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# The Economics of Two-Tier Tariff-Rate Import Quotas in Agriculture

Devry S. Boughner, Harry de Gorter, and Ian M. Sheldon

This paper analyzes the economics of two-tier tariff import quotas (TRQs) and implications of alternative trade liberalization scenarios. The Uruguay Round Agreement on Agriculture had tariffs replace nontariff barriers as the protective mechanism while quotas ensured minimum trade flows. Our framework isolates the effects of changes either in the second-tier tariff, and first-tier tariff, or the quota. We show how market conditions or relative policy instrument levels determine which tariff or quota affects trade and domestic and world prices. Whether or not exporting countries have been allocated export quotas and the procedures for the distribution of the rights to export and import also influences the efficiency of TRQs.

The Agreement on Agriculture (WTO 1995), hereinafter 'the Agreement,' which concluded the Uruguay Round of the GATT, instituted market access provisions through tariffication and quotification. Tariffication required all countries to convert nontariff barriers to trade into tariffs and to agree to reduce these tariffs by an unweighted average of 36%, a minimum of 15% per tariff line, by the marketing year 2000/2001. Quotification provisions contained two access commitments: a current access (CA) and a minimum access (MAC), as cited in the "Modalities for the Establishment of Specific Binding Commitments," hereinafter called the Modalities (WTO 1993). All countries agreed to maintain CA at a minimum of 3% of domestic consumption in the base period 1986–88, and to increase CA to 5% by the year 2000. If CA was greater than 3%, then countries were required to maintain and increase CA at or above its existing level. If the CA was lower than 3% of con-

sumption, then an additional MAC was made on a most favored nation (MFN) basis, the size of which was determined by the difference between the lower CA level and the MAC for that year. If CA was higher than 3%, then no MAC was required and the country simply notified in its schedule the CA opportunity for that year, with the allocation of the CA made on the same terms and conditions as prior to the Agreement.

To meet access commitments, many countries scheduled two-tier tariff-rate import quotas (TRQs) with the World Trade Organization (WTO). As Moschini (1991) notes, TRQs have not been a common instrument of trade policy. Consequently the literature contains little economic analysis of their economic effects, the most extensive early treatment being that of Rom (1979). A TRQ is an import quota, to fulfill CA and MAC levels, combined with a first-tier tariff for in-quota, including over-quota,<sup>1</sup> imports, and a higher second-tier tariff for out-of-quota imports.<sup>2</sup> Unless the second-tier tariff is prohibitive, the TRQ does not represent an absolute restriction on imports.

A total of 35 countries have scheduled 1,370 TRQs for agricultural commodities in the Agreement. TRQs were intended to provide a smooth transition to free trade with the second-tier tariff

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<sup>1</sup> The level of 'over-quota' imports at the first-tier tariff is allowed at the discretion of the importing country.

<sup>2</sup> There is a fourth type of import that should always be distinguished, non-quota imports with a tariff that can differ from that of the second-tier tariff.

protecting importers from a surge in imports (Moschini, 1991). However, because the TRQ both tariffies (protects) and quotifies (liberalizes) simultaneously, the question remains whether the TRQ system results in a more liberalized trade regime for agriculture (see Josling, Tangermann, and Warley 1996; Hathaway and Ingco 1995).

The purpose of this paper is to explain the economics of TRQs and to describe the inefficiencies resulting from the nontradability of import licenses and country-specific export quotas. We also show how trade liberalization occurs with alternative policy instruments, first- *versus* second-tier tariff reductions *versus* an increase in quotas, under various market conditions. There is no uniformity across countries or commodities in the setting of either the absolute or relative levels of the first- and second-tier tariffs, or in their reduction resulting in differing, realized and potential, trade liberalization effects. Quota rents are, therefore, also unequal across countries and commodities. Tariffs are typically redundant, because quotas often are the constraint determining imports and domestic/world prices. Tariffs were inflated through the process known as dirty tariffification. Import quotas were established as a function of a past base-period of import and consumption levels, both of which are subject to deflation or what can be described as dirty quotification. Inflation of tariffs and deflation of quotas reflect rent seeking by domestic farm and agribusiness groups, thereby generating the need for more protection. We identify the conditions under which either tier tariff becomes effective, i.e., which tier is the constraint and so determines the level of imports and domestic/world prices. We then describe the interaction between the tariffs and quota as to their effects on trade, welfare, and distribution of quota rents and tariff revenues. Liberalizing trade via a reduction in tariffs has a different effect than that of increasing quota levels.

A key factor affecting the welfare economics of TRQs is whether or not exporting countries have been allocated export quotas and the procedures, or lack thereof, for distributing the rights to rents by which exporters assign export licenses and importers assign licenses to importing firms. We determine that the distribution of rents, economic inefficiency, and trade effects can be significantly influenced by whether these rights to rents are tradable or not.

### The Economics of Two-Tier Tariff-Rate Import Quotas

During the process of tariffification, countries chose several different types of tariff, *ad valorem* tariffs

being the most common. There are also specific, mixed (*ad valorem* or specific), and compound (*ad valorem* plus specific) tariffs, or what the WTO terms technical tariffs, based on factors such as the value of the imported product, sugar content, or alcohol content. Each country had wide latitude in binding the original level of tariffs through their choice of reference prices in some cases to the purposeful miscalculation of tariff equivalents, known as dirty tariffification, in order to create a larger gap between internal and external prices than actually existed. Dirty tariffification mitigates trade liberalization effects of TRQs for given tariff reductions because most second-tier tariffs are redundant, resulting in what is known as water in the tariff. Dirty tariffification also refers to situations in which sectors with already low tariffs are cut relatively more in percentage terms to meet the 36% unweighted average reduction requirement.

Agricultural protection was relatively high in the base period of 1986–88 because world prices were unusually low. Dirty quotification occurs with the purposeful manipulation of domestic consumption calculations in setting the CA and MAC. The Modalities state that CA opportunities “. . . shall be no less than average annual import quantities for the years 1986–1988” (WTO 1993). However, the Modalities do not mention a specific base period for calculating domestic consumption for the MAC, giving countries wide latitude. For example, the United States used 1975–1981 as a base period for allocating portions of their country specific TRQ for sugar (WTO 1997). Also, the Modalities do not specify as to whether annual import quantities considered in the base period should be gross or net quantities. If countries used net imports, then the TRQ may be less than actual imports during that time period. Also, access opportunities differ based on whether the importing country calculated domestic consumption for highly aggregated commodity groups or calculated on a product-by-product basis.<sup>3</sup>

Either the import quota or one of the two tariffs can be *effective*, rendering the other two policy instruments *redundant*. A policy instrument is effective when it determines directly the level of the domestic and world prices and is redundant when the domestic market price is determined by one of the other two instruments. For a tariff to be effective, therefore, it must change, increase, or decrease the level of trade from the administered quota level. Otherwise, each tariff is redundant and

<sup>3</sup> See Modalities Section C, paragraph 15 for the specific wording on aggregating the MAC (WTO 1993).

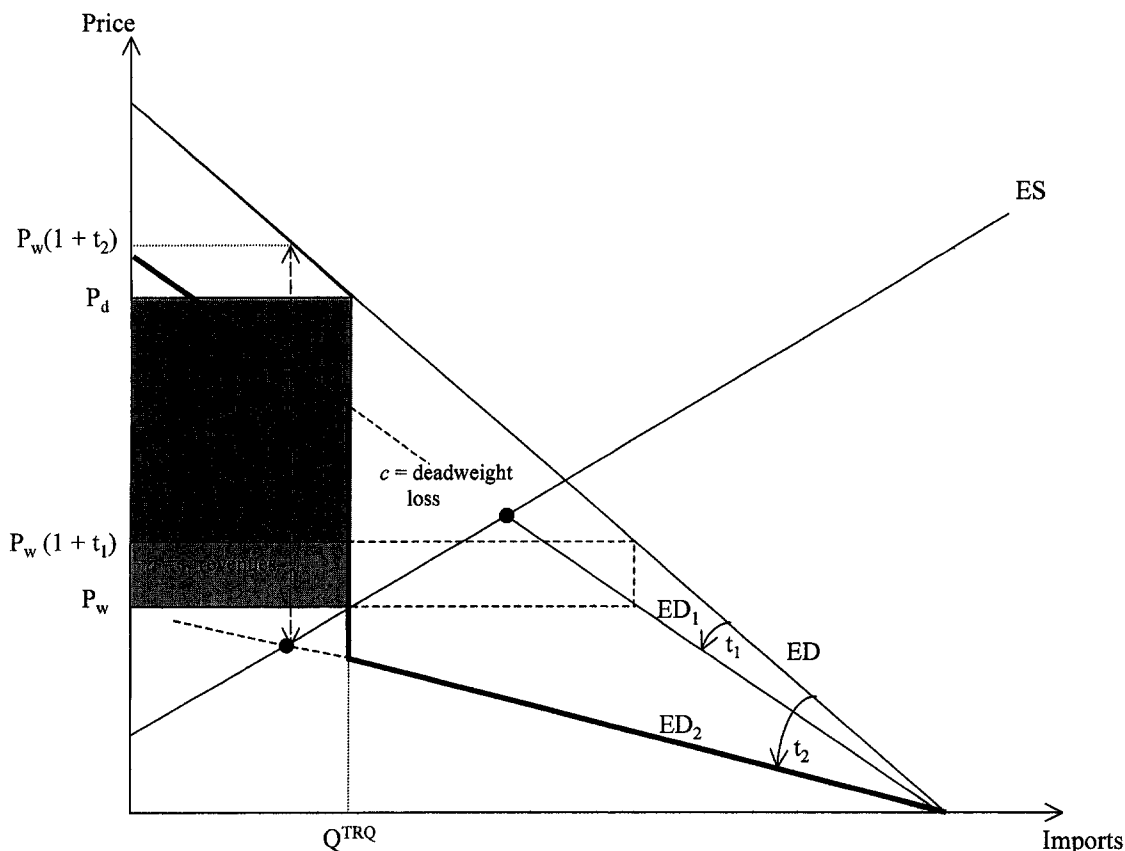


Figure 1. Import Quota Regime

the quota becomes effective. For a quota to be effective, the second-tier tariff plus the world price must be greater than the domestic price resulting from the import quota alone, the second-tier tariff being ineffective because it is for out-of-quota imports only, and the first-tier tariff plus the world price must be less than the domestic price determined by the import quota. If the second-tier tariff plus the world price falls below the domestic price determined by the import quota, then the quota becomes redundant, and the second-tier tariff is effective and thus determines the domestic market price. The first-tier tariff can be effective and can determine the domestic price, when the first-tier tariff plus the world price is greater than the domestic price determined by the import quota alone.

The case in which the import quota is effective, with redundant first- and second-tier tariffs, is shown in figure 1. As in standard textbooks (Houck 1986; Tweeten 1992), we depict the effects of an import quota with a vertical excess demand curve and the effects of an *ad valorem* tariff with a pivot in the excess demand curve. The world price  $P_w$  is determined at the intersection of the bold

excess demand curve under the effective import quota  $Q^{TRQ}$  and the excess supply curve  $ES$ .<sup>4</sup> A redundant second-tier tariff is depicted where the excess demand curve inclusive of  $t_2$  is depicted by  $ED_2$  that would generate  $P_d^2 = P_w(1 + t_2)$ , a hypothetical domestic price only. Out-of-quota imports do not occur, because the domestic price inclusive of the second-tier tariff generates a price that is above the lower domestic price  $P_d$  generated by the quota alone.  $Q^{TRQ}$  intersects the excess supply curve to the right of where the  $t_2$  inclusive excess demand curve intersects the excess supply curve, rendering  $t_2$  redundant.  $Q^{TRQ}$  is effective when it intersects the  $ES$  curve to the right of where  $ED_2$  does.

An ever-increasing  $Q^{TRQ}$ , however, becomes ineffective when it intersects the  $ES$  curve to the

<sup>4</sup> If one instead defines the excess demand curve as that determining the domestic price for each excess supply curve, then the bold part would be depicted as  $ED$  from the top and then become vertical at the actual import level. This vertical portion would move left or right (like an accordion) when the excess supply curve shifts left or right, assuming that either  $t_1$  or  $t_2$  remains effective.

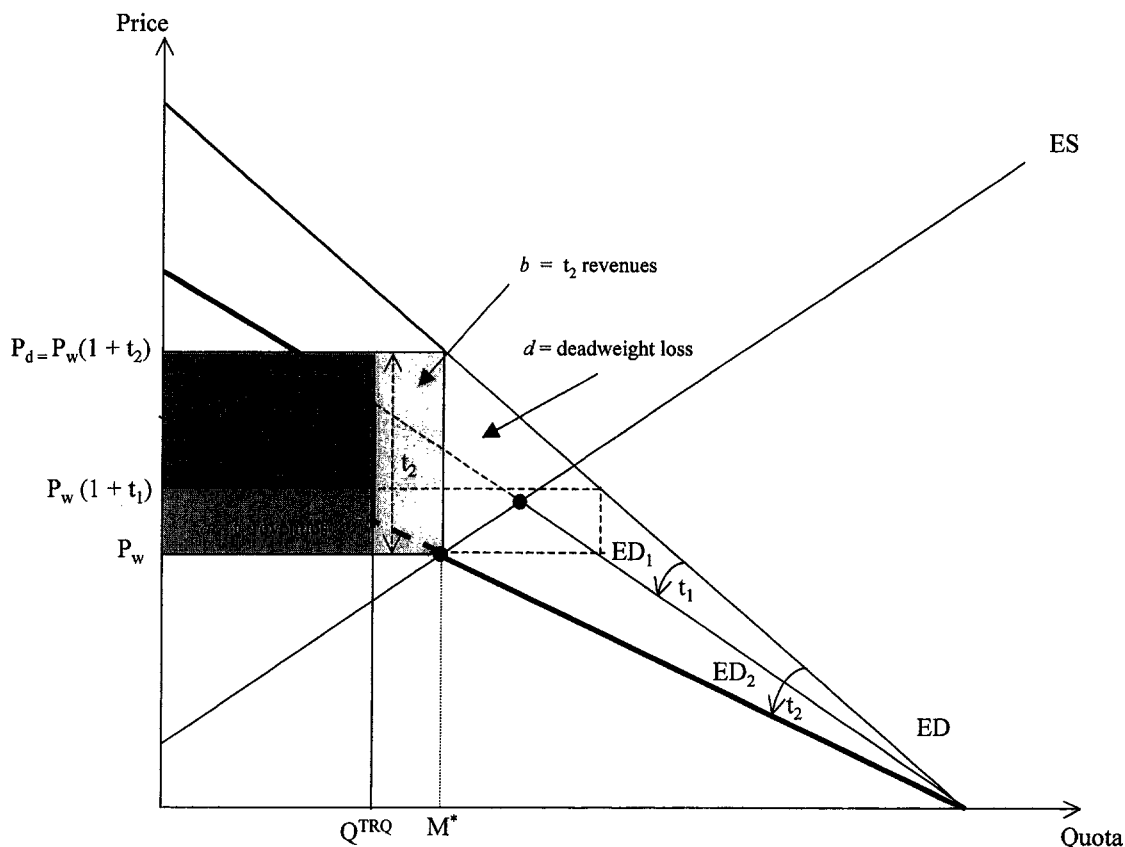


Figure 2. Second-Tier Tariff Regime

right of where the  $t_1$  inclusive excess demand curve  $ED_1$  intersects the ES curve. The quota is effective only when it intersects the ES curve between  $ED_2$  and  $ED_1$ . The vertical portion of the excess demand curve in figure 1, shown in bold, holds only for an ES intersecting it between  $ED_1$  and  $ED_2$ . The tariff revenue collected by the government in figure 1 is area  $a$  from the redundant first-tier tariff  $t_1$ , where solid lines surround all areas designated in the following figures. The amount of rent created is given by area  $b$ . The deadweight loss incurred by the importing and exporting countries with this TRQ is area  $c$ .

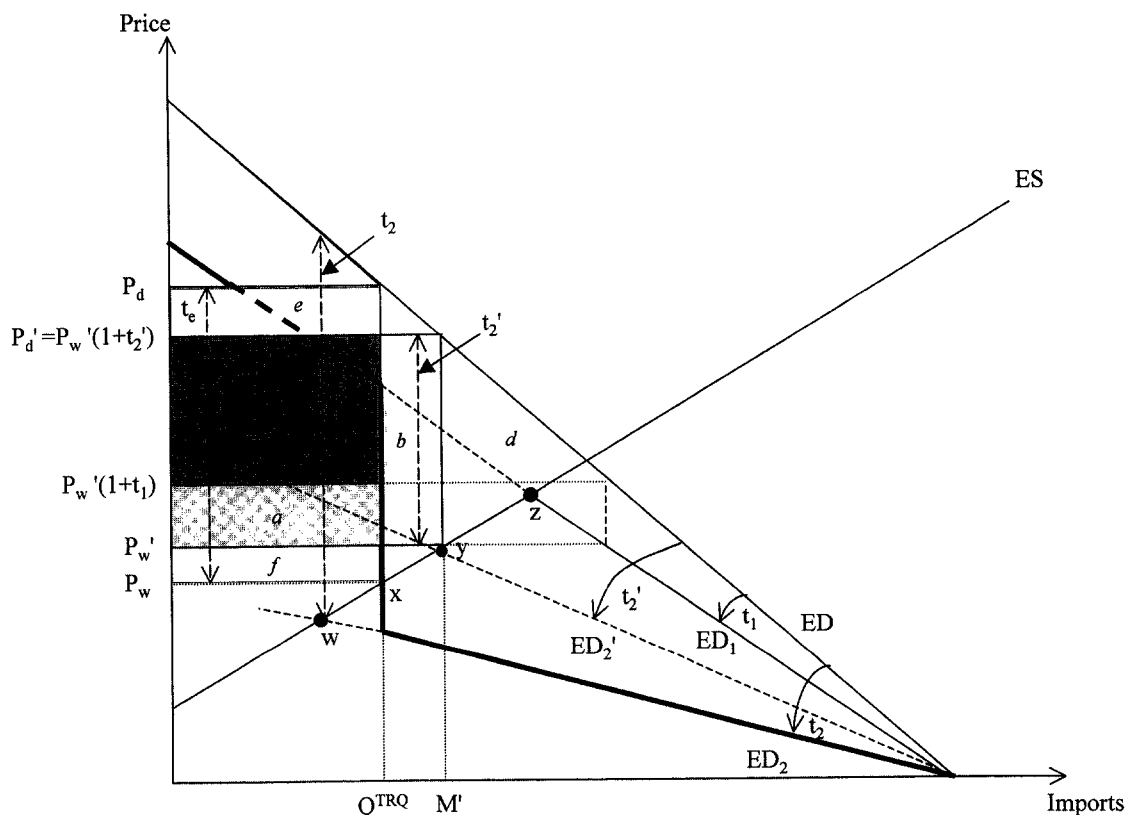
The case of an effective second-tier tariff  $t_2$  is depicted in figure 2. The domestic price  $P_d = P_w(1 + t_2)$  is determined below the price that would result from an effective import quota alone.<sup>5</sup> Note that an import quota creates rents even if the

quota is deemed redundant.<sup>6</sup> Assuming a 100% fill rate in figure 2, although not necessary (see Boughner 1999 and de Gorter and Boughner forthcoming), out-of-quota imports occur, increasing total actual imports to  $M^*$ , which is to the right of the import quota level  $Q^{TRQ}$ , where the excess demand curve  $ED_2$  inclusive of  $t_2$  intersects with the excess supply curve ES. Imports within  $Q^{TRQ}$  are assessed the first-tier tariff rate of  $t_1$ , and imports out-of-quota are levied the second-tier tariff  $t_2$ . Tariff revenues are areas  $a$ , and  $b$  from the first- and second-tier tariffs respectively, while quota rents are area  $c$ . The deadweight welfare loss of this TRQ is area  $d$ .

Finally, there is the case in which the quota does not bind, the effects of the TRQ on domestic and world prices being the same as that of an ordinary tariff. No quota rents are generated and no second-tier tariff revenues raised, only first-tier tariff revenue result. In addition, the standard deadweight

<sup>5</sup> There is a special case of the effective second-tier tariff where  $t_1 = t_2$  (not shown). In this case, one tariff would apply, and if the tariff inclusive ED curve intersected the ES curve to the right of  $Q^{TRQ}$ , no rents would accrue, resulting in pure tariffification.

<sup>6</sup> If  $t_2$  is redundant, then  $t_1$  is the only tariff affecting the level of total rents.



**Figure 3. Second-Tier Tariff Reduction**

loss of a tariff applies. It should be noted that, for given levels of each policy instrument a change in market conditions (reflected by shifts in the intersection of the excess supply and demand curves) can cause regime switches, and as discussed above, vice-versa.

### Implications of TRQs for Future Trade Negotiations

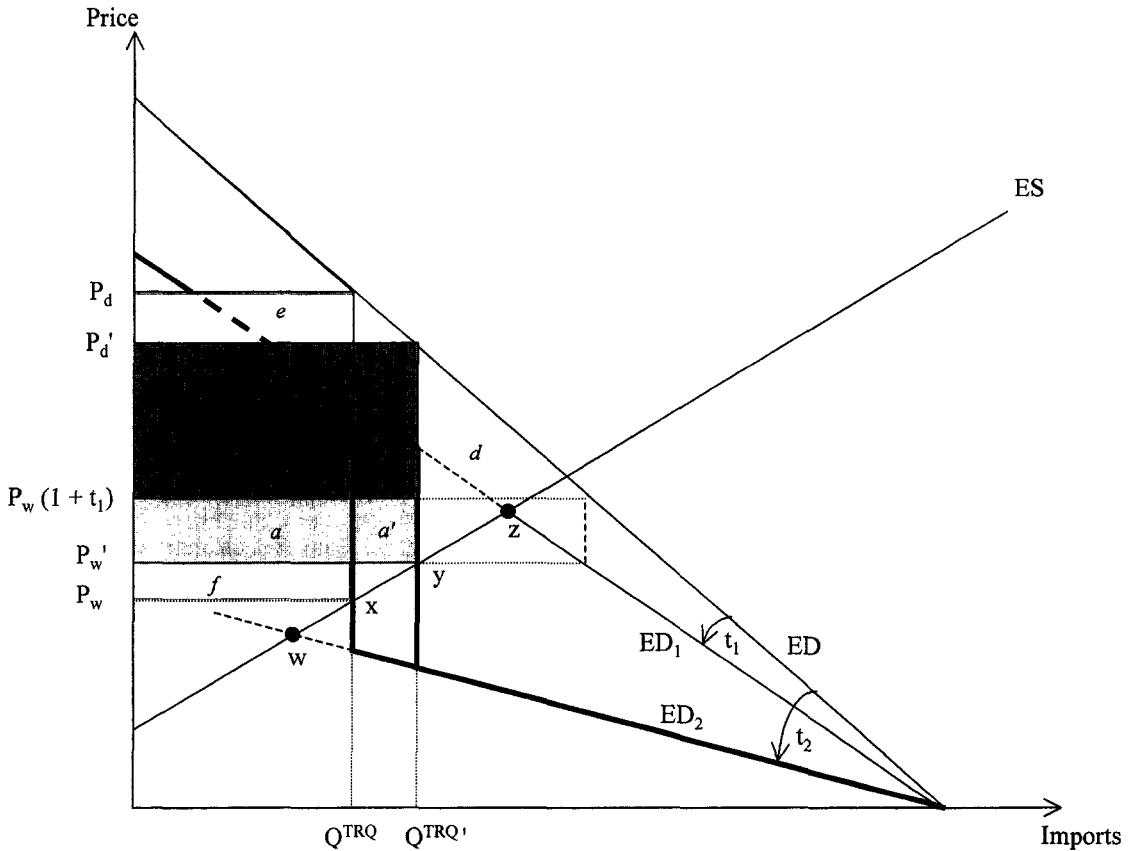
In addition to the cases outlined in the previous section, other tariff-quota combinations are also possible. The share of rents versus tariff revenue depends on the relative difference between the two tariffs and on the size of the import quota. There is, however, no one uniform TRQ policy administered by every country, which makes it difficult to determine whether an increase in import quotas or a decrease in tariffs will result in a greater trade liberalizing effect.

The above analysis implies that reducing only one of the two tariffs or increasing the quota may or may not result in trade liberalization. If governments are interested in protecting farmers, then

governments should not be given the choice of reducing either tariff or increasing quota levels, for fear of choosing the most protective of the two aforementioned options. To maximize trade liberalization effects, negotiators need to identify which of the three policy instruments is effective and then change the corresponding policy instrument. However, a regime switch could occur rather quickly such that a further reduction in a tariff or an increase in the quota becomes ineffective in liberalizing trade. To counter that, it is important not only to identify the effective instrument in the current situation but also how soon the instrument becomes redundant upon liberalization.

To do this, one must calculate the tariff equivalent  $t_e$ , which is defined as the difference between world and domestic prices if the TRQ were to be effective. The level of out-of-quota imports or under-fill relative to the quota gives information about how close the unobserved  $t_e$  is to the actual wedge between world and domestic prices. Indeed, to avoid an instrument becoming redundant upon liberalization, it may be necessary to liberalize at least two instruments at the same time.

In figure 3, consider the case where  $t_e$  is close to



### Figure 4. Quota Increase

but less than  $t_2$ . Over the range  $w-x$ , a small reduction in  $t_2$  will have no impact on imports, the quota being the effective instrument. For trade liberalization to occur in this case, an increase in the quota will be required. However, if  $t_2$  is either already less than  $t_e$ , or is reduced below  $t_e$ , further decreases will have a maximal effect in liberalizing trade. For example, if the second-tier tariff is reduced to  $t_2'$  from  $t_2$ , so that the excess demand curve goes through point  $y$ , the second-tier tariff becomes the effective instrument. The world price increases to  $P_w'$ , and the domestic price falls to  $P_d'$  as imports increase to  $M'$ . Tariff revenue from the first-tier tariff is  $a$ , the loss of this revenue being  $f$ , while additional revenue from the second-tier tariff is  $b$ . Quota rents are  $c$ , the loss of rents being  $e$ . The deadweight loss after reduction of the second-tier tariff is now area  $d$ . Hence, for such cases where  $t_e$  is close to  $t_2$ , it may be sufficient to focus on negotiating significant reductions in  $t_2$  only, an outcome that is definitely desirable for all cases where  $t_e$  is initially greater than  $t_2$  (see de Gorter and Boughner, forthcoming, for an empirical example from the U.S. dairy industry).

Using figure 4, suppose instead that the quota is increased to  $Q^{TRQ'}$ , where this increase generates the same amount of imports as does reduction in the second-tier tariff to  $t_2'$ . This has the same effect on world and domestic prices. Revenue from the first-tier tariff is now made up of area  $(a + a')$ , while loss of first-tier tariff revenue is area  $f$ . Quota rents are area  $(b + c)$ , while quota rents fall by area  $e$ . Deadweight loss of the TRQ remains at  $d$ . Liberalization via increases in the quota, or some combination of an increase in the quota reduction in the second-tier tariff, can occur between points  $x$  and  $z$ , assuming that the quota is initially the effective instrument. Beyond  $z$ , reductions in the first-tier tariff, or some combination of an increase in the quota reduction in the first-tier tariff, are necessary.

To summarize, negotiators should focus on reducing  $t_2$  only in those cases where  $t_e$  is greater than but close to  $t_2$  or if  $t_e$  is less than  $t_2$ . If  $t_e$  is far below  $t_2$ , increasing the quota will have a greater chance of liberalizing trade. A reduction in  $t_1$  will liberalize trade only if  $t_2$  is close to  $t_1$ , in which case both tariffs need to be reduced, and if  $t_e$  is

significantly less than  $t_1$ —otherwise, quotas will also have to be increased in order to get trade liberalizing effects. This analysis shows the importance of understanding the relationship between three tariffs: the first-tier tariff  $t_1$ , the second-tier tariff  $t_2$ , and the tariff equivalent of the quota, actual or hypothetical.

### Export Quotas, Import Licenses and the Rights to Rents

As well as the orthodox deadweight losses of TRQs, there can also be efficiency losses due to the nontradability of both country export quotas and import or export licenses allocated to firms. The distribution of rents with TRQs depends critically on whether or not export (import) licenses are assigned to firms for the right to export (import). Assigning rights implicitly allocates the rights to rents, but, as will be shown later, it may be possible that owning rights will not always obtain the rents.

Recall that the CA portion of the import quota was to be allocated on existing terms and conditions as part of the tariffication process, and that the MAC portion of the import quota was to be provided on a MFN basis (see 'Modalities' Section C, paragraph 14, WTO 1993). If countries subdivided any portion of their total import quota among supplying countries, either CA and/or MAC amounts, affording the supplying countries the right to export, then the TRQ became a country specific TRQ, often called a global quota or allocated quota (Rom 1979) or an export quota. Once the exporting countries were designated, the export quota remained fixed and usually nontradable. In some cases, the right to export was allocated if and only if the exporting country agreed to the submission of an export license to exporting firms. For example, the European Union required export licenses for 21 of their 85 TRQs in 1996. If an export license is required, then country-specific rights are bestowed to the exporting firm. The right to export, therefore, is transferred from the exporting country to specific exporting firms.

Not every importing country allocated exporting rights to specific countries for every TRQ. As a result, no export rights were assigned in these unallocated TRQ cases. Several issues arise regarding the allocation of export quotas, and an understanding of the non-discriminatory export quota allocation process is required. Inefficiency arises because Article XIII of GATT does not require that rights to export is allocated to the lowest-cost exporters. Rights can be allocated to higher-cost exporters, and there are no requirements in place to make the

export quotas tradable. As a result, the inefficiencies of export quota allocation are institutionalized.

In addition to deciding who has the right to export, importing countries can also decide which importing firms receive the right to import. No specific provisions exist for the exact method of allocating import licenses. As a result, importing countries use varying methods of allocation, some more efficient than others (see Skully 1999; Boughner and de Gorter 1998). The period import licenses are valid, the size of the licenses, eligibility requirements for receiving an import license, reallocation of unused licenses, and requirements for the use of the license are determined differently by different countries. The GATT Agreement on Import Licensing, hereinafter referred to as Licensing Agreement, requires that the application process for obtaining and renewing a license be as simple as possible and that all rules and information concerning the procedures be published (WTO 1994). The Licensing Agreement provides for two types of import licensing: automatic and nonautomatic. Rules applied by importing countries for licensing procedures should "... be neutral in application and administered in a fair and equitable manner." No licensing procedures should be trade distorting or restrictive and "... no more administratively burdensome than absolutely necessary to administer the measure."

The problem with the Licensing Agreement, however, is that it depends on the importing country to decide what is fair and equitable and which methods are least administratively burdensome. The Licensing Agreement sets standards for countries to follow, but these standards are simply loose guidelines left to the interpretation of the importing countries.

Who has the right to export or import, and factors such as imperfect competition and bargaining power between firms in exporting and importing countries implicitly determine the rights to rents. If no rights to export or import have been assigned, then the rights to rents are wide open, with rent seeking and degree of bargaining power determining how the rents are either distributed or dissipated.

### *Allocating Quotas for the Right to Export*

To analyze this situation, we evaluate three different export allocation mechanisms. In each scenario, quotas and licenses are assumed to be nontradable and the level of available rents is dependent on the amount of rent dissipation due to higher-cost exporters having the right to export. In addition, the second-tier tariff is assumed to be



redundant, and there can be 100% quota fill. In the first scenario, we abstract from the issue of imperfect competition and bargaining power by assessing the inefficiencies of allocation. In the second and third scenarios, imperfect competition and bargaining power is introduced to highlight its effects on the distribution of rents. There are situations where 'equal rights to rents' does not mean equal bargaining power, resulting in unequal distribution of the rents.

### Scenario 1

- Quota rights to export allocated
- Right to import allocated
- No export licenses issued and exporting firms are perfectly competitive and have no bargaining power

In this scenario, the rights to rents are allocated to the importing and exporting country, but because the exporting firms have no bargaining power without the allocation of export licenses, there has not been an equal allocation of rights. The importing country, therefore, captures the rents. But the level of rents realized depends upon the inefficiency of the exporting country with export quota rights. Even if the right to export is allocated to the lowest-cost producers and when perfect competition is assumed to exist among exporting firms, the latter are deemed to have no bargaining power. The welfare of the exporting country is given by the lightly shaded area  $W$  in figure 5. The importing firms offer  $P_w$  to the exporters and gain the entire portion of the rents under the quota of area  $(c + a)$ , ignoring first-tier tariffs, where area  $a$  also includes the more darkly shaded area. If a first-tier tariff  $t_1$  is actually imposed, the importing firm's rent is now shared with taxpayers in the importing country. The overall deadweight loss due to the import quota is area  $(b + h)$ .

Alternatively in this scenario, if the rights to export are allocated to the highest cost producers and there is still a 100% quota fill rate, the importing firm has no choice but to import from the high-cost producers and offer them the price  $P_d$ . The rents of area  $(a + c)$  are completely dissipated because the export quota is allocated to the highest-cost exporters possible with the import quota just filled. Compared with the low costs of production of area  $d$ , high costs of production are areas  $(e + f)$ , the latter being sufficient to dissipate the rents. The deadweight loss of the import quota is now given by areas  $(c + a)$  as well as  $(h + b)$ .

If a first-tier tariff  $t_1$  is introduced in this case,

imports decline to  $M_{t_1}$  below the quota level  $M^*$ , so that there is quota under-fill and a loss of producer surplus to the high-cost producers. With no provisions either to surrender or to trade the right to export, the domestic price becomes  $P_d (1 + t_1)$ . Consumers in the importing country lose, and, after accounting for the tariff revenue  $g$ , worldwide welfare declines by the shaded area  $xyz$ . If the first-tier tariff were raised to  $t_1'$ , high-cost producers have no incentive to export their product, and imports fall to zero, i.e., zero fill of the quota. With the rights to export being nontradable, trade is restricted and the autarky price  $P_a$  prevails in the importing country.

This scenario offers some interesting possibilities for trade liberalization. If liberalization takes the form of reducing the first-tier tariff from  $t_1'$  to, say,  $t_1$ , or to zero, consumers gain from a lower domestic price, as do high-cost producers. However, the quota rents are still dissipated. Alternatively, increasing the TRQ, but still allocating it to high-cost producers would result in under-fill of the TRQ, as the price is not high enough to provide an incentive for extra-marginal suppliers to meet the quota, assuming the rights remain nontradable. In the extreme, the quota could be increased to the point where none of it is filled.<sup>7</sup>

This latter result simply reinforces the notion that policymakers should consider liberalizing both instruments in conjunction with the allocation of the rights to export and import. For example, if quota rights were reallocated to low-cost producers and the first-tier tariff were reduced, there would be an increase in consumer surplus and quota rents would be fully appropriated by the importers. The full benefits of trade liberalization would only occur if the quota were increased and allocated to low-cost producers. In this situation, importing firms appropriate the quota rents, and the deadweight loss of the TRQ would fall.

### Scenario 2

- Quota rights to export allocated
- No right to import is allocated and perfect competition exists among importing firms
- Export licenses are issued and/or exporting firms have bargaining power

If the exporting country is required to allocate export licenses, then the rights to rents are transferred from the exporting country to the exporting

<sup>7</sup> For an analysis of other reasons for quota under-fill, see de Gorter and Boughner (2000).



not exist, leaving importers and exporters to negotiate over available rents. Hornig, Boisvert, and Blandford (1990) analyze the distribution of rents for U.S. cheese imports and conclude that unequal market power exists between importers and exporters, so that even though both rights were assigned, exporters extracted a greater share of the rents. As the level of rents rose, exporting firms were interested only in maintaining a price-cost margin and so allowed the importers' share to increase, approaching a more equal division of the rents.

In scenario 3, if low-cost producers receive the right to export, the rents of area  $(c + a)$  are left intact. The rents are distributed according to bargaining power. With a first-tier tariff at  $t_1$  or  $t_1'$ , the rents reduce by the amount of the tariff revenue, but the bargaining game persists. The quota is assumed to fill, therefore, even though imperfect competition exists with the potential to reduce the amount of imports or exports.

If, however, exporting firm(s) have monopoly power and the intersection of the marginal revenue of excess demand and marginal cost of excess supply occurs to the right of  $Q^{TRQ}$ , the deadweight loss of the TRQ relative to a competitive market is still equal to  $(h + b)$ . If the TRQ were then removed via trade liberalization, the level of imports would increase to the monopoly profit-maximizing outcome, with consumers and producers gaining additional surplus. However, some of the quota rents would be transformed into export monopoly rents, and there would also be a deadweight loss due to monopoly power. A similar result can be derived from the case of an importing firm with monopoly power (see Krishna and Tan 1998).

If the right to export is allocated to the high-cost producers and the quota is filled, even with the right to import allocated and/or imperfect competition existing among importing firms and export licenses issued and/or imperfect competition among exporting firms, all rents are dissipated.

### *Inefficient Allocation of the Right to Import*

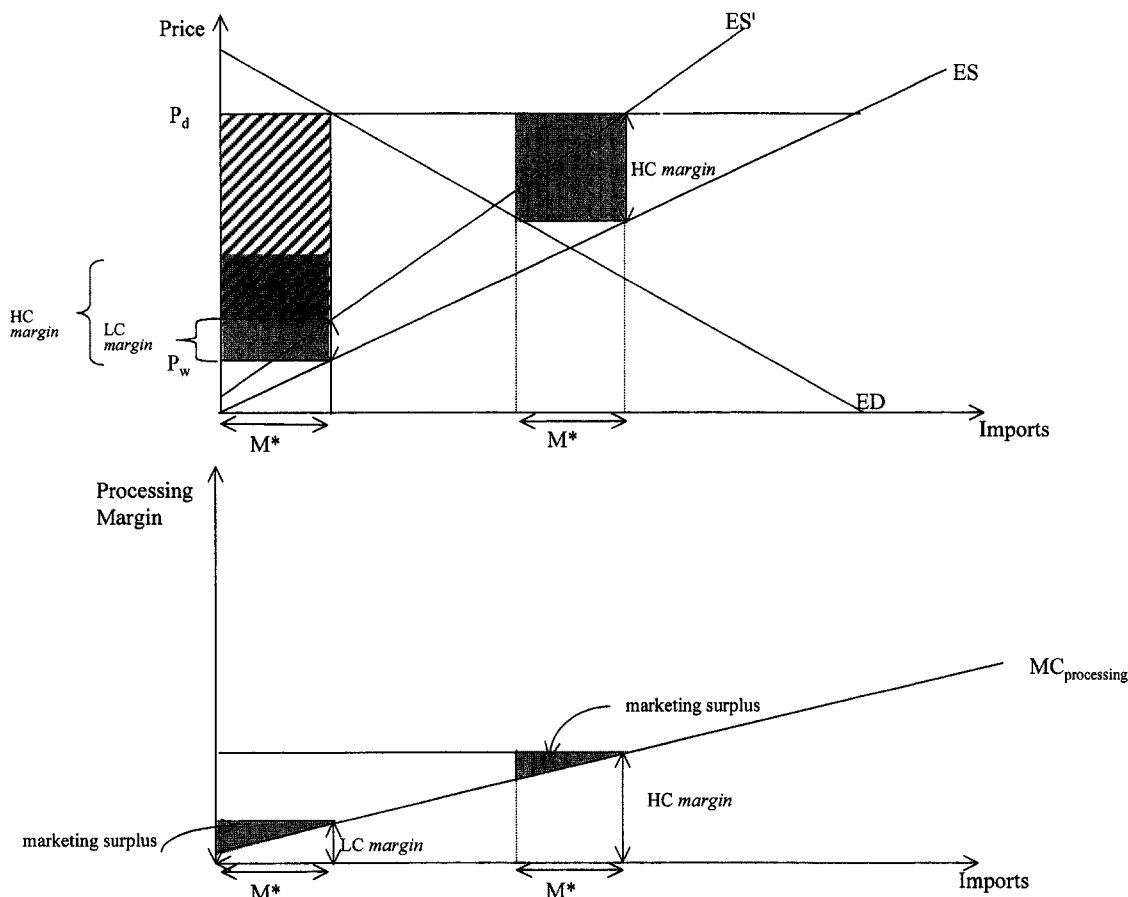
Unlike one-time allocation of the right to export by importing countries in the Agreement, the right to import has been allocated more frequently. Most import licenses are allocated for use during a specific time period, i.e., a year or a season. Often the licenses are allocated without considering importing firms' economic efficiency. Moreover, the size of the licenses is usually predetermined, based on the amount available and not on the cost structure of the importing firms. Nontradable import li-

censes can cause inefficiency if least-cost firms do not receive rights to the licenses. Another inefficiency arises if nontradable licenses are allocated for subproducts in a commodity group, for example for individual cheese types. Unless the rents for each license across product categories are equal, inefficiency arises (Anderson 1985). A competitive auction would ensure that the most efficient, low-cost importing firms would gain access to importing rights, if the rights are tradable after the initial auction (Skully 1999; Bergsten et al. 1987). The nontradability feature of an import-licensing scheme exacerbates the economic waste due to inefficient allocation across product categories at the outset. The inefficiency of an importing country's arbitrary allocation of licenses across products within a TRQ category will depend on the elasticity of substitution in demand between the products (Anderson 1985). The higher the elasticity of substitution, the less harm an arbitrary allocation of nontradable import quotas across products will be because consumers will substitute away from the more expensive products. However, a low elasticity of substitution results in consumption closer to the optimal quantity, despite the arbitrary import quota set on each product category within a group. The net result is then an empirical question.

Nevertheless, Anderson (1985) concludes that subcategorization of nontradable import licenses results in significant inefficiency. Krishna and Tan (1998) question this result by showing various situations where subcategorization is desirable. The outcome depends on the economic environment, including whether the country exerts market power on world markets and on the objective function of the government (Corden 1971; Spencer 1996).

The economics of importing can be characterized as firms supplying marketing services, including the cost of conversion to final product and transportation and marketing costs. The cost-inclusive excess supply curve becomes  $ES'$  in figure 6. The bottom panel exhibits a linear, upward-sloping supply curve for importing services, assuming fixed proportions. For the analysis to follow, we assume a 100% fill rate, nontradability of import licenses and export quotas, and that the importing firms obtain the entire rights to rents, because we assume no exporting licenses have been issued and perfect competition exists among exporting firms.

When the entire TRQ amount  $M^*$  is allocated to the low-cost importing firms who face a processing margin of  $LC\ margin$ , the amount of import license rents is the hatched area. When the entire amount is allocated to high-cost importing firms, as de-



**Figure 6. Inefficiency of Non-Tradable Licenses Allocated to Firms for the Right to Import**

picted in figure 6 with a 100% fill rate, the rents decline by the amount of the shaded and hatched area. Although not shown, it is possible for all rents to be lost if the margin is so high that the product of  $M^*$  and the margin are equal to the area  $(P_d - P_w) \times M^*$ .

## Summary

In this paper we have analyzed the economics of the two-tier tariff-rate import quotas (TRQs) that were implemented following the signing of the Uruguay Round of GATT. The policy objective of TRQs was to tariffy (protect) and quotify (liberalize) at the same time, although they were in practice subject to dirty tariffication and dirty quotification. The framework laid out in this paper isolates the effects of changes either in the second-tier tariff, the first-tier tariff, or the quota. We show how market conditions or relative policy instrument levels determine which tariff or quota influ-

ences trade and domestic/world prices. The implication of this analysis is that to maximize the impact of trade liberalization, it is critical for trade negotiators to identify which instrument is actually effective, and, therefore, to change that instrument to maintain a trade liberalizing effect. In addition, it is important for negotiators to identify how soon an instrument becomes redundant following liberalization.

Economic welfare is affected not only by the basic inefficiencies of TRQs, but by whether or not exporting countries have been allocated export quotas, and the procedures, or lack thereof, for the distributing the rights to export and import. In particular, our analysis highlights how the degree of inefficiency depends on nontradable quotas and licenses, the degree of product subcategorization, and cost differentials between exporters and trading firms. The distribution of the remaining quota rents depends critically on the distribution of the rights to rents and the bargaining power of individual import and export firms.

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