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## Trade Distortions and Policy Instruments:

### How should the effects be measured?

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#### *Abstract*

*Government intervention in agriculture affects trade flows and limits the overall gains from trade. Such intervention involves both domestic and trade policy instruments. During the Uruguay Round negotiations, the quantitative measure used — PSEs and CSEs — did not reflect the trade distorting effects of either of these groups of policy instruments. In recent theoretical work, it has been shown that there exists a trade restrictiveness index which has desirable properties not present in the PSE/CSE measures. In this paper, the index is explored and the implications of it explored for future agricultural trade negotiations.*

#### **1. Introduction**

The Uruguay Round Agreement on Agriculture, when viewed in the light of the history of agriculture in the GATT, was a significant achievement. In comparison with the negotiations of earlier Rounds, there were a number of new elements, *inter alia*: the presence on the agenda of domestic agricultural policy instruments; the results from quantitative models in which trade liberalisation was simulated; and values from the OECD's calculations of producer subsidy equivalents (PSEs). The first was fundamental because domestic policy objectives and instruments rather than trade policies have been, and remain, the more important source of agricultural protectionism. The second and third provided policy makers and negotiators with a set of numbers, particularly budgetary costs, that were of orders of magnitude which were hard to ignore.

In looking forward to the planned review of 1999 in the World Trade Organisation (WTO), it is important to reflect on the role played by the Aggregate

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Measure of Support and to assess whether the PSE concept is the best available. During the Uruguay Round, analysts such as Hathaway (1987), amongst others, argued in favour of the position that measures of transfers to the farm sector were not the appropriate focus in trade negotiations. Cahill and Legg (1990) countered that the PSE calculation was transparent, was practical and, therefore, was useful in negotiations, despite these criticisms. However, it is easy to show that PSEs do not necessarily reflect trade effects in a meaningful way.

Recently, a new measure, the Trade Restrictiveness Index (TRI), has been developed by Anderson and Neary. It has a number of desirable features. For example, it can be used in a partial or general equilibrium setting, and in the former requires little additional information over that necessary to calculate a PSE; it can accommodate import quotas; it can deal with intermediate inputs; and it can encompass distortions in factor markets. By converting both trade and domestic instruments to a single tariff rate equivalent, the TRI provides the trade focus which is absent in the PSE calculation and at the same time permits aggregation in a multi-commodity, partial equilibrium setting to be achieved in a way which measures trade restrictiveness in a meaningful way, consistent with index number theory.

Nevertheless, in the context of agricultural trade, there are two caveats which need to be assessed. These arise from: first, the instability and uncertainty of international prices and volumes of agricultural products; and second, on the importing country focus used in measuring restrictiveness. Together, these characteristics mean that the trade focus is again not quite where it ought to be because, under uncertainty, there is no equivalence of tariffs and quotas or of other instruments which prevent price transmission from international to domestic markets. Therefore, the restrictiveness of instruments when viewed from the exporting country's perspective is not one of indifference towards the choice of instrument by importing countries. Fortunately, under the Agreement on Agriculture nontariff barriers are being converted to tariffs (usually tariff rate quotas (TRQs) and bound tariffs) but trade distorting domestic

instruments remain, although the support provided in aggregate has been capped and is being reduced.

The remainder of the paper is structured as follows. An outline of the TRI is provided in Section 2. The way in which the TRI can be used in the context of TRQs and bound tariffs is explored in Section 3. The effects of introducing price uncertainty in the context of a tariff rate quota are discussed in Section 4. Some implications of the use of the TRI in the review to be held in 1999 form the conclusions (Section 5).

## 2. The Trade Restrictiveness Index

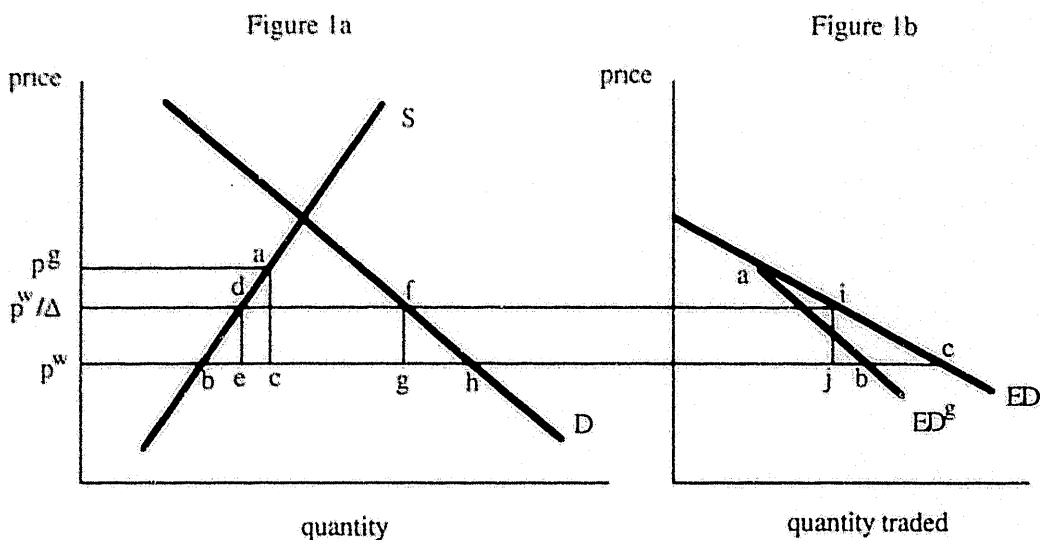
The trade restrictiveness index,  $\Delta$ , is defined, using the balance of trade function, as: "... the scalar factor of proportionality, or tariff factor surcharge, by which period-1 prices would have to be adjusted to ensure balanced trade when utility is at its period-0 level." (Anderson and Neary 1994, p. 143).<sup>1</sup> The intuition is most easily understood when period-1 represents the free trade position. Then the tariff surcharge factor,  $1/\Delta$ , is the power of the tariff or one plus the *ad valorem* tariff rate which generates the same restrictiveness as that created by the policy settings in place during the base period.

The basic idea is contained in the partial equilibrium diagram (Figure 1a) which shows a small importing country in which the farm policy objective of income support is effected through a guaranteed price/deficiency payments programme. Let period-0 be the situation with the price support policy in place and period-1 be the free trade position. Then the idea behind the TRI (in this example) is to obtain a tariff-equivalent price which, when applied to the free-trade position, will return welfare to its period-0 level. Let  $p^w$  and  $p^s$  be the world and guaranteed prices, respectively, and  $1/\Delta$  the tariff surcharge factor. Then the gain in welfare, measured here as producer surplus, in moving from the policy position at  $p^s$ , to that of no policy at  $p^w$ , is given by the usual

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<sup>1</sup> The balance of payments function is a dual function defined as the difference between domestic expenditure,  $e(\pi, u)$ , over domestic income,  $g(\pi)$ , adjusted for tariff revenues,  $(\pi - \pi^*)'m$  and transfers from abroad,  $\beta$ , i.e. as  $B(\pi, u) = e(\pi, u) - g(\pi) - (\pi - \pi^*)'m - \beta$ , where,  $\pi$  is the vector of domestic prices,  $\pi^*$  is the vector of world prices and  $u$  is domestic utility.

deadweight-loss triangle,  $abc$ . Then to calculate the TRI, a tariff-inclusive price of  $p^t \equiv p^w / \Delta$  is obtained such that change in welfare, measured now as consumer and producer deadweight losses from the tariff, is just sufficient to return welfare to its original level at  $p^s$ . In Figure 1a,  $p^t$  is such that the area  $adec$  (which is a gain in welfare) is just equal to the area  $fgh$  (a loss of welfare), thereby leaving welfare at its period-0 level, i.e.  $abc = dbe + fgh$ .



The same information is contained in Figure 1b in which the country's import demand function is drawn without the guaranteed price policy as  $ED$ , and with that policy as  $ED^g$ . Now the deadweight-loss triangle,  $abc$ , measures the aggregate of the changes in producer surplus plus consumer surplus relative to free trade and is equal to the area labelled in the same way in Figure 1a. The tariff-equivalent price,  $p^t$ , creates a welfare loss of  $ijc$  which, by construction, equals  $abc$ .

In this example, the exporting countries, if they had a choice, would prefer the existing policy to the tariff equivalent rate which leaves the importing country at its period-0 welfare level, i.e. exporting at  $b$  (Figure 1b) rather than at  $j$ . Of course, free trade, at  $c$ , would be best. This need not always be the outcome because, in comparison with the actual set of instruments, e.g. an import quota or a variable import levy, a tariff might be preferred by the exporters. Note also that the distribution of welfare between

producers, consumers and taxpayers in the importing country would be different between the guaranteed price policy and the tariff, although the unweighted sum is the same. However, the TRI should not be interpreted as a change in the choice of policy instruments but only as a way of creating a single index number of trade restrictiveness across an economy based on domestic welfare.

### 3. The TRI and TRQs

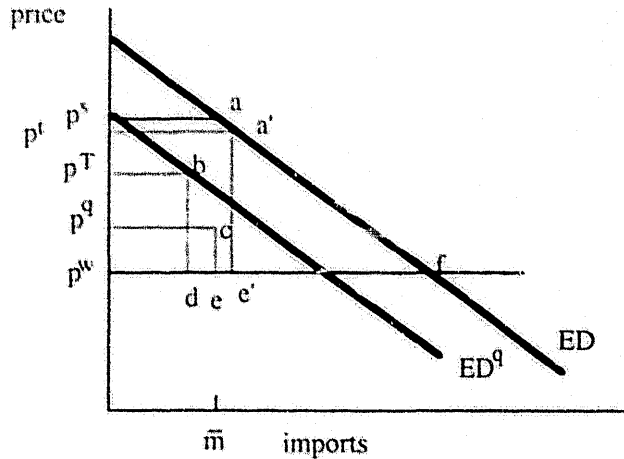
Under the Agreement on Agriculture, nontariff barriers such as import quotas, voluntary export restraints, import licenses, and variable import levies have been converted to tariffs, in some cases specific tariffs and in others, *ad valorem* tariffs. Most countries undertaking these conversions have adopted a combination of tariff rate quotas and bound tariffs as the way of adhering to both the tariffication and minimum access requirements of the Agreement.

In view of this common approach, it is useful to investigate how such re-instrumentation can be reduced to a single value of  $\Delta$ . Figure 1b can be modified to investigate how the TRI can be used to find the single *ad valorem* tariff rate which is equivalent to the tariff rate quota and the bound tariff. In Figure 2 let  $ED$  be the country's import demand function and  $ED^q$  be the residual import demand function when the tariff rate quota is binding, i.e. it is the demand for imports once the quota has been filled. When the quota is not binding, the TRQ can be treated as a simple tariff. Let the world price be  $p^w$ , the price inclusive of the tariff rate on the import quota be  $p^q$ ,  $p^T$  the bound tariff on above-quota imports,  $p^s$  the domestic shadow price of the quota, and  $p^t \equiv p^w / \Delta$  the single tariff equivalent rate.

In period-0, the import quota is assumed to be binding at  $\bar{m}$ , generating tariff revenue of  $(p^q - p^w)\bar{m}$ . There are additional imports of  $b - p^T$ , generating additional tariff revenue of  $p^T p^w db$ . Therefore, imports in excess of the quota lower the domestic price and increase welfare relative to that of either an import quota only or a prohibitive tariff. If period-1 is a free trade position, then the gain in welfare from removing both tariff policies is made up of two parts: the loss from removing the bound tariff and the gain from removing the TRQ. Together, these give a net gain of

the areas  $-p^s p^w db + p^s p^w fa - p^q p^w ec$ . Then  $p^t$  is established as before by setting it at a level at which this area and  $a'e'f$  are equal. It would appear, therefore, in a deterministic setting, that the TRI can measure the trade restrictiveness of TRQs and bound tariffs and highlights the true restrictiveness of the TRQ instrument in that  $p^t$  is closer to  $p^s$  than to  $p^T$ .

Figure 2



#### 4. Uncertainty, TRQs and the TRI

Another aspect of the Agreement on Agriculture was the acknowledgment that tariffication of non-equivalent nontariff barriers, in the face of volatile world and domestic prices, could lead to undesirable import surges. To allow importing countries to protect themselves from such surges, a special safeguard provision was added (Article 5 of the Agreement) which allowed governments to impose additional duties (up to one third) if imports exceeded a trigger level (a moving three-year average) (IATRC 1994, p.9). Some analysts of the Agreement have commented critically on the use of TRQs and have urged that they be removed at the end of the implementation period. However, Anderson and Young (1992) proved that a specific tariff rate quota is the optimal policy for a small importing country to pursue in the face of uncertainty caused by either a stochastic import demand function or import supply function when

the objective is to constrain average imports and the amount by which average imports exceed some critical value.

It was shown in the previous Section that the TRI can be used to measure the restrictiveness of a tariff rate quota and a bound tariff. Assume that the source of fluctuation is only in the import supply function. Hence, if world prices are now permitted to fluctuate, then so too will import levels and domestic welfare. Under the assumption that the import demand function is linear (Figure 2), the change in welfare following a price change is a convex function of that price change. In particular,  $dSW = -\frac{b}{2}(p_\tau^T - p_\tau^W)^2$ , where  $b$  is the slope of the import demand function,  $p_\tau^T$  (or  $p_\tau^Q$  when the quota is not binding) is the tariff-inclusive domestic price and  $p_\tau^W$  is the world price in time period  $\tau$ . Because the TRI has to adjust to ensure that utility remains constant with respect to changes in the policy instrument, then the tariff surcharge factor is also a convex function of domestic prices. The implication for the calculation of the TRI is that, from Jensen's inequality,  $E(p_\tau^W / \Delta_\tau) > E(p_\tau^W) / \bar{\Delta}$ , where  $\bar{\Delta}$  is the value of the TRI corresponding to  $E(p_\tau^W / \Delta_\tau)$ . In other words, the TRI would need to be calculated for each period and then the average computed, if necessary. The alternative of averaging prices and then calculating the corresponding TRI will underestimate the degree of restrictiveness of the instruments.

## 5. Conclusions

The purpose in this paper has been to consider the applicability of the trade restrictiveness index in the context of tariff rate quotas and bound tariffs. These instruments were introduced by many governments in response to the tariffication required under the Agreement on Agriculture. It has been shown that the TRI reflects the restrictiveness of TRQs in a sensible way. Under uncertainty, a specific TRQ is known to be an optimal trade policy. Therefore, there are theoretical as well as practical reasons why the instrument was chosen. The effect of fluctuating world prices on the TRI was shown to require careful calculation over time because the welfare effects inherent in the TRI are a convex function of the differences between policy-induced domestic prices and fluctuating world prices.



By focussing on the a tariff-rate equivalent, the TRI has the advantage over the PSE calculation in directing attention to the trade effects of farm support policies and does so with little additional data requirements. Therefore, a time series of such calculations ought to be available to negotiators for the so-called mini-round of 1999.<sup>2</sup> Nevertheless, there remains a concern that the concept of restrictiveness should, in some sense, also reflect the exporting country's welfare, particularly when the major sources of agricultural protectionism have large country effects. This is especially important under price uncertainty when equivalences between instruments breaks down

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<sup>2</sup> For a wider discussion of this point, see Anderson (1995).