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PROTECTIVE EFFECTS OF SOURCE-SPECIFIC 'VER' AND GLOBAL QUOTA UNDER OLIGOPOLY

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Abstract: This paper demonstrates that under oligopolistic market structure with quantity-setting firms, the argument that source-specific VERs are less effective in restricting imports than global quota is not necessarily valid. Contrarily, the quota permitting "less" imports might be anti-protective under non-cooperative behaviour of firms unless the quota regime is very stringent. (JEL Cl. no. F13).

1. INTRODUCTION

Nowadays Voluntary Export Restraints (VERs) have become widespread not only because these are convenient means for countries to restrict imports outside the framework of GATT but also because such policies do not introduce market distortions in the importing country. As such VERs have attracted considerable attention of the economists analysing the different aspects of it and comparing VERs with other protective instruments Brecher and Bhagwati (1987), Harris (1985), Dinopoulos and Kreinin (1989), Dean and Gangopadhyay (1991) and Murray, et al. (1988).

It is generally argued that since VERs are bilateral in nature and are therefore source-specific, they are less effective than quotas, which are "global" and non-discriminatory, in restricting imports and generating protection for the producers in the importing country. Furthermore, VERs are usually negotiated with some major exporting countries leaving other sources unrestrained.¹ But for a country aiming at restricting imports is it not surprising to negotiate VERs only with few major exporters? Putting other way, when a country switches from a quota regime to VER is it not rational for the country to negotiate VERs with all sources of supply, if possible, so as to generate at least same protection for the domestic industry as under the quota regime? Negotiating VER with few exporters can only be justified if such a move leaves domestic production unchanged.

We address this particular issue in this paper in an oligopolistic framework with

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¹ For example, in case of automobiles USA negotiated a VER with Japan leaving South Korea unrestrained.

quantity-setting domestic import-competing firm and two exporting foreign firms. However, to examine what role the particular behavioural assumptions play in this context, we do not confine our analysis to any particular conjectures of the firms such as Cournot.² Instead, we take into account the whole range of oligopolistic interactions including non-cooperative and collusive behaviours. One convenient, albeit ad hoc, way of parameterising such interactions or “reactions” is “conjectural variations” (CV) in output.³ The CV reflects the firm’s beliefs about the rival’s response to change in its own output. Specific parametric values of CV then define particular behavioural assumption and lead to different oligopolistic outcomes between (quasi-) competitive and joint profit maximisation. However, given our focus on the “positive” policy aspect, we do not impose any restrictions that the CV be “consistent”, i.e., ‘ex ante’ and ‘ex post’ expectations regarding rival’s behaviour must match.⁴

In terms of such a CV approach we demonstrate that the protective effect of “global” quota compared to discriminatory and selective VER crucially hinges on the value of CV. That is, the underlying behavioural assumption or the nature of oligopolistic interaction cannot be neglected.

The rest of the paper is organised as follows. In section 2.1 we specify the model under free trade while in section 2.2 we compare the protective effects of quota and VER. Finally in section 3 we conclude the paper.

2.

2.1. *The Model under Free Trade*

Consider the home country market where one domestic firm and two foreign firm sell a homogeneous good. The foreign firms produce the good in the plants located in their respective home countries. There are no fixed cost of production. The marginal costs are constant though not identical. Such marginal costs (MCs) are denoted by c , c_1^* , c_2^* . The variables with asterisk stand for foreign firms while the two foreign firms are distinguished by subscripts 1 and 2. Assumption of constant MCs allow us to concentrate on the domestic market only as all other markets including the domestic market are “segmented” [see Helpman (1982)].

The demand function in the domestic market is assumed to be linear⁵:

$$p = A - B(q + q_1^* + q_2^*), \quad A > 0, B > 0 \quad (1)$$

² After all, there is a good deal of empirical evidences for non-Cournot conjectures, e.g., Japanese glass industry and US coffee industry (Gollop and Roberts, 1979, Iwata, 1974).

³ A conjectural variation approach to the analysis of intraindustry trade and strategic trade policy is not uncommon, e.g., Anderson et al. (1989), Eaton and Grossman (1986), Hwang (1984) and Hwang and Mai (1988).

⁴ The requirement that CVs be consistent may be appealing in its own right, but in profit maximising conduct of firms consistency is not of sole importance.

⁵ Linear demand is assumed to simplify the analysis. The main results are, however, independent of this linearity.

where, ' p ' is the domestic price of the good, ' q ' is the domestic production, ' q_i^* ' is the export by the i -th foreign firm ($i = 1, 2$).

The firms' strategy variables are their respective output levels. They set their output to maximise their profits:

$$\bar{A} = Aq - Bq^2 - Bqq_1^* - Bqq_2^* - cq \quad (2)$$

$$\bar{A}_1^* = Aq_1^* - Bqq_1^* - Bq_1^{*2} - Bq_1^*q_2^* - c_1^*q_1^* \quad (3)$$

$$\bar{A}_2^* = Aq_2^* - Bqq_2^* - Bq_1^*q_2^* - Bq_2^{*2} - c_2^*q_2^* \quad (4)$$

The first order profit maximising conditions then yield the reaction functions which together solve free trade equilibrium values of domestic production and imports (or foreign outputs) given the value of the CV. Let such solution values be $\bar{q}(r)$, $\bar{q}_1^*(r)$ and $\bar{q}_2^*(r)$, where, ' r ' denotes the value of the CV which is assumed to be constant and "symmetric":

$$r = dq_1^*/dq = dq/dq_1^* = dq_1^*/dq_2^* = dq_2^*/dq_1^* \quad (5)$$

A positive (negative) value of ' r ' implies collusive (non-cooperative) behaviour while zero value of ' r ' implies Cournot conjectures. The upper and lower limits on the value of CV, r , are $+1$ and $-1/2$ respectively.

2.2. Protective effects of Quota and VER

Suppose, the home government negotiates a VER with the second foreign firm requiring it to restrict its supply to \tilde{q}_2^* which is less than its free trade supply, \bar{q}_2^* . The other firm remains unrestrained. Therefore, under such a discriminatory VER, foreign firm-1 and the domestic firm will interact among themselves in the domestic market the residual demand, i.e., demand "net" of \tilde{q}_2^* :

$$p = A' - B(q + q_1^*) \quad (6)$$

where, $A' = A - B\tilde{q}_2^*$.

The profit maximising conditions yield following reaction functions:

$$B(2+r)\tilde{q} + B\tilde{q}_1^* = A' - c \quad (7)$$

$$B\tilde{q} + B(2+r)\tilde{q}_1^* = A' - c_1^* \quad (8)$$

From (7) and (8) we obtain the revised output levels as:

$$\tilde{q} = [(1+r)A' - (2+r)c + c_1^*]/B(1+r)(3+r) \quad (9)$$

$$\tilde{q}_1^* = [(1+r)A' + c - (2+r)c_1^*]/B(1+r)(3+r) \quad (10)$$

By our assumption of constant CV, home firm's belief regarding behaviour of unrestrained foreign firm-1 and vice versa remain unchanged. What is irrelevant now is the belief about behaviour of firm-2 as VER puts a constraint on its supply, i.e., dq_2^*/dq and dq_2^*/dq_1^* are meaningless. But the conjecture of the firm-2 about its rivals' behaviour (under free trade) affects the output decisions of other firms

under the VER regime, \tilde{q} and \tilde{q}_1^* , to the extent that it affects the position of the “net” or residual demand curve as is evident from (6). In other words, given the supply of firm-2 and the residual demand under the selective VER regime, the home firm and the unrestrained foreign firm-2 play the output game on the basis of their (pre-VER) beliefs regarding behaviour of each other and accordingly revise their output decisions as given in (9) and (10).

Now suppose this selective VER is replaced by a global quota permitting “less” total imports. In particular, the quota regime allows the previously restrained firm-2 the same amount to sell as it was selling under VER, i.e., $\bar{q}_2^* = \tilde{q}_2^*$, while restricts the sale of firm-1 to $\bar{q}_1^* = \tilde{q}_1^* - \theta$, where θ is some positive constant. Greater value of θ indicates more stringent quota regime, while for $\theta=0$, imports under the quota and VER’ regimes are same.

Under the quota system the domestic firm is turned into a monopolist maximising its profit on the basis of the demand curve net of total imports:

$$p = A'' - B\bar{q} \quad (11)$$

where, $A'' = A' - B\tilde{q}_1^*$ (see Figure-1). Therefore, domestic production under the quota regime can be obtained as,

$$\begin{aligned} \bar{q} &= (A'' - c)/2B \\ &= \theta/2 + (2+r)\tilde{q}/2 \end{aligned} \quad (12)$$

where, \tilde{q} is as given in (9).

Dependence of home firm’s output under quota on the value of CV despite its monopoly position is simply due to the fact that the quota levels are set with respect to free trade levels of supplies which vary with the value of CV. That is, as under VER, value of CV (r) determines the position of the net demand curve under quota and hence the output decision of the domestic firm. Accordingly, change in home firm’s output as we switch from the selective VER to global quota regime (permitting “less” total imports) will also depend on the CV. To see this we subtract \tilde{q} from both sides of (12) and obtain,

$$\bar{q} - \tilde{q} = (r\tilde{q} + \theta)/2 \quad (13)$$

Therefore, the protective effect of global quota depends on the stringency of the quota regime as well as on the value of the CV, r . So long as the equilibrium under free trade and under VER are Cournot and/or collusive ($r \geq 0$), quota is always more protective compared to VER. But when the equilibrium is non-cooperative ($r < 0$), quota generates more protection for the domestic industry only if the quota is set far below the import level under VER or if the equilibrium is not too non-cooperative (i.e., the absolute value of ‘ r ’ is small). Therefore,

PROPOSITION 1. *Compared to source-specific VER, a global quota permitting “less” total import protects the domestic industry unambiguously except when firms’ behaviours are non-cooperative in which case strictness of the quota regime (as*

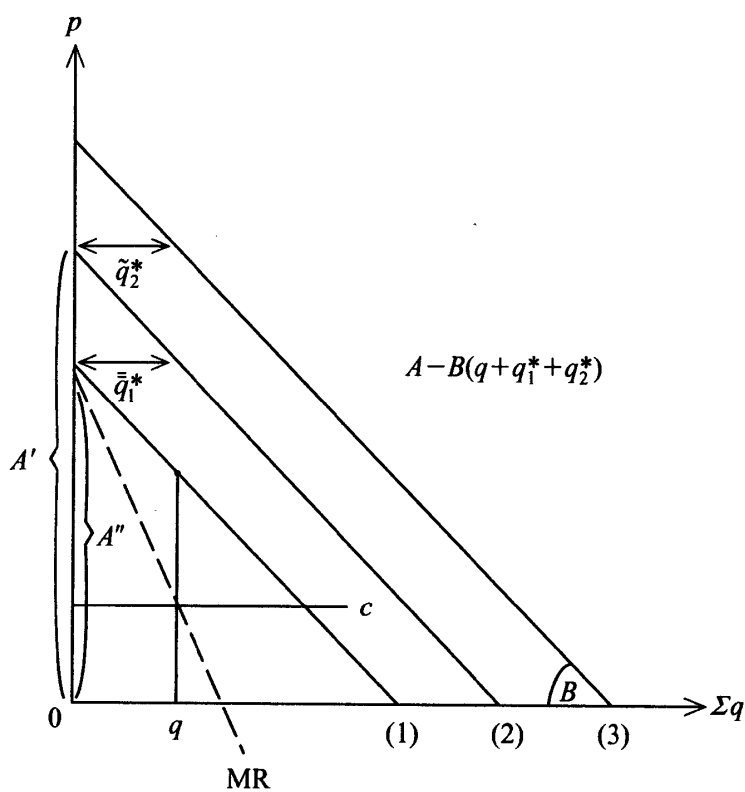


Fig. 1. Demand curves under alternative systems.
 (1): "net" demand under quota
 (2): "net" demand under VER
 (3): total demand under free trade

captured by the value of θ) is important.

On the other hand, degree of protection under quota increases as we move from Cournot to perfectly collusive behaviour.

The above analysis points out two other interesting facts when the import level under VER is alternatively set as quota, i.e., $\theta = 0$. First the two systems will lead to identical domestic price only when the VER equilibrium is Cournot ($r = 0$). Similar price-equivalence result is obtained by Hwang and Mai (1988) for equal-import tariff and quota. Secondly, quota is unambiguously anti-protective for all non-cooperative behaviour. Therefore,

PROPOSITION 2. *A shift from source-specific VER to "equal-import" global quota regime results in—i) protection for the domestic industry only for Cournot or collusive behaviour; ii) identical domestic price only under Cournot conjecture.*

3. CONCLUSION

In terms of a simple model we have demonstrated here that in an oligopolistic

environment equal-import global quota is not necessarily more protective. All depends on the underlying behavioural assumption. What is more, a quota which permits "less" total imports compared to selective VER may be antiprotective when firm behaviour is non-cooperative unless the quota regime is very stringent. Under such circumstances, therefore, the practice of negotiating VER with only major sources of supply can perhaps be justified in terms protection generated compared to quota regime. In sum, the claim that source-specific VERs are less effective than global quota is not necessarily valid.

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