THE NON-EQUIVALENCE OF TARIFFS AND QUOTAS UNDER RETALIATION

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*The author is indebted to Jagdish Bhagwati for his comments and suggestions.

The standard Marshallian demonstration that, except for revenue effects, tariffs and quotas are equivalent has been reexamined in recent theoretical contributions. Bhagwati (1965) reopened the issue by demonstrating the possibility of non-equivalence in the presence of monopoly, with subsequent contributions by Shibata (1968) and him (1968) distinguishing between alternative ways of defining equivalence but underlining the same basic conclusion that the equivalence proposition could break down in the presence of monopoly. Subsequently, the theoretical analysis of non-equivalence has been extended to the case of U.S. oil-type quotas by McCulloch and Johnson (1973). Yet another theoretical contribution by Fishelson and Flatters (1973) has examined the non-equivalence that would arise under uncertainty.

In this note we extend the theoretical analysis of non-equivalence of tariffs and quotas by introducing the possibility of retaliation. By using a Cournot-Johnson type of retaliation mechanism (such that each country in a two-country

1I am informed by the editor that R. Gordon, in an unpublished manuscript arrived independently at similar conclusions to those of McCulloch and Johnson regarding equivalence in the presence of U.S. oil-type quotas.

2That quotas and tariffs would be non-equivalent under uncertainty seems to be a corollary to the general view that, while a quota may be equivalent to a tariff at one point in time, the equivalence does not hold if supply and demand conditions change; unless, of course, the quota is changed continually to its equivalent tariff value. But, the frequency with which quotas and tariffs can be changed in any economic regime are rarely identical; tariffs frequently can be changed only over a much longer period. Also note that, as Bhagwati (1965) pointed out, industries in some developing countries prefer to have both tariffs and quotas, instead of relying on the latter; the uncertainty of being protected by quotas is rather greater than the uncertainty of holding onto tariff protection, since quotas are also addressed to the balance of payments situation and may well lose their protective effect if the payments situation is improved.
system chooses an optimal quota in light of the quota-shifted foreign offer curve facing it and ignoring the consequences of its choice on the quota-level that the foreign country would choose in retaliation), we show that a protective warfare which uses quotas will lead, in general, to a different outcome than when tariffs are the weapons chosen. We also show that, contrary to the case of optimum-tariff retaliation analyzed by Johnson (1953) where the tariff warfare may none-the-less improve the welfare of the country which initiated the war, the case of optimal-quota retaliation inexorably leads to elimination of trade and the consequent loss of welfare to each of the trading countries.

We assume two countries, I and II, each producing two goods, X and Y, under competitive conditions, Y being exported by country I. When quotas are applied, quota holders are assumed to behave competitively. In fig. 1, OI and OII represent the offer curves of countries I and II, respectively. Competitive equilibrium in the absence of trade restrictions is attained at point \( a_o \), where \( OA_0 \) of good X is imported by country I, \( a_oA_0 \) of good Y is imported by country II and the terms of trade are the ratio \( OA_0/A_oA_0 \). Following the assumptions and methodology employed by Meade (1952) we can define indifference curves from trade along which each country remains at the same level of utility. \( U^I_0U^I_0 \) and \( U^II_0U^II_0 \) represent the pair of those curves corresponding to the utility levels enjoyed by each country at the unrestricted competitive equilibrium. Since at \( a_0 \) both offer curves are less than infinitely elastic, either country could gain by imposing some degree of trade restriction. As is well known, a country will maximize its utility when trading at a point where the foreign offer curve is tangent to an indifference curve from trade.

Assume that country I starts the process and sets an optimal import quota of \( OA_1 \) units of good X – it must be \( OA_1 < OA_0 \) for the quota to be binding – such that the new equilibrium is at point \( a_1 \) on OII where the welfare of country I is maximized since the indifference curve \( U^I_1U^I_1 \) is tangent to the foreign offer curve. The new offer curve of country I which country II is facing becomes the locus \( Ob_1a_1A_1 \) which is the same as the original offer curve until point \( b_1 \) where it becomes a vertical line since more imports are not feasible due to the import quota. The response of country II will depend on whether her optimal level of trade falls in the region \( Oc_1 \) (on OI) or in the region \( c_1b_1 \). If the optimal level of trade for country II falls in the region \( Oc_1 \), either an export or an import quota can be used to attain it; if it falls in the region \( c_1b_1 \) only an export quota can be used since any point in that region implies more imports and less exports than at the initial equilibrium at \( a_1 \). The reader can easily verify that, whatever the initial position, the final result of the retaliation process will be the same; we will thus only illustrate the case where the level of trade that maximizes the utility of country II falls at the kink, \( b_1 \), of the new offer curve of country I. To reach point \( b_1 \), an export quota in the amount \( OA_1 \), equal to the import quota on the same good imposed by country I seems to be necessary. If this quota is imposed, however, the imports of country II are
undetermined at any level between $A_1a_1$ and $A_1b_1$ and, as such, there is no presumption that trade at $b_1$ will be reached given the competitive behavior of both suppliers and demanders. It is then reasonable to assume that country II will fix an export quota marginally smaller than $OA_1 - OA_2$ in the figure—

![Diagram](image_url)

Fig. 1

which will allow for trade to occur at $b_2$ (arbitrarily close to $b_1$). The offer curve of country II now becomes $Oa_2b_2$ which coincides with the original OII only in the region $Oa_2$. The optimal level of trade for country I must now be at the kink $a_2$ of the new offer curve of country II. This new level of trade can be unambiguously attained through an export quota in the amount $A_2c_2$.
(the reader can verify that if an import quota slightly smaller than OA₂ is used our final results will be unchanged). To the export quota A₃C₂ of country I, country II now responds with an export quota of OA₁ which shifts trade from point a₂ to point c₂, more favorably to country II. This, however, will bring as response a still smaller export quota by country I in the amount A₃a₃ which shifts trade to point a₃. To this country II responds with a still smaller export quota and, as the reader can easily verify, the process will continue until all trade is completely eliminated.

Conclusions. We can therefore conclude that, even in the absence of monopoly, revenue effects or uncertainty, tariffs and quotas are not equivalent when foreign retaliation is allowed for. Furthermore, we have shown that optimal quota retaliation will lead to the elimination of international trade between the countries involved. Our analysis would seem to strengthen the policy presumption that tariffs are preferable to quotas.

References


Postscript. After this paper reached proof stage, Harry G. Johnson pointed out to me that although the retaliation process seems to lead asymptotically to the elimination of trade, it can never logically eliminate trade completely. It will never pay to either country to impose a zero trade quota since this step would always imply a reduction in welfare as compared with some positive amount of trade, however small (see H. G. Johnson, 'Quotas and Retaliation: A note', unpublished manuscript, University of Chicago, 1974). Consequently, the proposition that trade is eliminated should be modified to read that the volume of trade tends asymptotically to zero (although in fact, never reaches it). It has also been called to my attention that Edward Tower has independently arrived at results which are similar to those presented in this paper.