A graphical analysis of the functioning of tariff rate quotas: market access and welfare effects for exporting countries

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Abstract

This paper analyses the economics of tariff rate quotas assuming a large importing country and several different suppliers with differing levels of competitiveness. Eleven theoretical situations are distinguished according to the way the quota is allocated to exporters, the level of constraint imposed by the quota and the relative competitiveness of export suppliers. A graphical analysis is developed and the effects of tariff rate quotas on market access and welfare gains for exporters are discussed in the eleven cases.

1. Introduction

The Uruguay Round Agreement on Agriculture (URAA) legitimised tariff rate quotas (TRQs) as market access instruments. It was feared that the tariffication of non-tariff barriers in the agricultural sector as a result of the Agreement would lead to high bound most favoured nation (MFN) tariffs, and the purpose of TRQs was to ensure a minimum level of access to importing country markets as well as to secure the market access of current exporters. At the conclusion of the URAA, 1371 TRQs were notified to the World Trade Organisation (WTO) by a total of 37 countries (G/AG/NG/5/7). However, a number of studies have indicated that the operation of TRQs has given rise to problems and have questioned the usefulness of TRQs for exporters (de Gorter and Sheldon, 2000; Skully, 2001). In particular, TRQ amounts have often been under-utilised, which has been attributed in part to the way in which they have been managed by importing countries, and minimum access quotas have not always been honoured (G/AG/NG/5/7). In addition, TRQs generate quota rents, and the procedures for allocating quota entitlements, including the division of rents, have distorted trade and are often subject to political pressure (Abbott and Morse, 1999; Abbott, 2001). Thus, the future role of TRQs and the way in which they should be managed is one of the issues on the agenda of the current Doha round of WTO trade negotiations (Matthews and Laroche Dupraz, 2001).

The purpose of this paper is to describe and analyse in theoretical terms the various outcomes which may arise with the operation of TRQs, with the objective of highlighting their economic effects both for the importing country which makes use of them and for the exporting countries which are subject to them. We investigate in particular the circumstances in which TRQs can lead to positive gains for exporting countries. As noted, TRQs were introduced either to create new market access opportunities (minimum access quotas) or to maintain existing trade flows (current access quotas) following the tariffication of non-tariff barriers to agricultural trade. We first examine the circumstances in which these objectives are met or not. Subsequently, we use a graphical analysis to explore the nature of the economic effects associated with TRQs (whether the creation of rents or otherwise) and their importance in terms of economic welfare for exporters compared to the effects of a simple MFN tariff regime.

The classical exposition of the economic effects of a TRQ assumes a small country importer unable to influence the world price and makes use of an infinitely elastic (horizontal) export supply function at the given world price level. For example, Skully (2001) and Elbehri et al. (1999) graphically represent a TRQ as two horizontal curves, one drawn at the world price plus the in-quota tariff and the other at the world price plus the over-quota MFN tariff. Elbehri et al. (1999) develop a model of this type to integrate TRQs into the GTAP (Global Trade Analysis Project) computable general equilibrium model, in order to be able to include the impact of TRQs on market access and economic welfare, and in particular to account for the allocation of quota rents between importers and exporters. Under these assumptions, the unit value of the rent when the TRQ is binding is equal to the difference between the domestic price, on the one hand, and the world price plus the in-quota tariff, on the other hand. The impact of the TRQ on the world price is of course ignored under the assumption of a small country importer.

OECD (2002) and Mönnich (2003) introduce the large country assumption into their analysis of the functioning of TRQs, which is more in line with the reality of their use by the EU, Japan and to a lesser extent, the US and Canada which are the principal users of this instrument. But the graphical analysis used in these two papers is focused on the interactions between the manner of licence allocation (first come first served, historical shares, etc.) and the TRQ fill rate for the EU and other OECD countries. In our analysis, we choose to set aside this question of the precise manner in which import licences are allocated between economic agents (exporting firms, importing firms, importing or exporting states, etc.) in order to focus on the welfare effects for exporters that have the possibility of benefiting from TRQ access.

To simplify our analysis, we assume that import licences are always made available to the exporting country and never to the importing country (whether individual firms or the state). This is far from always being the case, and thus the results which we obtain must be interpreted in the light of this hypothesis. Even within this simplified framework, however, the way in which a TRQ is implemented, and in particular the rules for allocating the quota among potential suppliers, is crucial for deciding both the allocation of market share and quota rent. Some TRQs are global quotas, open to all suppliers without distinction. Others (such as the TRQ for sugar in the EU) are allocated to specific suppliers which are thus guaranteed access to the market of the importing country. Does this mean that they automatically benefit from a rent on these exports? If this is not the case, what is then the nature of the economic gain arising from the operation of this TRQ?

Previous analyses of the operation of TRQs make the assumption of a single infinitely elastic source of export supplies. This framework does not take into account the possible competition between alternative sources of supply on the market of the importing country. Looking at the operation of EU agricultural TRQs it is clear that, in many cases, there can be a variety of exporters each with different levels of cost competitiveness which may be competing on the EU import market.

In this paper, we assume that the importing country is a large country in world market terms and we introduce the possibility of several sources of export supplies competing for access to this import market. The effects of a TRQ in terms of both market access and economic welfare are identified, taking into account not only the quota rent but also changes in the economic surplus of exporters able to take advantage of the TRQ.

Section 2 of the paper develops the graphical framework for the analysis taking account of a variety of different situations concerning the restrictiveness of the TRQ (whether it is filled or not), the manner in which the quota is allocated among potential exporters and their relative competitiveness. Section 3 summarises the results of the analysis and the principal conclusions as well as suggesting directions for future work.

2.   Graphical analysis of tariff rate quotas

This section presents a graphical analysis of the impact of TRQs on the economic welfare of exporting countries. The classical analysis is extended in two ways: we allow for the possibility that the export supply curves of exporting countries are upward sloping, and we take into account two exporting countries (or regions) with

different costs of production and therefore different levels of competitiveness. We distinguish the case where the TRQ is allocated specifically to a country or group of countries from the case of a global TRQ which is open to all potential exporters. For the purposes of making the graphical representation as easy to follow as possible, we have assumed that tariffs take the form of specific rather than *ad valorem* tariffs.

The first case describes the situation where one source of export supply benefits from a specific allocation under the TRQ. Other potential exporters, which are not allocated a share of the TRQ, cannot benefit from the reduced in-quota tariff. Their exports face the full over-quota tariff, the MFN tariff. For this first case, we will describe first the situation where the preferred exporter is more competitive than other potential suppliers, and then the reverse situation.

Two parameters influence the economic impact of the TRQ: whether the quota is binding or not, and whether over-quota imports exist or not. Eleven different situations are identified (cases *a* through *k*). We focus the analysis on the economic surplus enjoyed by the exporters who use all or part of the quota as well as on the level of quota rent created in each situation.

A TRQ is defined by an import quota designated Q. The tariff applied on imports within this quota volume is designated *t*, and the MFN tariff applied to over-quota imports is designated T. Two separate concepts can be distinguished, the preferential margin and the quota rent. The unit preferential margin is defined as the difference between the over-quota tariff T and the in-quota tariff *t*. The unit quota rent, where it exists, depends on the extent to which the quota is filled, and on the existence of an export supply within the quota. The notation used in the graphical analysis in this section is summarised in Table 1.

Table 1. Summary of notation used

Demand	Supply	Price
D, total demand for imports	S_t, in-quota supply at the in-quota tariff *t*	**t**, in-quota tariff
D_{RES}, residual demand	$S_{T(res)}$, over-quota supply at the over-quota tariff T	**T**, over-quota tariff
Q, volume of the tariff rate quota	S_T, supply at the over-quota tariff T in the absence of a TRQ	**P**, domestic price of imports
	S^{PRE}, preferred supply (benefiting from a specific allocation of the TRQ)	**P'**, supply price of exporter
	S^{NPF}, other supply (at the MFN over-quota tariff)	
	Q^{PRE}, quantity supplied by preferential suppliers S^{PRE}	
	Q^{NPF}, quantity supplied by non-preferred suppliers S^{MFN}	
	$Q^{TOT} = Q^{PRE} + Q^{MFN}$	

Allocation of TRQ to a preferred supplier

The total demand for imports of the importing country is denoted as D. It faces two potential sources of supply. To take account of the specific allocation of the TRQ to a preferred supplier, we introduce the concept which we call the residual demand D_{RES}. This represents the import demand which remains after the imports supplied by the preferred exporter within the TRQ are taken into account. For each price level, $D_{RES} = D - S_t^{PRE}$.

In the diagrams which follow, we distinguish between $S_{T(res)}^{PRE}$ and S_T^{PRE} :
- $S_{T(res)}^{PRE}$ is the over-quota export supply, at the tariff T, originating from the preferred exporter which is available to meet the residual import demand after consumption of the quota volume Q.
- S_T^{PRE} is the total export supply of the preferred exporter which would materialise in the absence of the TRQ. The vertical interval equal to $(T - t)$ separates the export supply curves S_T^{PRE} and S_t^{PRE}.

Under a TRQ regime, $S^{PRE} = S_t^{PRE} + S_{T(res)}^{PRE}$.

Under a simple MFN regime, $S^{PRE} = S_T^{PRE}$. In other words, there is a horizontal displacement Q between the export supply curves $S_{T(res)}^{PRE}$ and S_T^{PRE}.

2.1.1. Case where the preferred supplier is also the most competitive

In each diagram, the preferred export supply is represented by a curve with two steps : $S^{PRE} = S_t^{PRE} + S_{T(res)}^{PRE}$ where S_t^{PRE} is the preferred country export supply under the in-quota tariff regime t and $S_{T(res)}^{PRE}$ is the preferred country export supply under the over-quota tariff T in the case where the quota Q is filled. The two steps of the curve S^{PRE} are parallel but displaced vertically from one another by the amount $(T - t)$.

The intersection of the curves S_t^{PRE} and D indicates whether the TRQ quantity Q is binding or not. In the case where Q is not filled, neither $S_{T(res)}^{PRE}$ nor S_T^{MFN} is sufficiently competitive to access the importing country's market. This is the case (*a*) described below.

a) Case where the TRQ is not filled

The import price P is determined by the intersection of the curves D and S_t^{PRE}. At this price, the TRQ is not completely filled by the preferred country S_t^{PRE}. The over-quota supply is zero, and no rent is created by the TRQ.

Because it benefits from a reduced tariff, the preferred country gains an improvement in its market access compared to a situation in the absence of the TRQ. The surplus of the preferred exporter is represented by the dotted triangle, and it would be smaller in the absence of the additional market access created by the TRQ. The surplus gain due to the TRQ corresponds to the difference between the exporter's surplus in the TRQ regime (the dotted triangle) and in the MFN regime, which would be the triangle [abc]. Under the assumption of linear supply and demand curves, the dotted triangle has exactly the same area as the triangle [ade]. Thus the gain in exporter surplus due to the TRQ is shown by the area shaded grey [bced].

Diagram (a)

Labels in diagram (a): S_T^{MFN}, $S_{T(res)}^{PRE}$, S^{PRE}, S_t^{PRE}, $T-t$, d, b, P, a, c, e, S_T^{PRE}, D_{RES}, D, Q^{PRE}, Q

b) *Case where the TRQ is filled, no over-quota imports, no MFN imports*

Diagram (b)

Labels in diagram (b): S_T^{MFN}, $S_{T(res)}^{PRE}$, S^{PRE}, S_t^{PRE}, $T-t$, P, P', S_T^{PRE}, D_{RES}, D, $Q^{PRE} = Q$

For export supply volumes less than the quota Q, the supply curve of the preferred exporter S^{PRE} is aligned with S_t^{PRE}. The curve D_{RES} is kinked at the price P' at which S_t^{PRE} exhausts the quota Q. In effect, for prices above P', the export supply S_t^{PRE} is limited by the quota Q. For prices above the level (P' + T), the export supply curve S^{PRE} is displaced upwards by an amount $(T - t)$ with respect to the curve S_t^{PRE}.
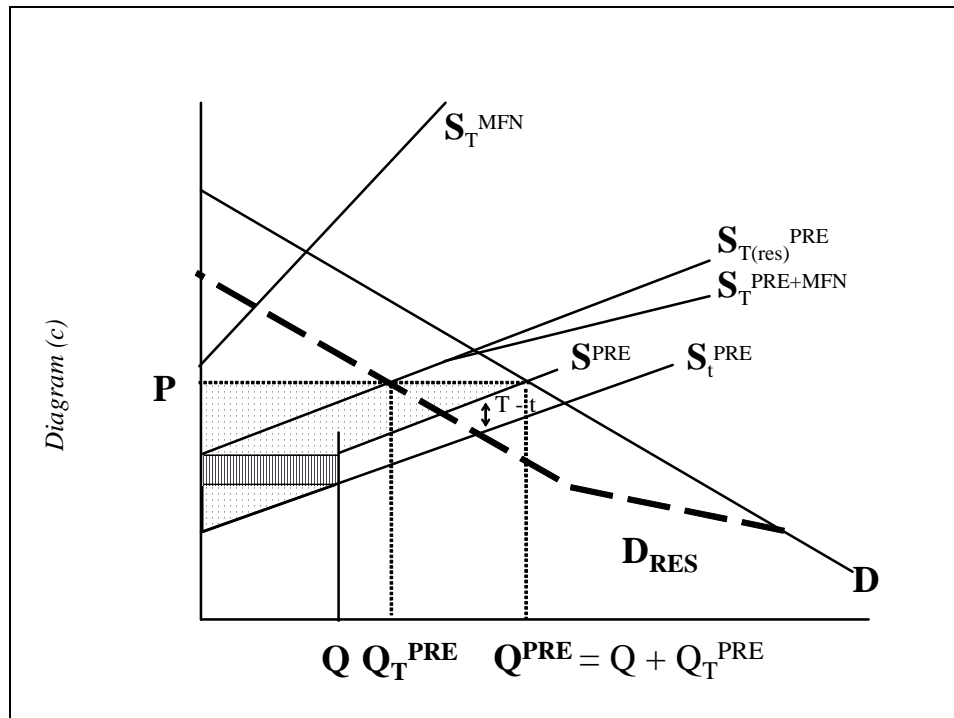
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The import price P is determined by the intersection of the decreasing demand curve D and the vertical line showing the quota Q. The TRQ is completely filled by exports from the beneficiary country S_t^{PRE}.

In this case, the TRQ improves the market access of the preferred country. By virtue of the reduced tariff rate which it faces, the preferred exporter gains an export surplus represented by the dotted triangle. The solid grey band, determined graphically in the same way as in case (*a*), represents this export surplus gain with respect to the situation where the preferred exporter faces a simple MFN tariff regime T.

In addition, the preferred exporter obtains a quota rent equal to (P – P')*Q, represented graphically by the rectangular hatched area. This rent must be added to the gain in surplus already mentioned.[2] Note that the amount of the unit rent (p – p') is less than the margin of preference (T – *t*).

c) Case where the TRQ is filled, over-quota imports, zero MFN imports

In this case, the curve D_{RES} is kinked at the price level at which S_t^{PRE} exhausts the quota Q. At prices above this level, the curve D_{RES} is parallel to the total import demand curve D. The domestic price of imports P is determined by the intersection of the curves D_{RES} and $S_T^{PRE+NPF}$. At this price, the export supply S_t^{PRE} is limited by the quota Q. The TRQ is entirely exhausted by the preferred supplier S_t^{PRE} and the volume exported above the quota by the preferred exporter is Q_T^{PRE}. The export supply S_T^{NPF} is not sufficiently competitive to be able to enter the market at the price P, therefore $Q^{MFN} = 0$.

Diagram (c)

$$Q \quad Q_T^{PRE} \quad Q^{PRE} = Q + Q_T^{PRE}$$

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[2] We recall again that we are assuming that the TRQ licences are allocated to the exporting country which manages them in such a way as to secure the quota rent. In practice, this may not be the case and thus the case here describes the maximum potential benefit to the preferred exporter.
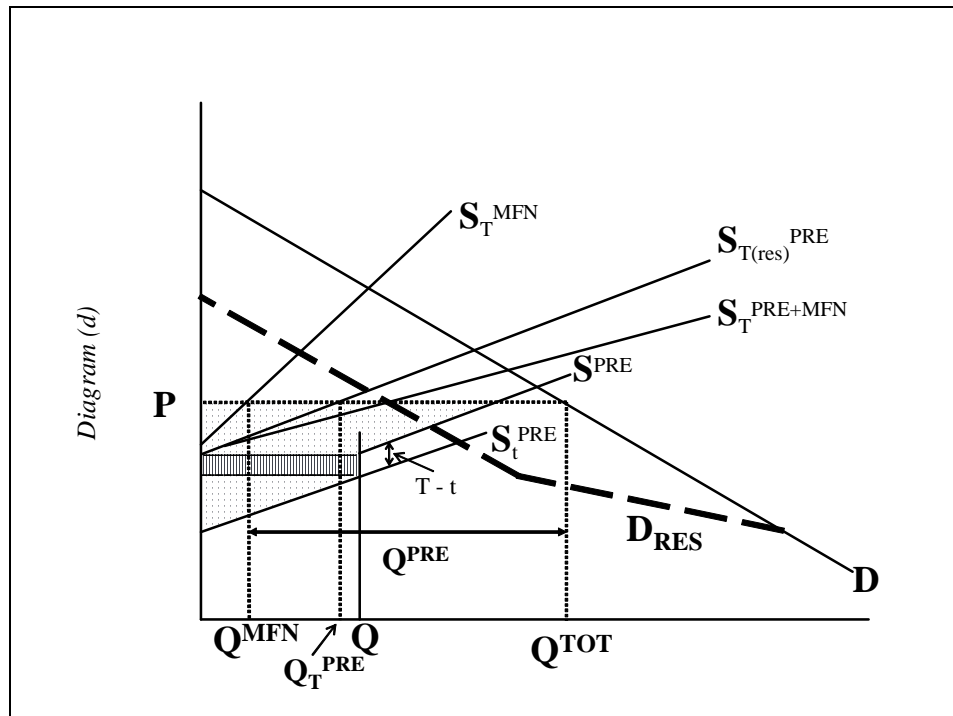
The preferred exporter obtains a quota rent as a result of the reduced in-quota tariff levied on exports within the quota. The unit quota rent is equal to the unit preference margin $(T - t)$. The total rent for the preferred exporter is equal to $(T - t)*Q$, represented graphically the hatched rectangle.

Note that under a simple MFN regime, market access for the preferred exporter would be exactly the same, that is Q^{PRE}. In other words, for this exporter, the gain in economic welfare as a result of the TRQ is simply the quota rent. The economic surplus of the exporter, apart from the quota rent, represented by the dotted area, is unchanged compared to what it would obtain under a simple MFN regime.

d) Case where the TRQ is filled, over-quota imports, MFN imports

In this case, the curve D_{RES} is kinked at the price where S_t^{PRE} exhausts the quota Q. The domestic price of imports P is determined by the intersection of the curves D_{RES} and $S_T^{NPF + PRE}$. At this price, S_t^{PRE} is limited by Q, the TRQ is entirely exhausted by S_t^{PRE} and the level of export supplies $S_{T(res)}^{PRE}$ is fixed at Q_T^{PRE} ; $Q^{TOT} = Q^{PRE} + Q^{NPF}$.

The preferred exporter obtains a quota rent $(T - t)*Q$ (the hatched rectangle) as a result of the reduced in-quota tariff from which it benefits on all of the in-quota imports. This quota rent must be added to the export surplus represented by the dotted area, which remains unchanged compared to the situation in the absence of the TRQ. As in the previous case, putting a TRQ in place has no effect on the market access of the preferred exporter : Q^{PRE} is unchanged. The TRQ simply results in a quota rent which must be added to the export surplus of the preferred exporter.

These first four diagrams *a* through *d* allow us to draw conclusions in the case where the preferred exporter is more competitive than other potential suppliers to the import market. If the TRQ is not filled, no rent is created (case *a*). If the TRQ is filled, then the preferred exporter obtains a quota rent, regardless whether there are over-quota
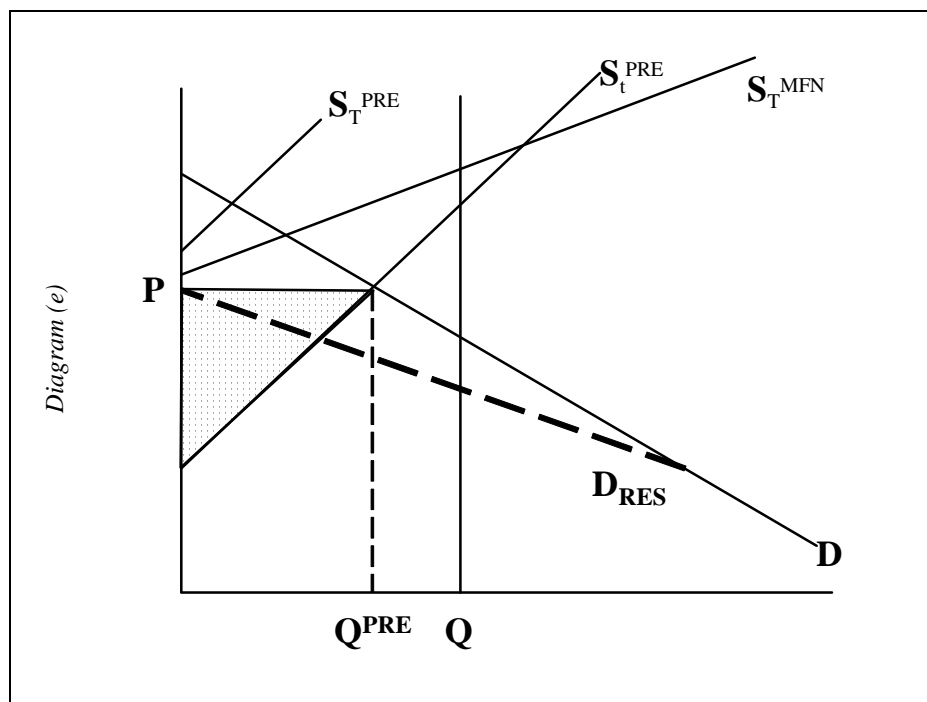
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exports (cases *b* through *d*). The value of the unit quota rent is less than the preferential margin $(T - t)$ when there are no over-quota supplies. It is equal to the preferential margin when the preferred exporter is sufficiently competitive to be able to access the importer's market even at the higher over-quota tariff T (cases *c, d*).

In all these cases, as a result of the reduced in-quota tariff from which it benefits on its in-quota exports, the preferred exporter will experience an increase in its economic surplus as compared to a situation without a TRQ. This gain in economic welfare is given by the quota rent when the preferred exporter is capable of supplying over-quota exports at the MFN tariff (cases *c, d*). When the preferred exporter is not able to export at the over-quota tariff, the TRQ creates in addition a gain in export surplus because it results in improved market access to the import market (cases *a, b*), which should be added to any quota rent which may be created in the situation where the TRQ is completely filled (case *b*).
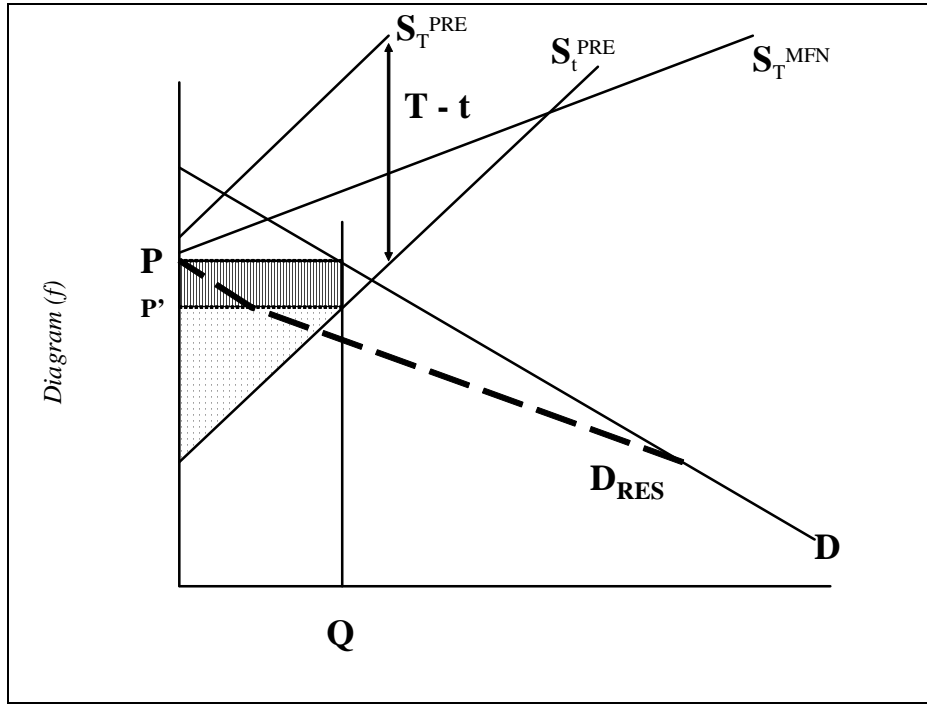
2.1.2. The preferred exporter is less competitive

e) The TRQ is not filled, no MFN imports

In this case, the domestic price of imports P is determined by the intersection of the curves D and S_t^{PRE}. At this price, the TRQ is not entirely filled by S_t^{PRE} which is in a position only to supply the quantity $Q^{PRE} < Q$. There is no over-quota supply, and thus no quota rent. In this case the implementation of the TRQ clearly opens market access to the preferred exporter. S_t^{PRE} is present on the market of the importing country and benefits from an exporter's surplus (the dotted area) which would not exist in the absence of the TRQ.

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f)   *Case where the TRQ is filled, no over-quota imports, no MFN imports*

In this case, the curve D_{RES} is kinked at the level of the price P' at which S_t^{PRE} exhausts the quota Q. The domestic price of imports P is determined by the intersection of the decreasing demand curve D and the vertical line representing the quota Q. The TRQ quota is entirely filled by S_t^{PRE}.
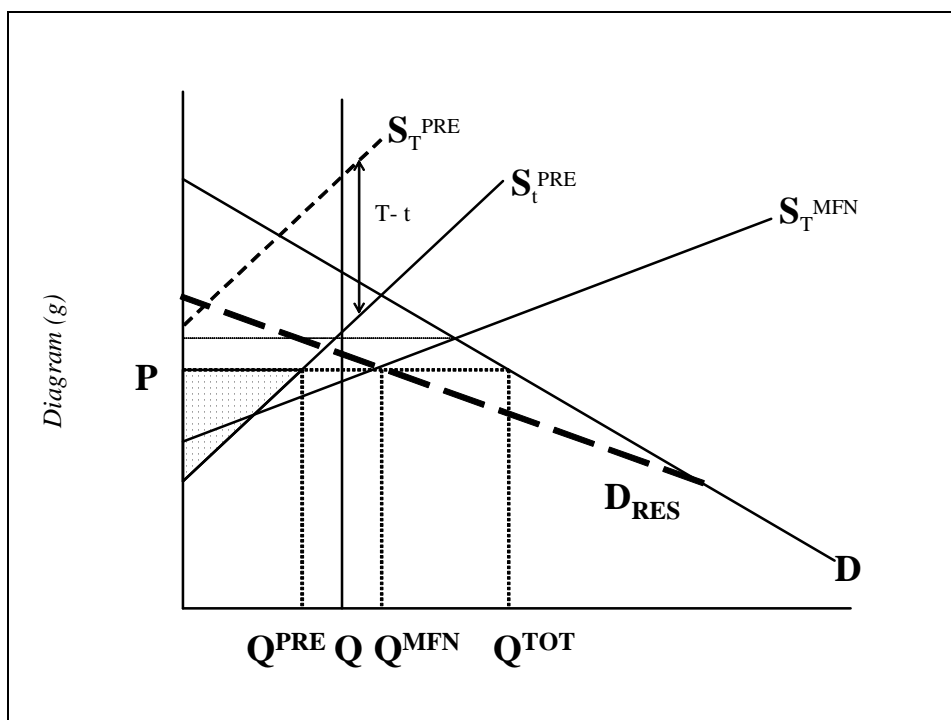
The preferred exporter obtains a quota rent (P – P')*Q (the hatched rectangle) with (P-P') < (T - t). As a result of the reduced in-quota tariff from which it benefits, the preferred exporter gains an exporter surplus (the dotted area) that would not exist in the absence of the TRQ. Thus the dotted and hatched areas together represent, for the preferred exporter, the gain in economic welfare as a result of the TRQ.

g)   *Case where the TRQ is not filled, MFN imports*

The domestic price of imports P is determined by the intersection of the curves D_{RES} and S_T^{NPF}. At this price, S_t^{PRE} is fixed at $Q^{PRE} < Q$; the TRQ is not filled and S_T^{NPF} is fixed at Q^{NPF} ; $Q^{TOT} = Q^{PRE} + Q^{NPF}$.
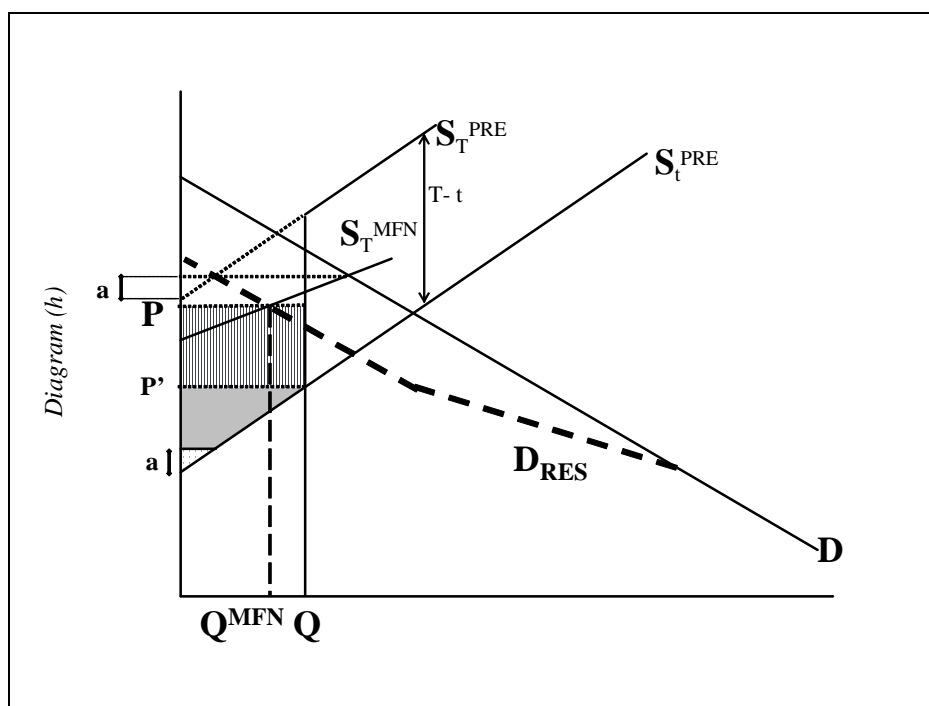
The preferred exporter does not obtain quota rent, but the existence of the TRQ allows it to benefit from additional exporter surplus (the dotted area) which would be zero[3] without the TRQ, on the assumption that S_T^{PRE} is not sufficiently competitive to be able to compete with S_T^{NPF} in the absence of the quota. In this case, the principal consequence of the TRQ is to open increased market access to the preferred exporter to the importing country market, which would be either zero or much smaller under a simple MFN tariff regime.

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[3] Or much smaller even if not zero for values of (T – *t*) smaller than that represented in the diagram.

Diagram (g)

h) Case where TRQ is filled, MFN imports

The curve D_{RES} is kinked at the price P' at which S_t^{PRE} exhausts the quota Q. The domestic price of imports P is determined by the intersection of the curves D_{RES} and S_T^{NPF}. At this price, the supply S_t^{PRE} is limited by the quota $Q = Q^{PRE}$; the TRQ is entirely filled by S_t^{PRE} and S_T^{MFN} adjusts to the level Q^{MFN}.

Diagram (h)

The preferred exporter obtains a quota rent amounting to $(P - P')*Q$ (the hatched area) with $(P-P') < (T - t)$. As a result of the reduced in-quota tariff from which it benefits, the preferred exporter gains an exporter surplus (the sum of the grey shaded

area and the dotted area) that would be smaller in the absence of the TRQ. Thus the shaded and dotted areas represent, for the preferred exporter, the gains in economic surplus arising from the implementation of the TRQ.
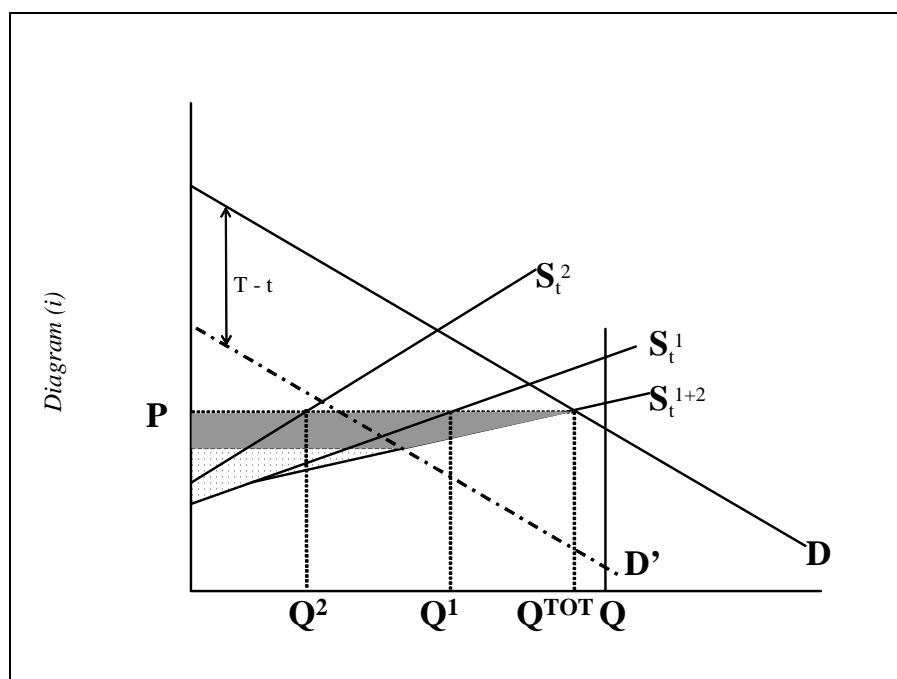
Note that if the preference margin (T – t) was smaller, to the extent that the preferred exporter was sufficiently competitive to be able to export under the over-quota tariff regime T, then the price P would be graphically determined by the intersection of the decreasing demand curve D_{RES} and the sum of the two supply curves S_T^{PRE} and S_T^{NPF}. In this case, the unit quota rent would be equal to (P – P') = (T – t) and the gain in economic surplus for the preferred exporter would be reduced by the amount of the quota rent. In other words, in this case the TRQ does not create export flows apart from those from the preferred supplier (which would be present on the market even in the absence of the TRQ) but allows it to benefit from the rent created by the quota-limited market.

The cases *e* through *h* do not differ from the cases *a* through *d* in terms of the welfare gains for the preferred exporter which arise from the implementation of the TRQ. However, the improved market access arising from the TRQ is more important when the preferred exporter is less competitive. In this case, the TRQ protects the preferred exporter from the competition from more efficient sources of supply. The TRQ makes possible access to the import market which would be highly unlikely in the absence of this protected access. Making a specific TRQ allocation is thus a powerful instrument to open and improve market access for targeted exporting regions which would otherwise be non-competitive.

Cases where the TRQ has no specific allocation

We distinguish two sources of export supply, S^1 and S^2, which differ in terms of their competitiveness. We suppose that S^1 is the more competitive region of the two.

i) Case where the TRQ is not filled
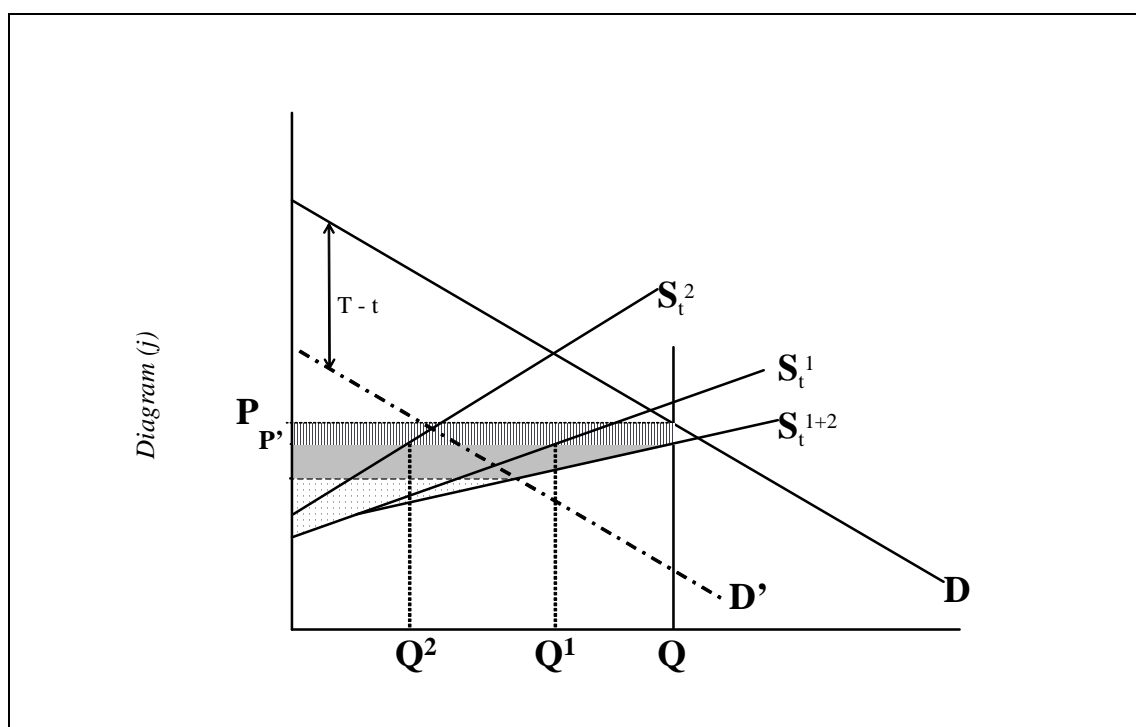

Diagram (i)

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The domestic price of imports is determined by the intersection of the import demand curve D and the total export supply curve S_t^{1+2}. S_t^{1+2} is not limited by the vertical line representing the quota amount Q. The quota is therefore not filled and does not generate any quota rent. The division of the market between suppliers 1 and 2, that is the market shares Q^1 et Q^2, is determined as a function of the relative competitiveness of the suppliers S_t^1 et S_t^2. In this case, the TRQ improves market access for all exporters.

In the absence of the TRQ and under a simple MFN regime, one could use the curves S_1^t et S_2^t to represent S_1^T et S_2^T to determine the market equilibrium on the import market. For this purpose, import demand is represented by the curve D', that is the curve D displaced downwards by a vertical amount [T – t]. The diagram shows that in this situation the exporter surplus of both exporters is represented by the dotted area.

Under a TRQ regime, the in-quota exporters benefit from an exporter surplus represented in the diagram by the dotted and shaded areas together. The area to the left of the curve S_t^1 shows the exporter surplus accruing to S^1; the area to the right shows the exporter surplus accruing to S^2 (the area equivalent to that which is found to the left of the curve S_t^2). Thus the gain in economic surplus as a result of the TRQ, compared to a situation under a simple MFN regime, is shown graphically by the shaded grey area.

  j)   Case where the TRQ is filled, no over-quota imports
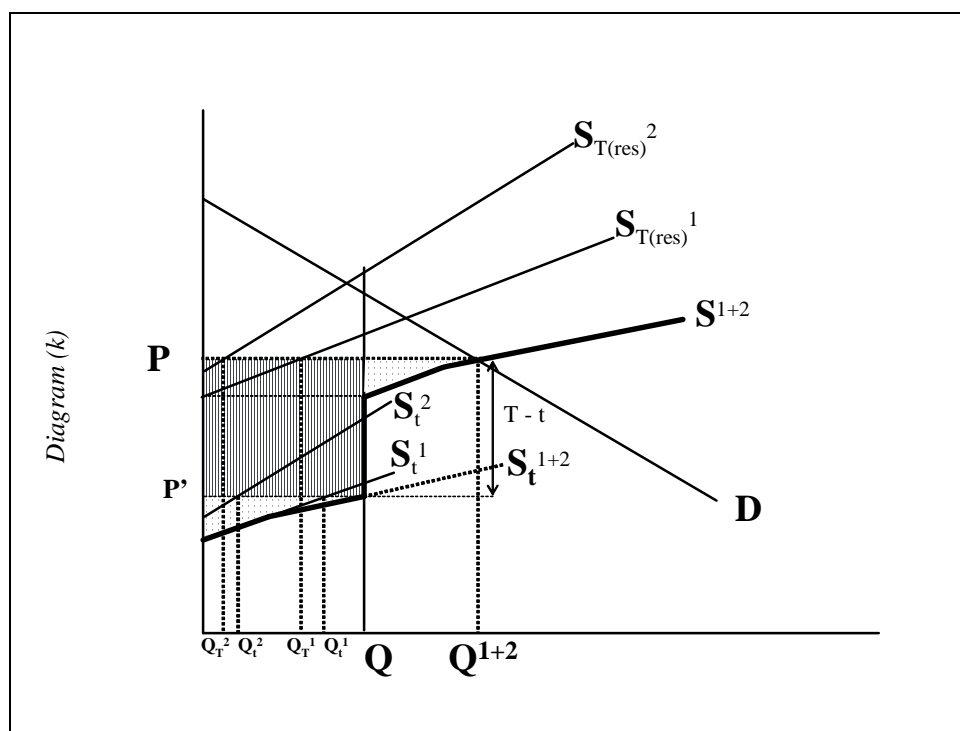

The domestic price of imports is that at which the import demand adjusts to the level of imports Q. At this price, the export supply S_t^{1+2} is limited by the vertical line of the quota Q ; the quota is filled. The shares of the import market Q_t^1 and Q_t^2 are determined by the relative competitiveness of S_t^1 and S_t^2.

Exporters 1 and 2 both capture a quota rent. The unit value of the quota rent is (P-P') < (T –t). Under the TRQ regime, the exporters benefit from an export surplus, represented by the dotted and shaded areas, to which should be added the quota rent (the hatched area). In the absence of the TRQ and under a simple MFN regime, the surplus would be reduced to the dotted area.

Even more clearly, in this case, the TRQ improves market access for all exporters. They gain both from increased exporter surplus and from the quota rent.

k) Case where the TRQ is filled, over-quota imports

Diagram (k)

The curve S^{1+2} presents:
-   a first kink at the price level at which S_t^2 enters the market ;
-   a second kink at the price level P' at which the TRQ is filled by the supply S_t^{1+2} ;
-   a third kink at the level at which the supply S_T^1 enters the market ; and
-   a fourth kink at the price at which the supply S_T^2 enters the market.

The domestic price of imports P is determined by the intersection of the demand curveD and the kinked supply curve S^{1+2}.

The export supply S^{1+2} is limited by the quota Q. The TRQ is filled. The market shares Q_t^1 and Q_t^2 are determined by the relative competitiveness of S_t^1 et S_t^2. Below the quota Q, demand is satisfied by the supply S_T^1 to the amount Q_T^1 and by the supply S_T^2 to the amount Q_T^2, with $Q^{1+2} = Q + Q_T^1 + Q_T^2$. The exporters 1 and 2 gain a quota rent with a uniti value of (T – t) on their exports at the reduced in-quota tariff t. This total rent is represented by the hatched area. It makes up the entire gain in economic welfare to exporters resulting from the TRQ compared to a situation without quota.

In the case where the TRQ is administered globally and is not allocated specifically to a preferred supplier or group of suppliers, and where the quota is filled, then a quota rent is created and benefits suppliers to the extent that they are in a position to export within the quota (cases *j, k*). If the TRQ is not filled, no rent is created (case *i*). In the absence of a specific allocation, then the relative competitiveness of exporters determines their market shares and the share of the quota rent where this exists.

In all cases, because of the reduced in-quota tariff from which they benefit, in-quota exporters obtain a gain in economic surplus. When there is over-quota imports, this welfare gain is made up of the quota rent, which in this case is at its maximum level, i.e., equal to the preferential margin.

3. Results and discussion

The graphical analysis of the functioning of TRQs which we have developed in this paper can be distinguished from other studies of this issue in a number of ways. First, the analysis assumes a large country importer, an assumption closer to the reality of TRQ implementation on world agricultural markets, and for the EU in particular. Next, we consider the case of several potential sources of export supply, differing in competitiveness, and competing on the importing country market.

Integrating these elements into an economic analysis of TRQs, it is possible to determine graphically the division of the quota-constrained market between exporters and the welfare gains they obtain, in terms both of export surplus and quota rent where this exists, arising from the implementation of a TRQ compared to a simple MFN tariff regime.

TRQs and market access

 TRQs were introduced with two main objectives:
- to open a minimum level of market access following the tariffication of non-tariff barriers which sometimes resulted in prohibitive tariff levels to generate trade (minimum access TRQs)
- to protect historic trade flows with existing suppliers (current access TRQs).

The graphical analysis shows that these two objectives often conflict with each other. Thus, a current access TRQ which is allocated to a preferred supplier that is not sufficiently competitive to fill the quota, when there exists a more competitive exporter that could supply the quota, will work contrary to the objective of ensuring a minimum level of market access. Improvement in the global access to the importing country market would require a revision of the way in which the quota is allocated to less competitive exporters. However, without the preferential access guaranteed by specific allocations under a TRQ, less competitive exporters would simply not be successful in accessing the importing country market. In this case, the improved market access as a result of the TRQ would fail to maintain the current access of these exporters.

This situation is relatively common on the EU market for imports of several agricultural products. Several EU TRQs are specifically allocated to African,

Caribbean and Pacific (ACP) countries, for example, to protect their historical trade in agricultural products with the EU (rice, sugar, etc.) arising from commitments under the Lomé and Cotonou Agreements. Without this specific allocation, the ACP countries might not be sufficiently competitive to take advantage of the TRQ quota. Even in the case where the TRQ is not completely filled, the TRQ plays an important role in terms of ensuring market access for preferred suppliers. However, the allocation of quotas in this way can be the subject of challenges in the WTO where other exporters feel that they have been disadvantaged by the particular quota allocation. An example is the very disputed case of bananas at the end of the 1990s and which still continues with challenges to the ACP quotas by Ecuador and the US at the beginning of 2007 (see Laroche Dupraz, 1998). A quota allocation which runs counter to the non-discrimination rules of the WTO may require a waiver if it is to be sustained.

TRQs and economic welfare

Table 2 summarises the effects of a TRQ for the economic welfare of exporters compared to a simple MFN tariff regime based on the eleven cases previously described.

Table 2. Welfare gains for exporters arising from a TRQ

	Unit quota rent r	Welfare gain (1)
1 – TRQ reserved for preferred exporters		
1.1.Preferred exporters are more competitive		
a) TRQ not filled	0	ES
b) TRQ filled, no over-quota imports, no MFN imports	$r = (P-P') < (T - t)$	ES, Rent
c) TRQ filled, over-quota imports, no MFN imports	$r = (T - t)$	Rent
d) TRQ filled, over-quota imports, MFN imports	$r = (T - t)$	Rent
1.2. Preferred exporters are less competitive		
e) TRQ not filled, no MFN imports	0	ES
f) TRQ filled, no MFN imports, no over quota imports	$r = (P-P') < (T - t)$	ES, Rent
g) TRQ filled, MFN imports	0	ES

h) TRQ filled, MFN imports
    - no over-quota imports
    - over-quota imports
	
	$r = (P-P') < (T - t)$
	$r = (P-P') = (T - t)$
		
		ES, Rent
		Rent

2- TRQ not reserved for preferred exports		
i) TRQ not filled	0	ES
j) TRQ filled, no over-quota imports	$r = (P-P') < (T - t)$	ES, Rent
k) TRQ filled, over-quota imports	$r = (T - t)$	Rent

(1) Compared to a simple MFN tariff regime, the operation of a TRQ may benefit an exporter that is in a position to export within the quota in different ways :
    a. ES – exporter surplus, excluding quota rent
    b. Rent

The unit quota rent is obviously zero in those cases where the TRQ is not binding (the quota is not filled). If there is no over-quota imports, the amount of the unit quota rent is less than the preferential margin $(T - t)$. When a quota rent is created, its value is reduced to the extent that the export costs of preferred suppliers are above the costs of other suppliers. The unit quota rent is equal to the preferential margin only in the case where the preferred supply is able to fill the quota entirely and to export above the quota at the MFN over-quota tariff.

In all cases, even when the quota is not binding, we observe that exporters obtain an increase in export surplus following the implementation of a TRQ, arising from the reduced in-quota tariff facing their in-quota exports. When the TRQ is filled, but there are no over-quota imports, part of this export surplus is substituted by the quota rent which they receive. When over-quota imports occur, the entire welfare gain to exporters arising from the TRQ takes the form of the quota rent, which then attains its maximum level: the unit rent in this case is equal to the preferential margin.

This last result is particularly interesting. As we indicated in the Introduction, in order to simplify the analysis we have assumed in all cases that quota rents were captured by either exporting firms or exporting countries. In practice, some ways of allocating licences for in-quota imports can have the effect of transferring the quota rent to the importing country. This is the case, for example, where the licences are sold by the importing country to the exporting firms; the proceeds of the sale, under the assumption of perfect competition, benefits the importer and substitutes for the quota rent accruing to the exporter. Even when licences are distributed freely, the method of their allocation can benefit more powerful operators (as under the first come, first served system) or make it more difficult for new entrants to gain or improve their access to the import market (where licences are allocated on the basis of historic shares). In other cases, import licences may be awarded to importing firms, thus excluding the exporting country and firms resident there from sharing in the rent. In other words, in those situations where the potential welfare gain to exporters as a result of a TRQ is at its maximum, these same exporters risk losing some or all of these gains to other agents depending on the market structure and the way in which the TRQ is administered.

TRQs were introduced to improve or maintain access to the markets of developed countries following the tariffication of non-tariff barriers. Access to developed country agricultural markets is one of the major issues for developing countries in the Doha Round of trade negotiations. Several countries have proposed an increase in TRQ quotas in order to loosen the binding nature of TRQs and to increase access to these quota-constrained markets. Taking into account the existence of competition between suppliers with very different costs of production, the analysis developed in this paper permits a more nuanced evaluation of this claim. Thus, in the case where a TRQ is allocated solely to specific suppliers under the terms of a preferential trade agreement (as in the case of Lomé-Cotonou), an increase in the size of a TRQ will only have a positive effect on the export volumes of preferred suppliers if they are in a position to fill the quota. Alternatively, if the increased TRQ is accompanied by an opening up of the quota to other sources of non-preferred supply, this would be a form of preference erosion and would result in a reduction in the economic welfare of preferred suppliers if the increased import volume resulted in a sufficient reduction in the import price. On the other hand, the new beneficiaries of the enlarged quota would benefit from an increase in their export surplus or even from access to a quota rent if they were sufficiently competitive and the TRQ remained binding. In this case, the manner in which TRQ import licences are distributed between former preferred suppliers and the new entrants would determine whether the trade advantages for those developing countries for which the TRQ had previously been reserved would be maintained.

Parallel to this theoretical analysis, empirical work is being undertaken to evaluate the extent to which developing countries benefit from a significant improvement in their market access for agricultural products and in their economic welfare as a result of the TRQ regime in comparison to a simple MFN tariff regime. The evaluation of the quota rents and their division between exporters should be complemented by an evaluation of the changes in exporter surplus in applying the analysis developed in this paper to the 87 TRQs introduced by the EU at the time of the signing of the URAA. The division of the gains between exporters depends on the characteristics of each TRQ (whether it is binding or not, and the size of the in-quota tariff relative to the over-quota tariff) and on the competing export supplies.

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