^B is determined by

$$q^B = c(p^B). \tag{16}$$

Let $\psi^A(q^B) = \sup\{q^A : p^A(q^A) > p^B(q^B)\}$; i.e. ψ^A defines an upper bound on the range of q^A compatible with $p^A > p^B$ given q^B. Using (15) and (16),

$$\begin{aligned}\psi^A(q^B) &= c(p^B) - 2y(p^B) \\ &= c\left(c^{-1}(q^B)\right) - 2y\left(c^{-1}(q^B)\right) \\ &= q^B - 2y\left(c^{-1}(q^B)\right),\end{aligned} \tag{17}$$

where $c^{-1}(.)$ is the inverse demand for the import good. Because c and c^{-1} are decreasing functions whereas y is an increasing one, ψ^A is an increasing function; moreover, it is readily seen from (17) that its slope $[\psi^A]' = 1 - 2y' \cdot [c^{-1}]'$ is more than one (the second derivative of ψ^A is positive with a linear demand and indeterminate otherwise). Define q_0^B by $\psi(q_0^B) = 0$; using (17), q_0^B must satisfy $q_0^B = 2y[c^{-1}(q_0^B)]$; that is, q_0^B is a fixed point, if any, of the function $2y[c^{-1}(x)]$. We claim that this fixed point exists, is positive, and is unique. Let $p_0^B = c^{-1}(0)$ whenever $c^{-1}(0)$ is well-defined (otherwise we say that $p_0^B = \infty$); p_0^B is the 'choke point' (vertical intercept) of B's inverse demand function, when it has one. Clearly, $2y[c^{-1}(0)] = 2y(p_0^B) > 0$; hence, if it exists, q_0^B must be strictly greater than zero. Moreover, at $q^B = c(1)$ (B's free-trade level of consumption, at which its external quota ceases to be binding), $c^{-1}(q^B) = 1$, so $2y[c^{-1}[c(1)]] = 2y(1)$, which is, by (15), less than $c(1)$: therefore, at $q^B = c(1)$, $2y[c^{-1}(q^B)] < q^B$. It follows that the function $2y[c^{-1}(x)]$ has at least one fixed point strictly between $x = 0$ and $x = c(1)$; moreover, because it is monotone decreasing, this fixed point is unique. Having established the existence of $q_0^B > 0$ completes the characterization of the function $\psi^A(q^B)$. A similar function $\psi^B(q^A)$ can be constructed on the assumption that $p^B > p^A$, leading to a partition of the space (q^A, q^B) into three regions: a central band with price equalization, and two lateral regions with price differentials of opposite signs, as shown in figure 2.

We can now use figure 1 to map quota pairs (q^A, q^B) into pairs of domestic prices (p^A, p^B) in order to construct payoff functions $\mathcal{V}^A$ and $\mathcal{V}^B$. Consider the following three functions: $\forall\, x, z$ in R^+,

$$\begin{aligned} z = f(x) &\quad\Leftrightarrow\quad x = c(z) - 2y(z), \\ z = g(x) &\quad\Leftrightarrow\quad x = 2[c(z) - y(z)], \\ z = h(x) &\quad\Leftrightarrow\quad x = c(z). \end{aligned}$$

Using (15), it can be seen that f gives p^i as a function of q^i when q^i is such that $p^i > p^j$ (i.e. when $q^i < \psi^i(q^j)$): similarly, g gives p^i as a function of $q^A + q^B$ when $p^i = p^j$ (i.e.

when $\psi^i(q^j) \leq q^i \leq (\psi^j)^{-1}(q^j)$); while h gives p^i as a function of q^i when $p^i < p^j$ (i.e. when $(\psi^j)^{-1}(q^j) < q^i$). A few more pieces of notation are needed to construct payoff functions. Let $s(p^i)$ stand for consumer surplus in i, and define the following three continuously differentiable functions:

$$\begin{aligned}
\hat{V}^i(q^i) &= C^i[f(q^i)] + a\left\{\pi[f(q^i)] + s[f(q^i)] + b[f(q^i) - 1]q^i\right\}, \\
\bar{V}^i(q^i, q^j) &= C^i[g(q^i + q^j)] + a\left\{\pi[g(q^i + q^j)] + s[g(q^i + q^j)] + b[g(q^i + q^j) - 1]q^i\right\}, \\
\check{V}^i(q^i, q^j) &= a\left\{\pi[f(q^j)] + s[h(q^i)] + b[h(q^i) - 1]q^i\right\}.
\end{aligned}$$

Recalling from section two that C^i is sector three's contribution function in i and noting that the terms in curly brackets are welfare terms, $\hat{V}^i$ is i's "payoff" (contributions plus appropriately-weighted welfare) when $q^i < \psi^i(q^j)$; similarly for $\bar{V}^i$ when $\psi^i(q^j) \leq q^i \leq (\psi^j)^{-1}(q^j)$; and for $\check{V}^i$ when $(\psi^j)^{-1}(q^j) < q^i$. The function $\check{V}^i$ differs from the other two in that i's import-competing lobby does not contribute because it sells its output in j; for the same reason, the producer price relevant for the calculation of producer surplus π is $f(q^j)$ instead of the domestic price $h(q^i)$. Using these, i's payoff function is

$$\mathcal{V}^i = \begin{cases} \hat{V}^i & \text{if } q^i < \psi^i(q^j) \\ \bar{V}^i & \text{if } \psi^i(q^j) \leq q^i \leq [\psi^j]^{-1}(q^j) \\ \check{V}^i & \text{otherwise.} \end{cases} \tag{18}$$

Equation (18) shows that $\mathcal{V}^i$ may be, in general, neither differentiable nor continous. As $\hat{V}^i$ and $\bar{V}^i$ are identical at $q^i = \psi^i(q^j)$, but $[\hat{V}^i]' > [\bar{V}^i]'$, $\mathcal{V}^i$ has a point of nondifferentiability at $q^i = \psi^i(q^j)$. Moreover, as $\bar{V}^i$ is strictly greater than $\check{V}^i$ at $q^i = [\psi^j]^{-1}(q^j)$, it also has a point of discontinuity (a jump *down*) at that point: by construction of the functions ψ^i and ψ^j, this jump must lie to the right of the point where $q^i = q^j$ (see figure 2). To the right of its jump, $\mathcal{V}^i$ rises monotonically along $\check{V}^i$ up to the point where q^i is no longer binding. In addition, because sector three is, in each country, the only lobby actively trying to influence the government, its contribution schedule C^i is adjusted so as to leave the government just indifferent between adopting $\bar{q}^i \equiv \text{argmax } \bar{V}^i$ and free trade, as shown in figure 3 (figure 3 shows the function $\mathcal{V}^i$ across a horizontal cross-section of figure 2).

The last remaining analytical step consists of characterizing the Nash equilibrium in (q^A, q^B). Because all relevant functions and parameters are identical in A and B, $\bar{q}^A = \bar{q}^B$; hence, any equilibrium must be symmetric. Maximizing the function $\bar{V}^i$ given $\bar{q}^j$ yields the first-order condition

$$\frac{\partial \bar{V}^i}{\partial q^i} = \frac{\partial \pi}{\partial q^i} + a\left\{\frac{\partial \pi}{\partial q^i} + \frac{\partial s}{\partial q^i} + b[g(q^i + q^j) - 1] + q^i g'(q^i + q^j)\right\}$$

$$
\begin{aligned}
&= y + a(y - c + bq^i)g' + ab(g-1) \\
&= \frac{y - a(1-b)q^i}{2m'} + ab(p-1) \ = \ 0.
\end{aligned}
\tag{19}
$$

Note that the last transformation comes from the fact that, by implicit differentiation, $g' = 1/2m'$ where $m = c - y$, and that, when $p^A = p^B$, no intra-block trade takes place so $m^i = q^i$. It is apparent by comparison of (19) with (11) that the value of q^i which maximizes i's payoff is the same whether or not rules of origin are imposed.

4.2 Asymmetric partners

In order to explore how the symmetry assumption affects the results of section 2, we will now specialize the model in such a way as to obtain closed-form solutions for endogenous quotas. Specifically, suppose that $a = 1$ and that utility and cost functions are quadratic, so that demand and supply functions in the import-competing sector (sector three) are linear:

$$
c^i(p^i) \ = \ (4 - p^i)/2\beta^i, \tag{20}
$$

$$
y^i(p^i) \ = \ p^i/2\beta^i. \tag{21}
$$

In (20) and (21), β^i is an inverse measure of country size: as it goes down, the inverse demand curve $p_D^i = 2 - 2\beta^i c^i$ rotates counterclockwise around its vertical intercept as if identical consumers were being added to country i, whereas the supply curve $p_S^i = 2\beta^i y^i$ rotates clockwise as if by addition of identical firms. Combining (20) and (21), country i's import-demand function is

$$
m^i(p^i) = (2 - p^i)/\beta^i; \tag{22}
$$

the domestic price level is obtained by inverting (22) and noting that $m^i = q^i$, so $p^i = 2 - \beta^i q^i$. Substituting these functional forms into first-order condition (5) (which holds prior to the FTA) yields

$$
-\beta^i \left[(2 - \beta^i q^i)/2\beta^i \ - \ (1-b)q^i\right] \ + \ b(1 - \beta^i q^i) \ = \ 0, \tag{23}
$$

or, in closed form,

$$
\hat{q}^i = \hat{\lambda}/\beta^i \quad \text{where} \quad \hat{\lambda} = \frac{2(1-b)}{3-4b}. \tag{24}
$$

In this setup, the first-order condition is linear in q^i and can be expressed as $\beta^i A q^i - B = 0$, where $A = 3/2 - 2b$ and $B = 1 - b$; the second-order condition requires that $A < 0$, which implies that $b > 3/4$. Note that $\hat{q}^i > 0$ only if $b < 1$.

In a non-cooperative FTA, the relevant first-order condition is (10). Let $\gamma = \beta^A\beta^B/(\beta^A + \beta^B)$, so $(m^A)' + (m^B)' = -1/\gamma$. With the symmetry assumption relaxed, the equivalence of imports and quotas now holds only in the aggregate (for the entire area); that is, $m^A + m^B = q^A + q^B$. Let $Q = q^A + q^B$; the domestic price level P common to the area is now determined by $(2-P)/\beta^A + (2-P)/\beta^B = Q$, which gives $P = 2 - \gamma Q$. Substituting the functional forms (20) and (21) into (10) now gives

$$-\gamma\left[(2-\gamma Q)/2\beta^i - \gamma Q/\beta^i + bq^i\right] + b(1-\gamma Q) = 0. \tag{25}$$

Because (25) is again linear in q^i and q^j, it can be aggregated over $i = A, B$ and solved for Q, giving

$$\bar{Q} = 2\bar{\lambda}/\gamma, \quad \text{where} \quad \bar{\lambda} = \frac{1-2b}{3(1-2b)} = 1/3.$$

Comparing $\bar{Q}$ with $\hat{Q} = \hat{q}^A + \hat{q}^B = \hat{\lambda}/\gamma$ gives

$$\bar{Q} - \hat{Q} = (2\bar{\lambda} - \hat{\lambda})/\gamma = -b/3\gamma(3-4b) > 0,$$

where the last inequality comes from the fact that $\gamma > 0$ implies that $\hat{\lambda} > 0$, which, together with the fact that $b < 1$, implies that $3 - 4b < 0$. Thus, given the postulated functional forms, the aggregate external quota of a free-trade area composed of asymmetric countries (choosing unequal external quotas) is larger than the sum of their individual pre-FTA quotas (as in previous sections, comparing post-FTA external quotas with pre-FTA MFN ones is meaningful because no trade takes place between A and B before the FTA). Although this result suggests that symmetry alone is not the driving force behind Proposition 1, it should of course be taken with caution, as linear supply and demand curves are indeed very special.

If both countries integrate completely, given an area-wide domestic price P, the aggregate import-demand function is $M(P) = (2-P)/\gamma$, and the consolidated quota can be calculated to be

$$\tilde{Q} = \hat{\lambda}/\gamma,$$

which turns out to be just equal to the sum of the pre-FTA quotas. Thus, complete harmonization exactly undoes the gains (in terms of reduced external protection) generated initially by the FTA.

However, Gros's (1992) result —namely, that the average price of the imported good goes up after quota harmonization— does not hold in the linear demand and supply context. To see this, observe that

$$\begin{aligned} p^A\hat{q}^A + p^B\hat{q}^B &= \hat{q}^A(2-\beta^A\hat{q}^A) + \hat{q}^B(2-\beta^B\hat{q}^B) \\ &= 2(\hat{q}^A+\hat{q}^B) - \beta^A\hat{q}^A(\hat{\lambda}/\beta^A) - \beta^B\hat{q}^B(\hat{\lambda}/\beta^B) \\ &= \hat{Q}(2-\hat{\lambda}), \end{aligned}$$

which, given that $\hat{Q}=\tilde{Q}$, is just equal to

$$\tilde{P}\tilde{Q} = \tilde{Q}(2-\gamma\tilde{Q}) = \tilde{Q}\left(2-\gamma\frac{\hat{\lambda}}{\gamma}\right) = \tilde{Q}(2-\hat{\lambda}).$$

Again, this should be interpreted with caution, as Gros' result reappears when the supply curve is made affine rather than linear (i.e. when a constant is added).

5 Concluding remarks

From a political-economy perspective, it has been often argued that deep forms of regional integration are a lesser evil for the multilateral trading system (e.g. Richardson, 1994, Panagaryia and Findlay, 1994, and Bhagwati and Panagariya, 1996). When special interests from different countries must co-ordinate their lobbying efforts to influence policies set at a supra-national level, Olson-type collective-action problems are less likely to be overcome, and lobbying pressures for trade protection tend to be diluted.

By contrast, we suggested in an earlier paper (Cadot, de Melo and Olarreaga, 1996) that, notwithstanding possibly acute collective-action problems, deep integration might enable special interests to internalize cross-border externalities in their lobbying activities, leading to increased external protection. However, our results were derived in an endogenous-tariff model in which (as in Richardson, 1993) competition for tariff revenue played a significant role, although its role in actual policymaking is of debatable relevance. In this paper, we extended our analysis to the highly relevant case of quantitative barriers, where quota rents, even if they are captured by the importing countries, do not generate competition and therefore do not affect the strategic interaction between the regional bloc's member states.

The new results contain both good and bad news for the multilateral trading system. The good news is that shallow, non-cooperative regionalism (which eliminates intra-bloc barriers but does not involve the coordination of external barriers) helps keep import-competing interests in check because of an *economic* dilution mechanism that is different from the collective-action problem previously stressed in the literature. The bad news is that those favorable effects are likely to reverse themselves as regional integration deepens through the coordination and harmonization of external barriers, enabling special interest to internalize cross-border externalities (as in the tariff case, although the nature of the externalities is different). Thus, the new results confirm qualititatively the intuition of the tariff-case results, although the equilibria are all interior and feature more plausible outcomes under quantitative barriers than under tariffs.

In a richer model with general-equilibrium interaction on factor markets, additional considerations would also come into play. As sectors competing with imports from within the area (sectors two in A and one in B) shrink under the effect of regional trade liberalization, the sector competing with the rest of the world (sector three) enjoys reduced rivalry on factor markets and can therefore expand. In the logic of the present model, sector three's ability to gain economic power translates into enhanced political clout as well, leading to renewed protectionist pressure against the rest of the world. In sum, it seems that, for a variety of reasons, our pessimistic conclusions on the effect of "deep regionalism" on outward protectionism are likely to hold irrespective of the type of trade-policy instruments available to member countries.

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Appendix

Strategic complementarity

The second cross-partial derivative of the function V^i is:

$$\frac{\partial(V^i)^2}{\partial q^i \partial q^j} = \frac{(y^i)' - a(m^i)' + \bar{\phi}^i(m^i)'' + ab}{(m^i)'}. \tag{26}$$

Let c^i be i's domestic consumption of the import good. After slight rearrangement and substitution of the first-order condition, (26) can be rewritten as

$$\frac{\partial(V^i)^2}{\partial q^i \partial q^j} = \frac{(1-a)(y^i)' + a(c^i)' + ab\,[1-(p-1)(m^i)'']}{(m^i)'}.$$

Provided that $a > 1$, the numerator of this expression is negative, so q^i and q^j are strategic complements (numerical simulations in Cadot, de Melo and Olarreaga, 1997, suggest that plausible policy outcomes require values of a largely in excess of unity).

Figure 1

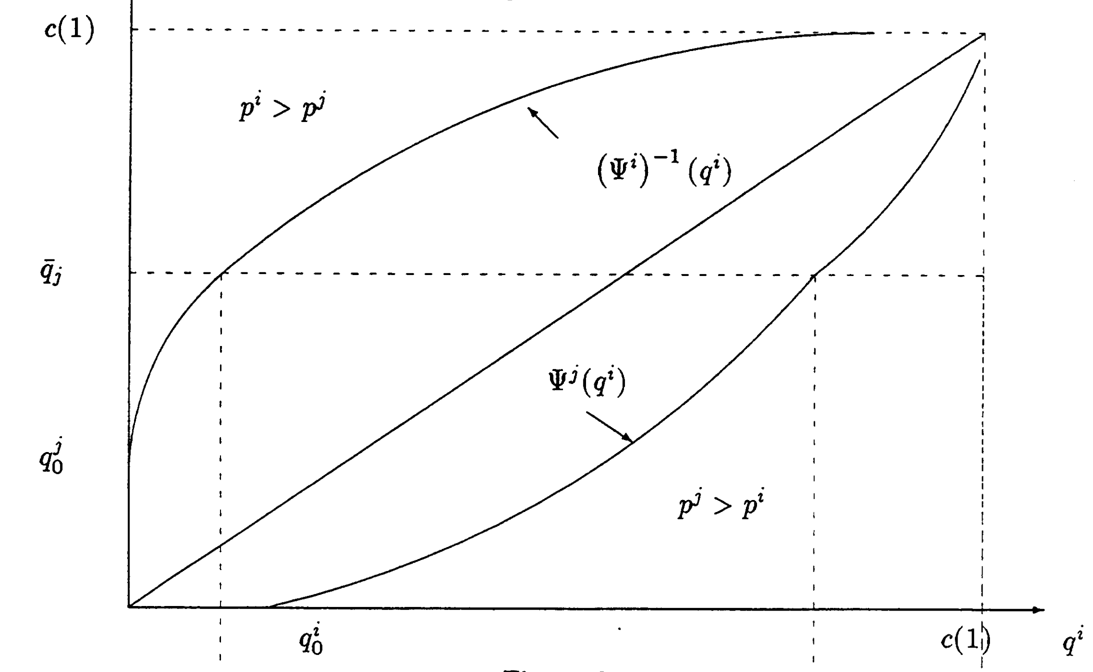

Figure 2