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A Note on India's MFA Quota Allocation System: The Effect of Subcategorization

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ABSTRACT. – This paper considers the ramifications of quota subcategorization, a practice which characterizes India's system of allocating Multi-Fibre Arrangement (MFA) licenses. We compare the justifications commonly given for this practice with the optimal policies to attain those objectives.

Un commentaire sur le système d'allocation des quotas MFA en Inde : l'effet de la subdivision

RÉSUMÉ. – Dans cet article nous considérons les ramifications de la subdivision des quotas, une pratique qui caractérise le système d'allocation des licences dans le cadre du Multi-Fibre Arrangement (MFA) en Inde. Nous comparons les justifications habituelles données pour cette pratique avec les politiques optimales nécessaires pour parvenir aux mêmes objectifs.

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1 Introduction

The Multi-Fibre Arrangement (MFA) is a system of quotas on textiles and apparel exported from developing countries to developed countries. Under this scheme, importing countries negotiate a series of bilateral voluntary export restraints on textile and clothing items with exporting countries. The actual administration of the quotas, including the allocation of quota licenses and the issuance of export visas, is left almost entirely to the exporting countries, with the importing countries responsible only for ensuring that the quota limits are not exceeded.

Although there exists a large body of literature focusing on the MFA's welfare consequences for both exporting and importing countries, surprisingly little attention has been paid to the effects of the quota implementation in the exporting countries [1]. In practice, the administration of MFA quotas often involves intricate rules and regulations governing the allocation and transfer of licenses, details which are ignored in most theoretical and empirical models. This is an unfortunate oversight, as implementation rules do affect the behavior of participants in the quota-constrained markets, which in turn has implications for the size and distribution of the resulting quota rent.

In this paper, we examine the implications of quota subcategorization, an implementation rule which is a key feature of India's quota allocation system. Even though the categories of restricted apparel under the MFA are quite detailed (specified by fabric and garment type in the case of exports to the United States), the Indian authorities often further split them into subcategories, e.g., children's and adult garments, or knitted, handloomed and mill-made/powerloomed garments, with the entitlements calculated separately. Special quantities are reserved for garments made of 100% cotton handloom fabrics, and portions of quota are also set aside for woollen and acrylic garments and knitwear, even when the importing country imposes no specific limits for these categories.

The conventional wisdom holds that subcategorization is an undesirable policy since it can lead to situations where the quota is not binding in certain subcategories and very binding in others, resulting in underutilization of the total quota despite a positive license price. Such an argument may be found in KHANNA [1991]. In this paper, we use a series of stylized targeting models to show that, depending on the environment and the objective of

1. Our related work on the MFA has involved the study of the quota allocation schemes in Hong Kong, Korea, India, Indonesia, Bangladesh, Pakistan and Thailand in a fair amount of detail. A description of MFA quota allocation schemes in the ASEAN countries can be found in HAMILTON [1986]. More recently, TRELA and WHALLEY [1991] compiled a useful summary of the quota allocation schemes in seventeen countries, including other Asian as well as Latin American and Caribbean countries.

the authorities, subcategorization may be theoretically desirable [2]. Some early work on the consequences of quota subcategorization can be found in CORDEN [1971], although he does not adopt the targeting approach that we use.

2 Subcategorization

Let us consider a particular MFA category, say cotton dresses. Assume that cotton dresses are produced in India under conditions of perfect competition, that Indian cotton dresses are produced for export only, and that India is a "large" exporter of cotton dresses (so it faces a downward sloping foreign demand for this good.) There are two types of homogeneous cotton dresses: those made from handloomed fabric and those made from powerloomed fabric. We shall refer to handloomed dresses as good 1 and powerloomed dresses as good 2. The total quota on Indian exports of cotton dresses is exogenously set at V units.

We first analyze how competitive forces will distribute the given quota of V units between handloomed and powerloomed cotton dresses. Then we consider several possible objectives behind the Indian authorities' decision to impose separate sub-quotas on handloomed and powerloomed dresses. The point of this exercise is to demonstrate that there may be a theoretical case for subcategorization, given the overall quota of V units. Depending on the objective function of the Indian authorities, some intervention may be required on their part to bring the market distribution in line with the desired distribution.

In the rest of this section, let Q_i denote the quantity of good i, $P_i(Q_i)$ the inverse demand function for good i, $C_i(Q_i)$ the total cost function for good i, and $C_i'(Q_i)$ the marginal cost function for good i, where $i = 1$ for handloomed cotton dresses and $i = 2$ for powerloomed cotton dresses. For notational simplicity, we drop all other variables entering into the P_i and C_i functions; in particular, we assume there is no substitution between handloomed and powerloomed dresses, hence P_i and C_i are written as functions of Q_i only.

Market Outcome

Suppose that the quota of V units on cotton dresses is binding. Left to competitive market forces, how will this quota eventually be divided between handloomed and powerloomed dresses? If the quota is binding, it will introduce a wedge between the demand price, $P_i(Q_i)$, which foreign consumers are willing to pay for the restricted cotton dresses, and the

2. It is interesting to note the similarity of the results to the strategic trade literature: a particular policy may be welfare-improving under some circumstances and welfare-reducing under other circumstances.

supply price, or marginal cost, $C_i'(Q_i)$, of producing the dresses. This wedge, $P_i(Q_i) - C_i'(Q_i)$, measures the per unit quota rent, i.e., the value of a quota license to export one dress of type i, $i = 1, 2$. If the quota licenses are freely transferable among producers of handloomed and powerloomed cotton dresses [3], arbitrage will ensure that the competitive market will allocate production between the two types of dresses such that, at the margin, the value of a quota license for handloomed dresses is equal to the value of a quota license for powerloomed dresses. To see this, note that if $P_1(Q_1) - C_1'(Q_1) > P_2(Q_2) - C_2'(Q_2)$, powerloom producers will sell their licenses to handloom producers, hence the production of handloomed dresses will rise and the production of powerloomed dressed will fall. Conversely, if $P_1(Q_1) - C_1'(Q_1) < P_2(Q_2) - C_2'(Q_2)$, production will shift from handloomed dresses toward powerloomed dresses. Only when $P_1(Q_1) - C_1'(Q_1) = P_2(Q_2) - C_2'(Q_2)$ will there be no incentive for handloom and powerloom producers to trade licenses.

The equilibrium condition under competitive market allocation, therefore, is:

$$P_1(Q_1) - C_1'(Q_1) = P_2(Q_2) - C_2'(Q_2). \tag{1}$$

Since the total quota, V, is assumed to be binding, all the licenses will be used:

$$Q_1 + Q_2 = V. \tag{2}$$

Equations (1) and (2) implicitly define the equilibrium output of handloomed and powerloomed dresses under competitive market conditions, subject to the total quota, V. Denote these quantities as V_1^m and V_2^m, respectively.

Welfare Maximization Objective

Now suppose the Indian authorities decide to impose separate quotas, V_1 and V_2, on handloomed and powerloomed dresses, respectively, with the objective of maximizing welfare. Using a partial equilibrium framework, and assuming cotton dresses are produced only for export [4], this objective is tantamount to maximizing the sum of producer surplus and license revenue from the production and export of the two types of cotton dresses. Assuming the quotas are binding, for each type of restricted cotton dress (denoted by i): producer surplus is given by $C_i'(V_i)\,V_i - C_i(V_i)$, i.e., the difference between sales revenue, $C_i'(V_i)\,V_i$, and the total cost of producing V_i units, $C_i(V_i)$; and license revenue is given by $[P_i(V_i) - C_1'(V_i)]\,V_i$, i.e., the per unit quota rent, $P_i(V_i) - C_1'(V_i)$, multiplied by the number of dresses exported,

3. Since the late 1980s, some 60-65% of quota licenses was allocated to firms based on their past performance. According to KUMAR and KHANNA [1990], these licenses were freely transferable and an active secondary market existed in which the licenses were bought and sold. In 1991, the rules were changed to allow only permanent transfers.

4. This assumption is made for simplicity. Allowing for domestic consumption (and thereby including consumer surplus in the welfare function) will not alter the nature of the results.

V_i. Thus, the sum of producer surplus and license revenue is given by $P_i(V_i)V_i - C_i(V_i)$ for each dress type i.
Hence, given the exogenously specified quota level of V, the Indian authorities' objective function would be to:

$$\text{(3)} \qquad \max_{V_1, V_2} P_1(V_1)V_1 - C_1(V_1) + P_2(V_2)V_2 - C_2(V_2) \quad \text{s.t. } V_1 + V_2 = V.$$

Assuming the objective function is concave, the first order conditions for welfare maximization dictate that:

$$\text{(4)} \quad P_1'(V_1)V_1 + P_1(V_1) - C_1'(V_1) = P_2'(V_2)V_2 + P_2(V_2) - C_2'(V_2) = \lambda^w$$

where λ^W is the Lagrange multiplier. In other words, the welfare maximizing subcategorization equates the difference between marginal revenue and marginal cost for the two sectors. Equation (4) implicitly defines the optimal levels of V_1 and V_2 for welfare maximization. Denote these quantities by V_1^w and V_2^w.

PROPOSITION 1: The competitive market allocation will achieve welfare maximization, i.e., $V_1^m = V_1^w$ and $V_2^m = V_2^w$, if and only if $P_1(V_1^m)/\varepsilon_1(V_1^m) = P_2(V_2^m)/\varepsilon_2(V_2^m)$, where $\varepsilon_i = -P_i(V_i)/P_i'(V_i)V_i$, the elasticity of demand for good i, defined as a positive number. If $P_1(V_1^m)/\varepsilon_1(V_1^m) > P_2(V_2^m)/\varepsilon_2(V_2^m)$, then $V_1^m > V_1^w$ and $V_2^m < V_2^w$, i.e., the competitive market outcome results in an overproduction of handloomed dresses and an underproduction of powerloomed dresses for the purpose of welfare maximization. If $P_1(V_1^m)/\varepsilon_1(V_1^m) < P_2(V_2^m)/\varepsilon_2(V_2^m)$, then $V_1^m < V_1^w$ and $V_2^m > V_2^w$, i.e., the competitive market outcome results in an underproduction of handloomed dresses and an overproduction of powerloomed dresses for the purpose of welfare maximization.

Proof: The first order condition for welfare maximization (equation (4)) can be written as:

$$\text{(5)} \qquad [P_1(V_1) - C_1'(V_1)] - P_1(V_1)/\varepsilon_1(V_1) = [P_2(V_2) - C_2'(V_2)] - P_2(V_2)/\varepsilon_2(V_2)$$

using the definition of ε_i given above. From equation (1), we know that at the competitive market quantities, $P_1(V_1^m) - C_1'(V_1^m) = P_2(V_2^m) - C_2'(V_2^m)$, so equation (5) holds at the competitive market equilibrium only if $P_1(V_1^m)/\varepsilon_1(V_1^m) = P_2(V_2^m)/\varepsilon_2(V_2^m)$. This situation is illustrated in Figure 1. If $P_1(V_1^m)/\varepsilon_1(V_1^m) > P_2(V_2^m)/\varepsilon_2(V_2^m)$, then at (V_1^m, V_2^m), the LHS of equation (5) is smaller than the RHS, i.e., the difference between marginal revenue and marginal cost is smaller for handloomed dresses than it is for powerloomed dresses, indicating an overproduction of the former and underproduction of the latter for the purpose of welfare maximization. This situation is illustrated in Figure 2. The opposite is

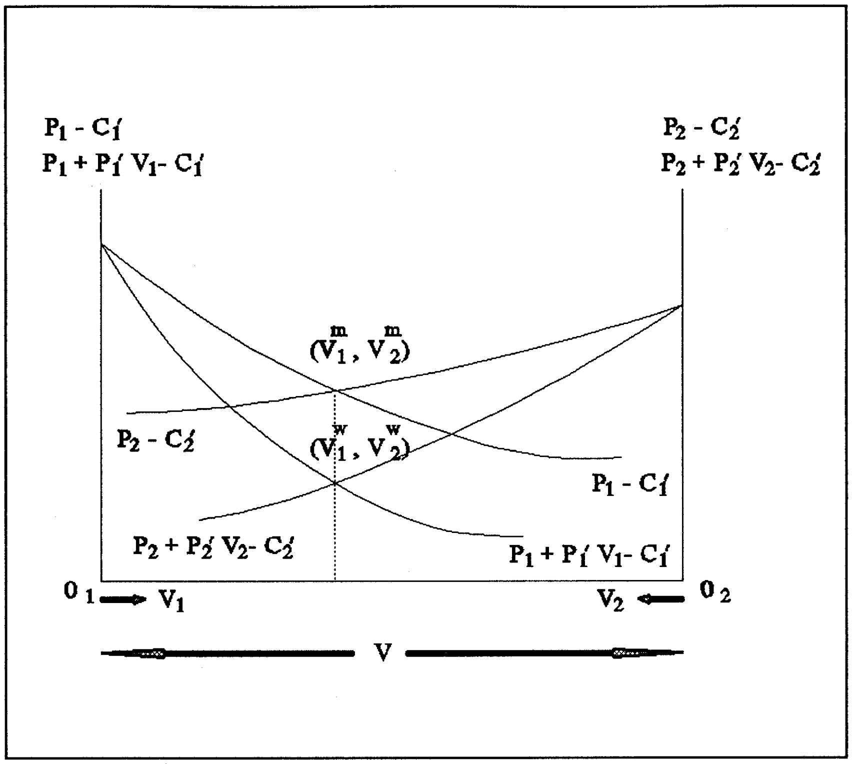

FIGURE 1

$V_1^m = V_1^w$ ***and*** $V_2^m = V_2^w$

true if $P_1(V_1^m)/\varepsilon_1(V_1^m) < P_2(V_2^m)/\varepsilon_2(V_2^m)$; this situation is illustrated in Figure 3.

PROPOSITION 2: Given an exogenously determined total quota, V, subcategorization of V generically leads to an improvement in welfare over the market allocation of V between the two types of dresses.

Proof: If the Indian authorities were able to set the *total quota* on cotton dresses rather than accept an exogenously given level, V, they would maximize the country's welfare by choosing the sub-quotas $V_1^{w^*}$ and $V_2^{w^*}$ such that equation (4) is satisfied with $\lambda^w = 0$. In other words, the first best welfare maximizing policy for India would be to set the sub-quotas so as to equate marginal cost with marginal revenue in the handloom and powerloom sectors. Given our assumption of India being a "large" country, and using reasoning analogous to the optimal tariff argument, we know that the chosen sub-quotas $V_1^{w^*}$ and $V_2^{w^*}$ would add up to the "optimal quota" on cotton dresses which will maximize India's welfare. Call this "optimal quota", V^{w^*}. Comparing the first best result with the situation where the quota is exogenously fixed at V, note that if V is larger than the "optimal

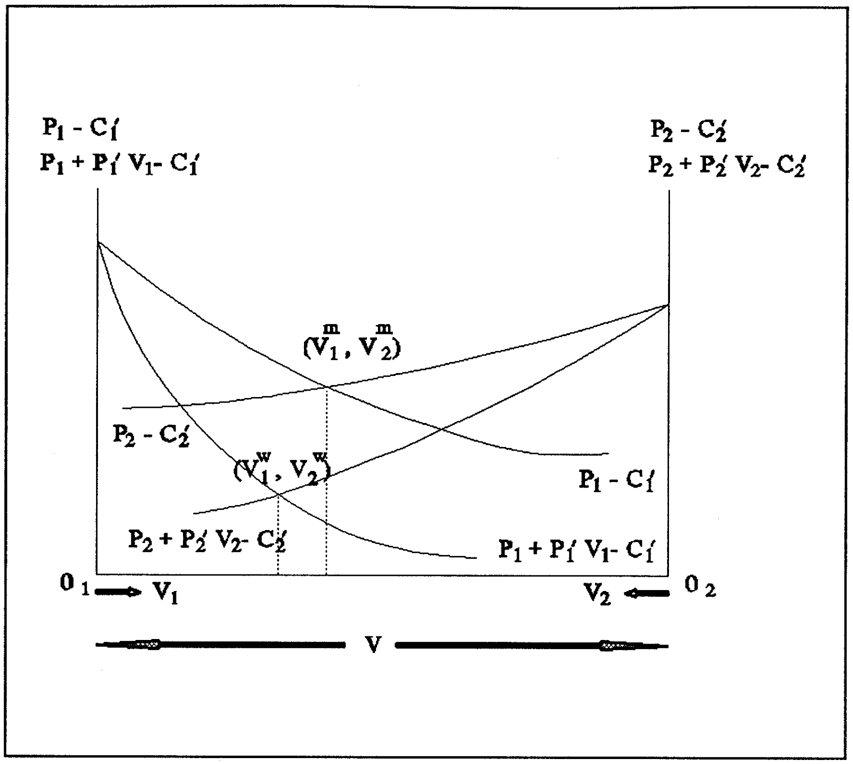

FIGURE 2
$V_1^m > V_1^w$ ***and*** $V_2^m < V_2^w$

quota" V^{w^*} [5], then the opportunity exists for the authorities to create an unusable "dummy" subcategory in order to exploit their monopoly power in the world market. By setting the quota size for the "dummy" subcategory at $V - V^{w^*}$, the authorities could effectively restrict their exports to the "optimal quota" level! If $V < V^{w^*}$, there is no room for subcategorization to enhance the country's monopoly power, although subcategorization would still be required in order to achieve welfare maximization at the given total quota level, V.

PROPOSITION 3: If India were a "small" country, i.e., a price taker, in the world market for cotton dresses, then the competitive market allocation will achieve welfare maximization.

Proof: If India were a price-taker in the world market for cotton dresses, P_i will not be a function of V_i. Hence, $P_i'(V_i)V_i = 0$ for $i = 1$, 2, and the market outcome will be identical to the welfare-maximizing outcome.

5. This would be the case if, in Figure 1, the two curves, $P_1(V_1) - C_1'(V_1)$ and $P_2(V_2) - C_2'(V_2)$ intersected below the horizontal axis (i.e., $\lambda^w = 0$).

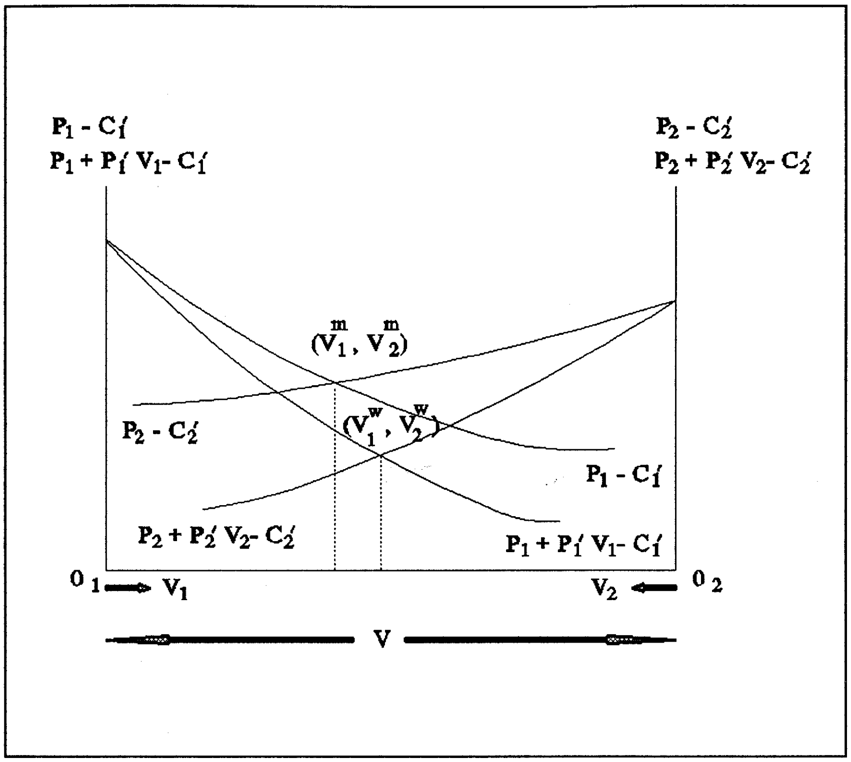

FIGURE 3

$V_1^m < V_1^w$ ***and*** $V_2^m > V_2^w$

Foreign Exchange Maximization Objective

Next, let us consider a different objective for imposing separate quotas on handloomed and powerloomed dresses, namely that of maximizing foreign exchange earnings. Given V, the Indian authorities would then have the following objective function (assumed to be concave):

$$\max_{V_1, V_2} P_1(V_1)V_1 + P_2(V_2)V_2 \quad \text{s.t. } V_1 + V_2 = V. \tag{6}$$

The first order conditions for revenue maximization dictate that:

$$P_1'(V_1)V_1 + P_1(V_1) = P_2'(V_2)V_2 + P_2(V_2) = \lambda^f \tag{7}$$

where λ^f is the Lagrange multiplier. In other words, the revenue maximizaton objective is met if the marginal revenues are equalized in both sectors. Equation (7) implicitly defines the optimal levels of V_1 and V_2 for foreign exchange (revenue) maximization, which we shall denote V_1^f and V_2^f, respectively.

PROPOSITION 4: The competitive market allocation will maximize revenue if and only if $[P_1(V_1^m)/\varepsilon_1(V_1^m) - P_2(V_2^m)/\varepsilon_2(V_2^m)] - [C_1'(V_1^m) - C_2'(V_2^m)] = 0$. If $P_1(V_1^m)/\varepsilon_1(V_1^w) = P_2(V_2^m)/\varepsilon_2(V_2^m)$, so that the competitive market allocation is also the welfare maximizing allocation, but $C_1'(V_1^m) > C_2'(V_2^m)$, then $V_1^m < V_1^f$ and $V_2^m > V_2^f$, i.e., the market equilibrium will result in underproduction of handloomed dresses and overproduction of powerloomed dresses for the purpose of revenue maximization. If $P_1(V_1^m)/\varepsilon_1(V_1^m) = P_2(V_2^m)/\varepsilon_2(V_2^m)$ and $C_1'(V_1^m) < C_2'(V_2^m)$, then $V_1^m > V_1^f$ and $V_2^m < V_2^f$, i.e., the market equilibrium will result in overproduction of handloomed dresses and underproduction of powerloomed dresses for the purpose of revenue maximization.

Proof: We can write the first order condition for revenue maximization (equation (7)) as:

$$\text{(8)} \qquad \begin{aligned} &[P_1(V_1) - C_1'(V_1)] - P_1(V_1)/\varepsilon_1(V_1) + C_1'(V_1) \\ &\quad = [P_2(V_2) - C_2'(V_2)] - P_2(V_2)/\varepsilon_2(V_2) + C_2'(V_2). \end{aligned}$$

At the competitive market equilibrium, $P_1(V_1^m) - C_1'(V_1^m) = P_2(V_2^m) - C_2'(V_2^m)$, so equation (8) holds at (V_1^m, V_2^m) if and only if $[P_1(V_1^m)/\varepsilon_1(V_1^m) - P_2(V_2^m)/\varepsilon_2(V_2^m)] - [C_1'(V_1^m) - C_2'(V_2^m)] = 0$. If $P_1(V_1^m)/\varepsilon_1(V_1^m) = P_2(V_2^m)/\varepsilon_2(V_2^m)$, we know from Proposition 1 that the competitive market solution maximizes welfare. However, if $P_1(V_1^m)/\varepsilon_1(V_1^m) = P_2(V_2^m)/\varepsilon_2(V_2^m)$, but $C_1'(V_1^m) > C_2'(V_2^m)$, then at (V_1^m, V_2^m), the LHS of equation (8) is larger than the RHS, i.e., the marginal revenue from handloomed dresses is greater than the marginal revenue from powerloomed dresses, indicating an underproduction of former and overproduction of the latter for the purpose of revenue maximization. The opposite is true if $P_1(V_1^m)/\varepsilon_1(V_1^m) = P_2(V_2^m)/\varepsilon_2(V_2^m)$ and $C_1'(V_1^m) < C_2'(V_2^m)$.

PROPOSITION 5: Given an exogenously determined total quota, V, subcategorization of V generically leads to higher revenue (foreign exchange earnings) than under the market allocation of V between the two types of dresses.

Proof: The first best revenue maximizing policy (if the Indian authorities were free to set the total quota rather than take it as given) would be to set the sub-quotas such that marginal revenue is zero in each sector (i.e., such that equation (7) is satisfied with $\lambda^f = 0$), with the sub-quotas adding up to V^{f^*}, the "optimal quota" from the revenue maximizing perspective [6]. As

6. Note that, due to the fact that marginal costs are not a consideration here, the "optimal quota" for foreign exchange maximization is always larger than the "optimal quota" for welfare maximization, i.e., $V^{f^*} > V^{w^*}$. This can also be deduced from a diagram similar to Figure 1, whereby if the curves $P_1' V_1 + P_1$ and $P_2' V_2 + P_2$ intersect at the horizontal axis so that the distance between the two vertical axes measures the revenue maximizing "optimal quota" V^{f^*}, then the curves $P_1' V_1 + P_1 - C_1'$ and $P_2' V_2 + P_2 - C_2'$ must intersect below the horizontal axis. Hence, in order to obtain V^{w^*}, we can think of having to push the right vertical axis leftward until $P_1' V_1 + P_1 - C_1'$ and $P_2' V_2 + P_2 - C_2'$ intersect at the horizontal axis; this new, narrower distance between the two axes now measures V^{w^*}.

before, comparing the first best result with the situation where the quota is exogenously fixed at V, note that if V is larger than the “optimal quota”, V^{f^*}, the authorities could create an unusable “dummy” subquota of size $V - V^{f^*}$ in order to effectively restrict their exports to the “optimal quota” level. Of course, if $V < V^{f^*}$, subcategorization cannot be used to attain the “optimal quota”, although subcategorization would still be required in order to achieve revenue maximization at a given total quota, V.

Quota Rent Maximization Objective

A third possible objective could be the maximization of quota rents from the restricted export of cotton dresses. In this case, given V, the Indian authorities would want to set sub-quotas V_1 and V_2 so as to satisfy the following objective function (assumed to be concave):

(9)
$$\max_{V_1, V_2} [P_1(V_1) - C_1'(V_1)]\,V_1 + [P_2(V_2) - C_2'(V_2)]\,V_2 \quad \text{s.t. } V_1 + V_2 = V.$$

The first order conditions for maximization dictate that:

(10)
$$[P_1'(V_1)\,V_1 + P_1(V_1)] - [C_1''(V_1)\,V_1 + C_1'(V_1)] = [P_2'(V_2)\,V_2 + P_2(V_2)] - [C_2''(V_2)\,V_2 + C_2'(V_2)] = \lambda^r$$

where λ^r is the Lagrange multiplier. Equation (10) implicitly defines the rent maximizing allocation of handloomed and powerloomed dresses, which we denote V_1^r and V_2^r, respectively.

PROPOSITION 6: The competitive market allocation will maximize quota rent if and only if $[P_1(V_1^m)/\varepsilon_1(V_1^m) - P_2(V_2^m)/\varepsilon_2(V_2^m)] + [C_1'(V_1^m)/\eta_1(V_1^m) - C_2'(V_2^m)/\eta_2(V_2^m)] = 0$, where $\eta_1 = C_1'(V_1)/\ C_1''(V_1)\,V$, the price elasticity of supply for good i. If $P_1(V_1^m)/\varepsilon_1(V_1^m) = P_2(V_2^m)/\varepsilon_2(V_2^m)$, so that the competitive market allocation is also the welfare maximizing allocation, but $C_1'(V_1^m)/\eta_1(V_1^m) > C_2'(V_2^m)/\ \eta_2(V_2^m)$, then $V_1^m > V_1^r$ and $V_2^m < V_2^r$, i.e., the market equilibrium will result in overproduction of handloomed dresses and underproduction of powerloomed dresses for the purpose of rent maximization. If $P_1(V_1^m)/\varepsilon_1(V_1^m) = P_2(V_2^m)/\varepsilon_2(V_2^m)$ and $C_1'(V_1^m)/\eta_1(V_1^m) < C_2'(V_2^m)/\eta_2(V_2^m)$, then $V_1^m < V_1^r$ and $V_2^m > V_2^r$, i.e., the market equilibrium will result in underproduction of handloomed dresses and overproduction of powerloomed dresses for the purpose of rent maximization.

Proof: Rearranging equation (10), we have:

(11)
$$[P_1(V_1) - C_1'(V_1)] - P_1(V_1)/\varepsilon_1(V_1) - C_1'(V_1)/\eta_1(V_1) = [P_2(V_2) - C_2'(V_2)] - P_2(V_2)/\varepsilon_2(V_2) - C_2'(V_2)/\eta_2(V_2)$$

using the definition of η_i given above. At the competitive market equilibrium, $P_1(V_1^m) - C_1'(V_1^m) = P_2(V_2^m) - C_2'(V_2^m)$, so equation (10) holds at (V_1^m, V_2^m) if and only if $P_1(V_1^m)/\varepsilon_1(V_1^m) + C_1'(V_1^m)/\eta_1(V_1^m) = P_2(V_2^m)/\varepsilon_2(V_2^m) + C_2'(V_2^m)/\eta_2(V_2^m)$. If $P_1(V_1^m)/\varepsilon_1(V_1^m) = P_2(V_2^m)/\varepsilon_2(V_2^m)$, we know from Proposition 1 that the competitive market solution maximizes welfare. However, if $P_1(V_1^m)/\varepsilon_1(V_1^m) = P_2(V_2^m)/\varepsilon_2(V_2^m)$, but $C_1'(V_1^m)/\eta_1(V_1^m) > C_2'(V_2^m)/\eta_2(V_2^m)$, then at (V_1^m, V_2^m), assuming marginal costs are increasing, the LHS of equation (11) is smaller than the RHS, indicating an overproduction of handloomed dresses and underproduction of powerloomed dresses for the purpose of rent maximization. The opposite is true if $P_1(V_1^m)/\varepsilon_1(V_1^m) = P_2(V_2^m)/\varepsilon_2(V_2^m)$ and $C_1'(V_1^m)/\eta_1(V_1^m) < C_2'(V_2^m)/\eta_2(V_2^m)$. A similar point is made in Corden (1971, p. 224) [7].

PROPOSITION 7: Given an exogenously determined total quota, V, subcategorization of V generically results in a larger amount of quota rent than would be the case under the market allocation of V between the two types of dresses.

Proof: If the authorities were free to set the total quota to maximize their collection of quota rent, they would choose sub-quota levels that satisfy equation (10) with $\lambda^r = 0$ such that the subquotas add up to the "optimal quota", V^{r^*} [8]. As before, comparing the first best result with the situation where the quota is exogenously fixed at V, note that if V is larger than the "optimal quota", V^{r^*}, the authorities could create an unusable "dummy" subquota of size $V - V^{r^*}$ in order to effectively restrict their exports to the "optimal quota" level. Of course, if $V < V^{r^*}$, no such opportunity exists for attaining the "optimal quota", although subcategorization would still be required in order to achieve rent maximization under a given total quota, V.

3 Conclusion

Depending on the authorities' objective as well as on demand and cost conditions, there may be a theoretical case for subcategorization as long

7. CORDEN (1971, p. 224) analyzes the situation where there are separate import quotas on two items (bags and hats) and concludes that allowing for interchangeability between bag and hat quotas may raise or lower total quota profits.
8. Assuming marginal costs are increasing, a comparison of equation (10) and equation (3) shows that $V^{r^*} < V^{w^*}$. This can also be seen by noting that in a diagram similar to Figure 1, if the curves $P_1' V_1 + P_1 - C_1'$ and $P_2' V_2 + P_2 - C_2'$ intersect at the horizontal axis so that the distance between the two vertical axes measures the welfare maximizing "optical quota" V^{w^*}, then the curves $P_1' V_1 + P_1 - C_1' - C_1''$ and $P_2' V_2 + P_2 - C_2' - C_2''$ must intersect below the horizontal axis if C_1'' and C_2'' are positive. Hence, in order to obtain V^{r^*}, we can think of having to push the right vertical axis leftward until $P_1' V_1 + P_1 - C_1' - C_1''$ and $P_2' V_2 + P_2 - C_2' - C_2''$ intersect at the horizontal axis; this new, narrower distance between the two axes now measures V^{r^*}.

as the country possesses some degree of market power and is able to affect the world price of its restricted export, i.e., as long as the country is a “large” exporter. However, even if this were the case, we would not advocate subcategorization since the informational requirements necessary for its success are not likely to be met in practice.

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