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This paper contains preliminary findings from research work still in progress and should not be quoted without prior approval of the author.

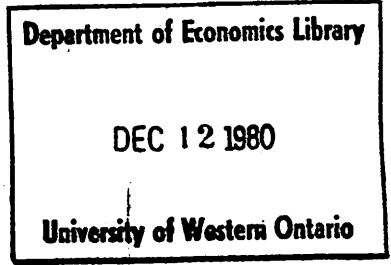
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THE WELFARE AND ALLOCATIVE EFFECTS
OF EXPORT TAXES VERSUS MARKETING BOARDS*

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Abstract

Three types of export marketing boards are compared to the traditional optimal export tax:

- (A) A board that cannot price discriminate between domestic and foreign customers;
- (B) A board that can discriminate, and
- (C) A board that is constrained by domestic marginal-cost pricing.

While all three types produce allocations inferior to the optimal export tax, type (C) is at least always superior to free trade. Adopting a "mini-max" attitude, the policy ranking is (1) export tax, (2) board type (C), (3) free trade, and (4) board types (A) and (B).

First Draft, November, 1980.

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I. Introduction.

The notion that a country with influence over world prices can improve its welfare via import and/or export taxes is an idea that goes back as far as Bickerdike (1906). Following Bickerdike, formulae for the optimal import or export tax have been proposed and refined by Graaf (1949), Johnson (1954), Jones (1967), and Kemp (1969). Yet export taxes are not often observed (Auquier and Caves (1979)) and import tariffs do not seem to be instituted primarily to exploit monopoly power in trade. We have, however, recently witnessed a growth in export marketing boards which might at first glance seem to perform roughly the same function as an optimal export tax. The purpose of this paper is to examine these marketing boards and compare them to the optimal export taxes developed in the trade theory literature.

Marketing boards, especially for agricultural and other primary products, are common in Canada, Australia, Europe, and in many developing countries. These boards do however differ both in their objectives and in the constraints they face. On the one hand, a marketing board could conceivably be directed to maximize some social welfare function. In this case, there will be no allocative differences between the marketing board and an optimal export tax. Distributional differences could of course exist depending on how the marketing board disposed of its profits. The more interesting situation would seem to be the case in which the marketing board is directed to maximize profits either on behalf of individual producers or on behalf of the government treasury.

Throughout this paper, we will concentrate on this profit-maximizing behaviour and neglect the tax-equivalent case of welfare maximization. The following section develops a two-good, general-equilibrium model in order to compare a social-welfare-maximizing,

optimal-export-tax equilibrium (henceforth SW equilibrium) to several marketing-board equilibria.¹

Three versions of the marketing board problem are considered. First, it is assumed that the marketing board cannot price discriminate between domestic and foreign buyers (e.g., it cannot prevent international arbitrage). This will be referred to as the MN equilibrium. Second, it is assumed that the marketing board is free to discriminate between domestic and foreign customers (henceforth the MD equilibrium). Third, it is assumed that the marketing board can set any foreign price (subject of course to foreign demand) but is constrained by marginal-cost pricing at home (henceforth the MM equilibrium). This constraint could arise for either of two reasons:

- A. individual producers are free to sell domestically without going through the marketing board (i.e., there is domestic competition) or
- B. the government imposes domestic marginal-cost pricing as a regulatory constraint.²

Several results emerge concerning social welfare, which is defined in terms of community indifference curves or revealed preference criteria (i.e., distributional considerations are either ignored or are assumed to be the domain of domestic taxation policy). First, all three marketing board equilibria involve a lower level of social welfare relative to the SW equilibrium. This is certainly not surprising with respect to the MN and MD equilibria. But it is, I think, a bit surprising for the MM case insofar as the marketing board is apparently acting as a competitor in domestic markets and as a monopolist in foreign markets. This result thus suggests that choosing prices subject to a marginal-cost pricing constraint is not the same thing as behaving as a price taker, given the ability to shift supply into or out of a second market.

Second, it is noted that the MN and MD equilibria may involve a level of social welfare which is less than the level which would prevail in competitive free trade (no marketing board). Indeed, it follows from Markusen (1980b) and Markusen and Melvin (1981) that the MN and MD equilibria could even involve losses relative to autarky.³ Third, it is shown that the MM equilibrium must involve a level of welfare somewhere between the social-welfare-optimum level and the free-trade level of welfare. Thus only in the MM case can we be assured of gains from trade and gains from the marketing board system.

Results concerning production of the export good are that the MD equilibrium will involve less production and the MM equilibrium more production than the SW equilibrium production level. The MN production level can lie on either side of the SW production level, but will always involve less than the SW production level if foreign demand is relatively more elastic than domestic demand.⁴ One relevant feature of these production differences has to do with foreign welfare. From production levels we are able to deduce the equilibrium level of the terms of trade which is in turn monotonically related to foreign welfare. It is shown that the MD and MM equilibria involve a lower world price for the domestic export good and thus a higher level of foreign welfare relative to the SW equilibrium. These two types of marketing boards thus involve an income transfer to foreigners relative to the optimal export tax. Only the MN board can involve an improvement in the terms of trade and a loss in foreign welfare relative to the social optimum. In such a situation, both countries are worse off relative to the SW equilibrium.

The paper concludes with a short section on foreign retaliation and collusion. It is noted that if two countries both behave in a symmetric, Cournot-Nash fashion, then the MM equilibrium will in fact improve world real income (although not necessarily the real income of both countries) relative to the SW equilibrium. On the other hand, two collusive marketing boards will produce an equilibrium inferior to the equilibrium produced by two "collusive" or cooperative welfare-maximizing governments.

II. The Social Welfare Optimum

The country in question is assumed to produce and trade two goods (X_0 and X_1) from factors in fixed and inelastic supply. Consumption quantities of X_0 and X_1 are denoted C_0 and C_1 respectively. p will denote the domestic price of X_1 in terms of X_0 and p^* will denote the world trading price of X_1 in terms of X_0 . X_1 is assumed to be the domestic export good.

Following Jones (1967), Vandendorpe (1972), and Markusen and Melvin (1979), it is assumed that demand conditions can be represented by a set of community indifference curves, so that the social welfare function and its total differential are given as follows:

$$(1) \quad U = U(C_0, C_1), \quad \frac{dU}{U_0} = dC_0 + \frac{U_1}{U_0} dC_1 = dC_0 + pdC_1.$$

As noted above, welfare is assumed to be a function of aggregate consumption only. dU/U_0 is the change in income in terms of C_0 and will henceforth be denoted dy . p will equal the marginal rate of substitution (U_1/U_0) as per the usual competitive assumptions.

With factors in inelastic supply, the aggregate transformation function and its differential are given as follows:

$$(2) \quad X_0 = F(X_1), \quad dX_0 - F'dX_1 = 0; \quad F', F'' < 0.$$

Equation (2) embodies the assumption that factor markets are competitive and that no monopsony distortions occur (Melvin and Warne, (1973), and Markusen (1980a, 1980b)). $-F'$ is the marginal rate of transformation along the efficient production frontier.

The balance of payments constraint and its differential are given by

$$(3) \quad e_0 + p^*e_1 = 0, \quad e_1 = X_1 - C_1, \quad da_0 + p^*de_1 + e_1dp^* = 0.$$

e_1 is thus domestic excess supply or foreign excess demand. $e_1 > 0$ by assumption.

Let θ denote the percentage distortion between p^* and F' (the MRT) and T denote the percentage distortion between p and F' . Price relationships are then given by

$$(4) \quad p^*(1-\theta) = p(1-T) = -F'$$

The domestic trading opportunities can be summarized by the foreign offer curve, which gives excess demands as functions of prices. Since the relevant information can be summarized in terms of either good by virtue of the balance of payments constraint, the foreign curve is simply specified as follows:

$$(5) \quad e_1 = E(p^*), \quad de_1 = E_p dp^*, \quad E_p = \frac{\partial e}{\partial p^*} < 0.$$

As noted in (5), it is assumed throughout the paper that foreign excess demand for X_1 (domestic excess supply) is negatively related to the world price ratio. Derivations of this offer curve from underlying demand and supply parameters can be found in Jones (1967), Markusen and Melvin (1979), and Markusen (1981). In the last section of the paper we will consider a more complicated version of (5) in which foreign excess demand depends on foreign taxes or price distortions as well.

Following Vandendorpe (1972), C_1 may be defined as a function of p and y .

$$(6) \quad C_1 = D(p, y), \quad dC_1 = D_p dp + D_y dy, \quad D_p < 0, D_y > 0.$$

$D_y > 0$ provided that C_1 is a normal good. Combining (6) and (5) with the identity $X_1 = e_1 + C_1$, we also have

$$(7) \quad dX_1 = de_1 + dC_1 = E_p dp^* + D_p dp + D_y dy.$$

Substituting $dX_1 - de_1$ for dC_1 in the welfare differential (1), we have

$$(8) \quad dy = dC_0 + p dC_1 = dX_0 - de_0 + p dX_1 - p de_1.$$

Substituting for dX_0 and de_0 from equations (2) and (3) respectively, we have

$$(9) \quad dy = F'dX_1 + pdX_1 + p^*de_1 + e_1dp^* - pde_1 \\ = (P+F')dX_1 + (p^*-p)E_p dp^* + e_1dp^*.$$

Substituting from (4) then gives

$$(10) \quad dy = (pT)dX_1 + ((p^*\theta - pT)E_p + e_1)dp^*.$$

Optimality requires us to choose θ and T such that (10) is zero for all differentials dX_1 and dp^* .

$$(11) \quad dy = 0 \text{ implies } T = 0, \quad \theta = -\frac{e_1}{p^*E_p} = 1/\eta_e^* > 0$$

Optimality thus requires that the domestic price ratio equal the MRT and requires an export tax (θ) equal to the inverse of the foreign elasticity of excess demand, denoted by η_e^* . As noted earlier, this formula goes back to Bickerdike and Graaff. For the remainder of the paper, we will assume that η_e^* is a constant. This constant elasticity assumption, introduced by Johnson (1954) and Gorman (1958), facilitates the comparison of the various equilibria.

The SW equilibrium is contrasted with the free trade equilibrium in Figure I. Free trade production and consumption are at A and A' respectively. The social-welfare-optimum levels of production and consumption are at points S and S'. As noted in (11), the consumer price ratio at S' (the slope of U_s) is equal to the slope of the transformation function at S. As per the usual textbook analysis, the export tax improves domestic welfare by shifting the world price ratio in favour of the domestic export good.

FIGURE I

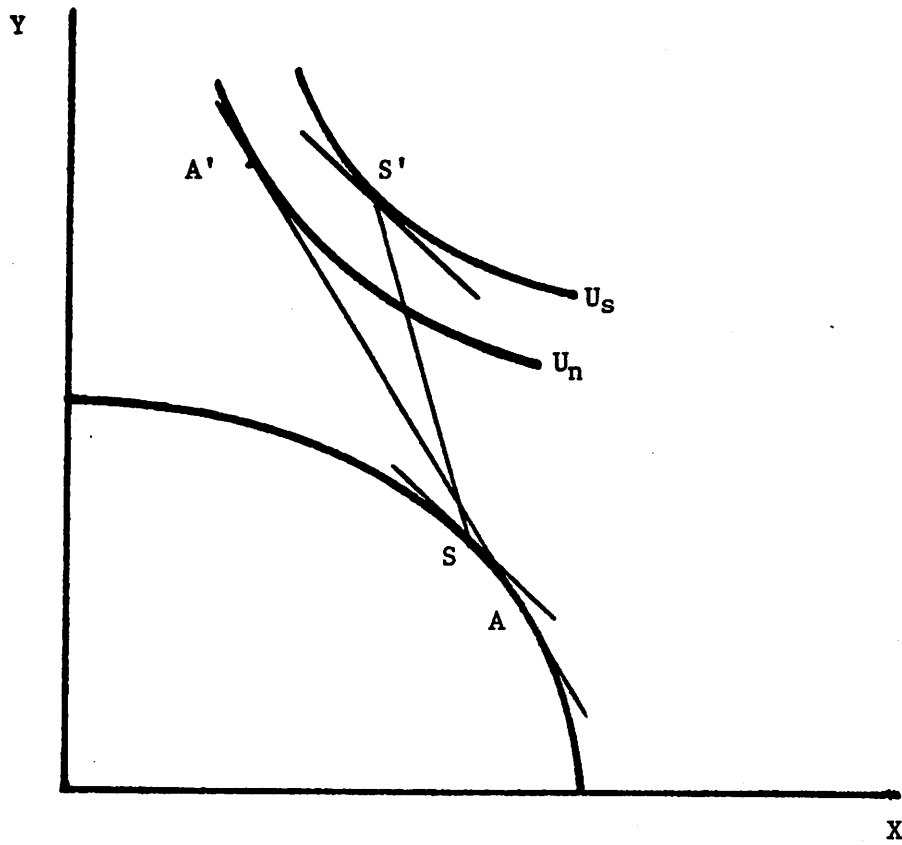
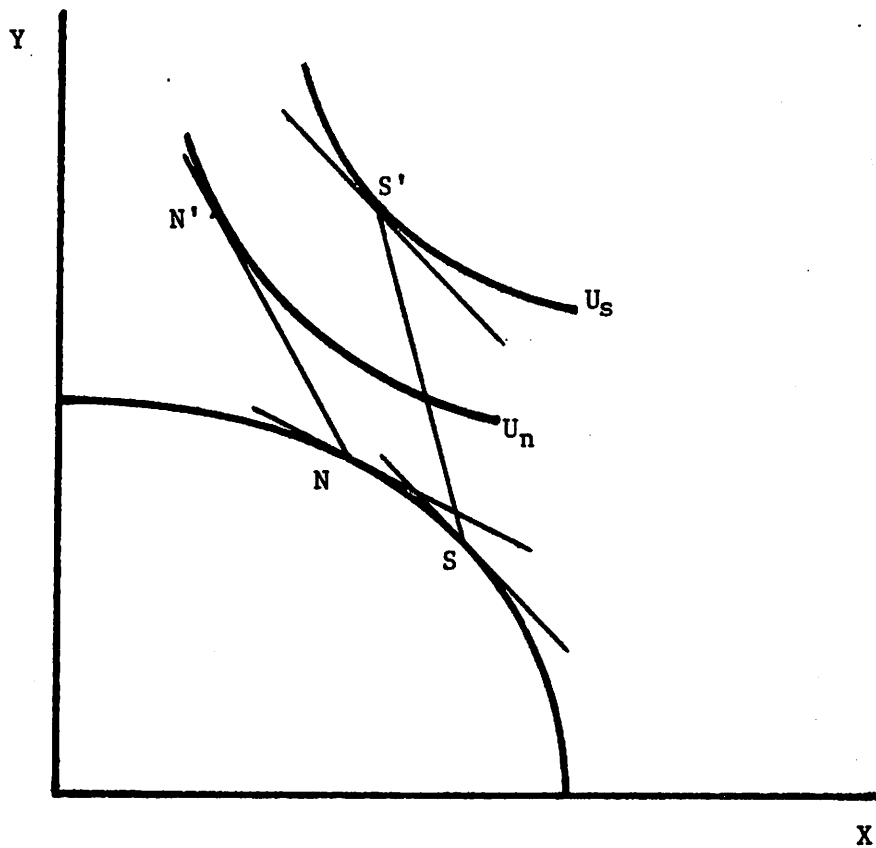


FIGURE II



III. Marketing Board - Price Discrimination not Permitted

As noted earlier, it is assumed that the objective of a marketing board is to maximize profits. In the present case, it is assumed that the board cannot discriminate between domestic and foreign customers so that $p=p^*$ or $T=\theta$. Since the social optimum requires $p < p^*$, it is immediately apparent that the marketing board cannot produce a first-best optimum. Denoting the cost of producing X_1 in terms of X_0 as $C(X_1)$, the marketing board's problem is as follows (π denotes profits):

$$(12) \quad \text{Maximize } \pi = p^*X_1 - C(X_1) \quad \text{where } p=p^* \text{ or } T=\theta.$$

$C'(x)$, the marginal cost of X_1 in terms of X_0 , will equal $-F(X)$.

Differentiating (12) and substituting for X_1 from (7), we have

$$\begin{aligned} (13) \quad d\pi &= p^*dX_1 + X_1dp^* - C'(X)dX_1, \text{ and from (7),} \\ &= p^*(E_p + D_p)dp^* + p^*D_y dy + X_1dp^* + F'(E_p + D_p)dp^* + F'D_y dy \\ &= (p^*+F')(E_p + D_p)dp^* + (p^*+F')D_y dy + X_1dp^* \\ &= (p^*T)(E_p + D_p)dp^* + (p^*T)D_y dy + X_1dp^* \end{aligned}$$

Given that $T=\theta$, dy is given in (10).

$$\begin{aligned} (14) \quad dy &= p^*TdX_1 + e_1dp^*, \text{ and from (7),} \\ &= p^*TD_y dy + p^*T(E_p + D_p)dp^* + e_1dp^*. \end{aligned}$$

Solving out for dy , we have

$$(15) \quad dy = (1-p^*TD_y)^{-1} (p^*T(E_p + D_p) + e_1)dp^* = Adp^*$$

where A may be either positive or negative depending upon the strengths of income and substitution effects. Substituting (15) into (13), we have

$$(16) \quad d\pi = (p^*T)(E_p + D_p + D_y A)dp^* + X_1dp^*$$

The profit maximizing level of T is found by setting $d\pi$ equal to zero for all levels of dp^* .

$$(17) \quad d\pi = 0 \text{ implies } T = \theta = - \frac{X_1}{p^* \left(\frac{E_p + D_p + D_A}{y} \right)} = 1/\eta_\omega$$

where η_ω is the "world" elasticity of demand facing the marketing board (the elasticity of domestic demand plus foreign excess demand). η_ω can be expanded as follows:

$$(18) \quad -\eta_\omega = \frac{p^* d(C_1 + e_1)}{C_1 + e_1 dp^*} = \frac{p^* dC_1}{C_1 + e_1 dp^*} + \frac{p^* de_1}{C_1 + e_1 dp^*}$$

$$(19) \quad \eta_\omega = \left(\frac{C_1}{C_1 + e_1} \right) \eta_d + \left(\frac{e_1}{C_1 + e_1} \right) \eta_e^*, \quad \eta_d = - \frac{p^* (D_p + D_A)}{C_1 y}$$

η_ω is thus the convex combination of η_d (the domestic elasticity of demand) and η_e^* , where the weights are respective shares of domestic consumption and exports in total domestic production ($C_1 + e_1$). The elasticities in (19) bear the following relationship to one another:

$$(20) \quad \eta_\omega < \eta_e^* \text{ if and only if } \eta_d < \eta_e^*.$$

Given the assumption that η_e^* is a constant, it then follows from (17) that the marketing board's profit-maximizing distortion between p^* and MRT is greater than the socially optimal distortion if and only if $\eta_d < \eta_e^*$ (domestic demand is less elastic than foreign excess demand).

Figure II shows the case in which $\eta_d \leq \eta_e^*$. S and S' continue to denote the SW production and consumption levels while N and N' denote the MN production and consumption levels. N' involves a tangency between a domestic indifference curve and the world price ratio by virtue of the constraint $p=p^*$. In order to see that the production of X at N must be less than production at S, consider first the case in which $\eta_d = \eta_e^*$, so that the desired distortion between the world price ratio and the MRT is the same in the MN equilibrium as in the SW equilibrium.

Suppose initially that the marketing board attempted to produce at S, and at the world price ratio joining S and S'. Since domestic consumers are able to consume at the world price ratio in the MN equilibrium,

point S' cannot be the consumer's equilibrium. Consumers will move to a point above S' where an indifference curve is tangent to the price ratio through S and S' . But this involves a higher import demand relative to S' and, given our assumptions about foreign demand, leads to a deterioration in the terms of trade. This leaves the "wedge" between p^* and $-F'$ smaller than the desired wedge as given in (17). Production must move to a point like N in order to lower $-F'$, improve the terms of trade, and thus re-establish the optimal distortion. The same movement up the production frontier from S will occur when $\eta_d < \eta_e^*$ by virtue of the fact that the desired distortion must exceed the SW distortion at S . A necessary but not sufficient condition for X to be higher at the MN equilibrium relative to S is that $\eta_d > \eta_e^*$.⁵

While the relation between η_d and η_e is an empirical matter, the case presented in Figure II ($\eta_d \leq \eta_e^*$) may be the most relevant for two reasons. First, the domestic market may be small relative to the world market. Second, η_e^* is an excess demand elasticity while η_d is a simple demand elasticity. η_e^* thus embodies a supply response which compliments the demand response (a price increase reduces foreign demand and increases foreign supply).

Finally, note that the MN board does not necessarily lead to a deterioration in the terms of trade relative to the SW equilibrium as is the case in Figure II. With domestic demand quite inelastic, Figure II could easily be redrawn with the price ratio connecting N and N' steeper than the price ratio connecting S and S' .

IV. Marketing Board - Price Discrimination Permitted

Now consider the case in which the marketing board is free to charge different prices to domestic and foreign customers. Since this will once again imply that the domestic price will not equal the domestic MRT, it will not result in a social welfare optimum. The marketing board's problem is given as follows:

$$(20) \quad \text{Maximize } \pi = pC_1 + p^*e_1 - C(X_1), \quad X_1 = C_1 + e_1$$

Differentiating, we have

$$\begin{aligned} (21) \quad d\pi &= pdC_1 + C_1dp + p^*de_1 + e_1dp^* + F'dX_1 \text{ and from (7),} \\ &= (p+F')(D_p dp + D_y dy) + C_1dp + (p^*+F')E_p dp^* + e_1dp^* \\ &= (pT)(D_p dp + D_y dy) + C_1dp + (p^*\theta E_p + e_1)dp^* \end{aligned}$$

the change in income dy , is given in (10).

$$\begin{aligned} (22) \quad dy &= (pT)dX_1 + (p^*\theta - pT)E_p dp^* + e_1dp^* \\ &= (pT)(dX_1 - E_p dp^*) + (p^*\theta E_p + e_1)dp^* \text{ and from (7),} \\ &= (pT)(E_p dp^* + D_p dp + D_y dy - E_p dp^*) + (p^*\theta E_p + e_1)dp^* \\ &= (pT)(D_p dp + D_y dy) + (p^*\theta E_p + e_1)dp^*. \end{aligned}$$

Solving out for dy , (22) becomes

$$\begin{aligned} (23) \quad dy &= (1-pTD_y)^{-1}(pTD_p)dp + (1-pTD_y)^{-1}(p^*\theta E_p + e_1)dp^* \\ &= Bdp + (1-pTD_y)^{-1}(p^*\theta E_p + e_1)dp^*. \end{aligned}$$

Equation (23) is not the same as (15) by virtue of the fact that $t \neq \theta$ and $dp \neq dp^*$. Substituting (23) into (21), we have

$$(24) \quad d\pi = (pT)(D_p + D_y B)dp + C_1dp + (1+(1-pTD_y)^{-1})(p^*\theta E_p + e_1)dp^*$$

Setting (24) equal to zero for all differentials dp and dp^* gives the optimal domestic and foreign distortions.

$$(25) \quad \theta = - \frac{e_1}{p^* E_p} = 1/\eta_e^*, \quad T = - \frac{C_1}{p(D_p + D_y B)} = 1/\eta_d$$

The profit maximizing value of θ is thus the same as the SW value, assumed to be a constant. The profit-maximizing domestic distortion is equal to $1/\eta_d$, where η_d takes on a somewhat different formula than η_d in equation (19) (A≠B). Due to the fact that $p=p^*$ in one case but not in the other, the income effect of a change in p is not the same in the two cases. This difference is however of no qualitative importance.

Figure III shows the MD equilibrium production and consumption points D and D' in relation to the SW equilibrium levels S and S'. In the present case, D must involve a lower level of X production relative to S regardless of the relationship between η_d and η_e^* . As noted in (25), the MD distortion between p^* and $-F'$ is the same as the SW distortion given the assumption that η_e^* is a constant. But if the marketing board were to produce at S, consumers would not be in equilibrium at S' since (25) requires $p > -F'$ while $p = -F'$ at S. Consumers would move to a point above S' and thereby deteriorate the terms of trade. This deterioration would reduce the wedge between p^* and $-F'$ and would require the marketing board to move to a production point like D in order to restore the wedge to its profit maximizing level.

The particular consumer equilibrium shown in Figure III is the case in which $\eta_d < \eta_e^*$. In such a situation $T > \theta$ and $p > p^*$ as shown in (25). In the chance case that $\eta_d = \eta_e^*$, $p = p^*$ and Figure III would be drawn identical to Figure II.

Before moving to the next case it might be important to note that either the MN or MD equilibria may involve a level of welfare which is lower than the free trade welfare level. This possibility is, I think, implicit in the work of Melvin (1970), Markusen and Melvin (1981), and Markusen (1980b). The possibility can in fact be proved for the MD

equilibrium by considering the case in which $\eta_e^* = \infty$, so that the optimal export tax is zero (free trade is the social welfare optimum). In this case, the MD equilibrium will involve a domestic distortion as shown in (25) (θ will however be zero). It in fact follows from Melvin (1970) that this MD equilibrium may involve a level of welfare which is below the autarky level.

FIGURE III

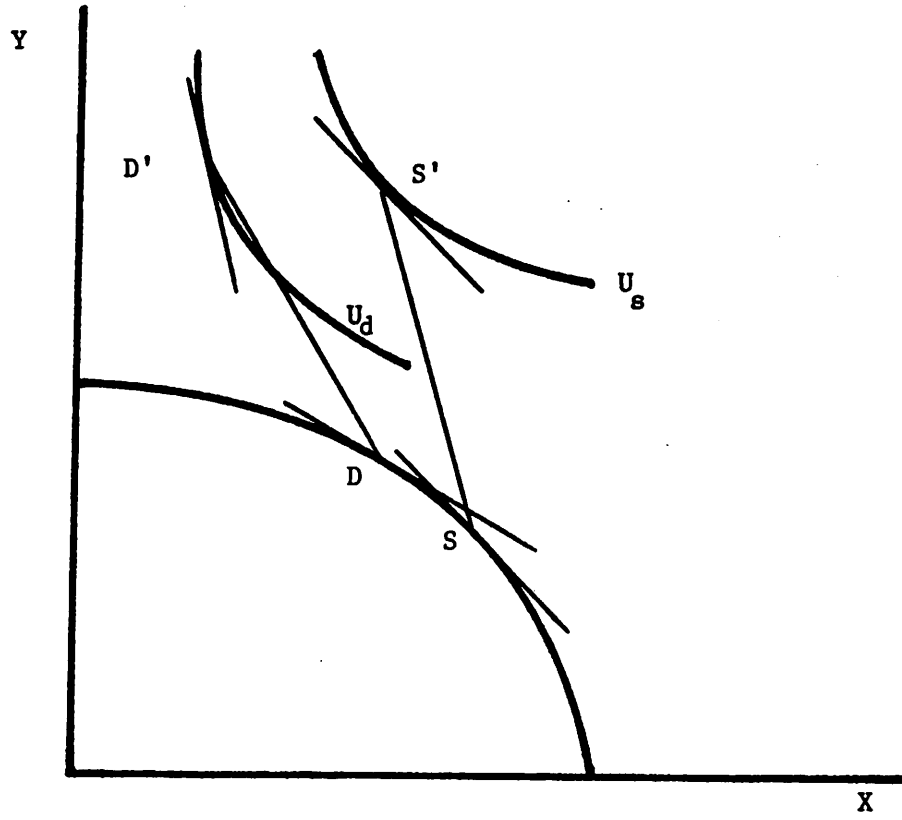
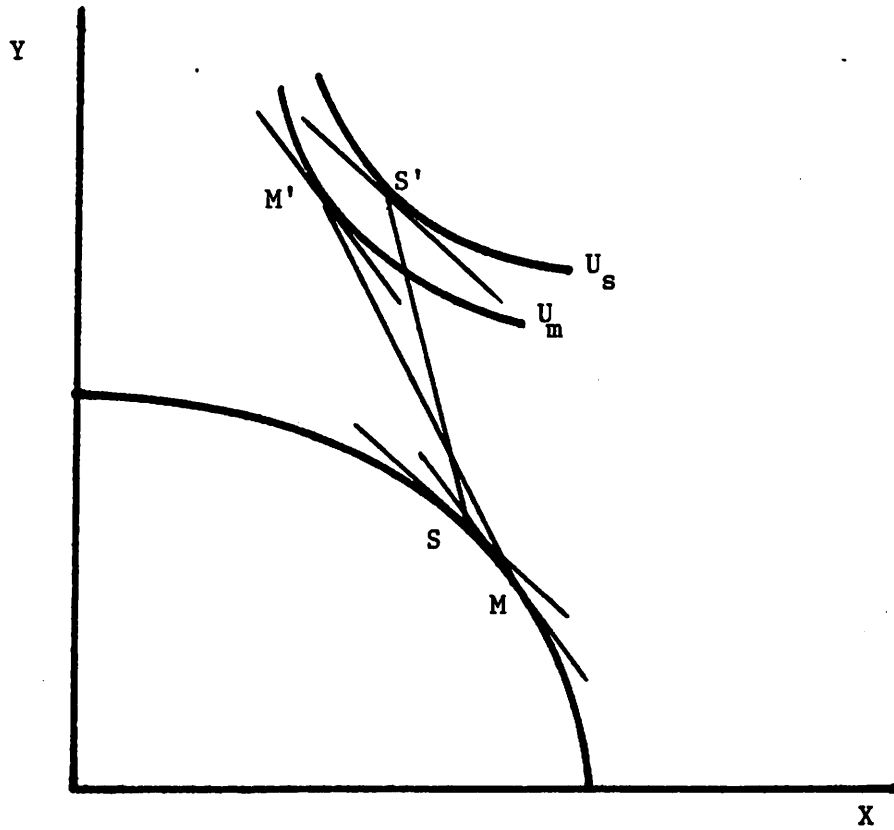


FIGURE IV



V. Marketing Board - Domestic Marginal-Cost Pricing

Finally we will consider the case in which the marketing board faces a domestic marginal-cost pricing constraint. As noted above, this constraint could be due to government regulation or to domestic competition among producers; that is, the marketing board controls only foreign sales. The marketing board's programming problem is now given as follows:

$$(26) \quad \text{Maximize } \pi = pC_1 + p^*C_1 - C(X) \text{ subject to } p = -F'.$$

Differentiating, we have

$$\begin{aligned} (27) \quad d\pi &= p dC_1 + C_1 dp + p^* de_1 + e_1 dp^* + F' dX_1 \\ &= p D_p dp + p D_y dy + C_1 dp + p^* E_p dp^* + e_1 dp^* \\ &\quad + F' D_p dp + F' d_y dy + F' E_p dp^* \\ &= C_1 dp + (p^* + F') E_p dp^* + e_1 dp^* \quad \text{Since } p = -F'. \\ &= C_1 dp + (p^* \theta E_p + e_1) dp^*. \end{aligned}$$

From this last line of (27), we see that profits will not be maximized by simply setting $\theta = 1/\eta_e^*$, and thus the profit maximizing solution will not be the social optimum. With T constrained to equal zero, dy is given in (10).

$$(28) \quad dy = (p^* \theta E_p + e_1) dp^*.$$

Since $p = -F'$, dC_1 and dX_1 are given as follows:

$$(29) \quad dC_1 = D_p dp + D_y dy, \quad dX_1 = (-F'')^{-1} dp.$$

Subtracting dC_1 from dX_1 , we have

$$(30) \quad de_1 = [(-F'')^{-1} - D_p] dp - D_y dy.$$

Inverting (30) gives us an expression for dp.

$$\begin{aligned} (31) \quad dp &= [(-F'')^{-1} - D_p]^{-1} de_1 + D_y [(-F'')^{-1} - D_p]^{-1} dy \\ &= G de_1 + D_y G dy. \quad G > 0. \end{aligned}$$

G is strictly positive by virtue of the facts that the production set is strictly convex ($F'' < 0$) and that G is a decreasing function of price, real income held constant ($D_p < 0$). Substituting the expression for dy in (28) into (31), and then substituting the resulting expression for dp into (27), we have

$$(32) \quad d\pi = C_1 G de_1 + C_1 D_y G (p^* \theta E_p + e_1) dp^* + (p^* \theta E_p + e_1) dp^*.$$

Substituting for de_1 , (32) becomes

$$(33) \quad d\pi = C_1 G E_p dp^* + (1 + C_1 G D_y) (p^* \theta E_p + e_1) dp^*.$$

Setting $d\pi$ equal to zero, we have

$$(31) \quad (p^* \theta E_p + e_1) = - \frac{C_1 G E_p}{(1 + C_1 G D_y)} > 0$$

Equation (31) is positive by virtue of the fact that $E_p < 0$ while $G, C_1 > 0$. (31) implies the following:

$$(32) \quad \theta < - \frac{e_1}{p^* E_p} = 1/\eta_e^*.$$

In the MM case, the profit-maximizing wedge between p^* and $(-F')$ is thus smaller than the socially optimal wedge. The MM equilibrium production and consumption levels are shown by points M and M' respectively in Figure IV. With $p = -F'$ as shown, M must involve a higher level of X production than the production level at S , the SW equilibrium. Indeed, M must lie somewhere between the SW equilibrium and the free trade production point A in Figure I. (θ could not be negative since this would involve negative profits given constant returns in X and competitive factor markets. Producers could always realize zero profits by producing at A .) Similarly, the social welfare level at the MM equilibrium must lie between the social optimum and free trade welfare levels.

The intuition as to why the MM equilibrium is not identical to the SW can be seen by referring back to equation (27). With $\theta = 1/\eta_e^*$, profits

would be optimized with respect to world prices, and from this point of view a small change in θ would result in zero change in profits. However, a small decrease in θ from its SW level increases the domestic price of the export good ($dp > 0$) as per the usual restrictions we have imposed on elasticities ($E_p < 0$ is sufficient for this result). This small improvement in p increases the domestic component of the board's profits by $C_1 dp$ without affecting foreign profits. Thus the marketing board should maintain a distortion somewhat smaller than the welfare maximizing distortion found by solving (28). In fact, subtracting (28) from (29), at a common value of θ shows that $(d\pi - dy) = C_1 dp$. Profits are maximized at a higher domestic price (and lower world price) for the export good than the social welfare maximizing price.

As a final point, note that both the MD equilibrium in Figure III and the MM equilibrium in Figure IV involve a world price ratio less than the world price ratio at the SW equilibrium. The former occurs since the wedge between p^* and $-F'$ is the same at D and S (Figure III) and $-F'$ is smaller at D than at S. Since foreign welfare is a monotonically decreasing function of p^* , foreigners are thus unambiguously better off with the MD and MM boards than with an optimal export tax.

VI. Retaliation and Collusion

The purpose of this section is to very briefly consider the implications of two countries engaging in the type of behavior modelled above. Suppose for example that both countries have MM-type marketing boards such there is only the single distortion between p^* and the MRT in each country. In this case, it follows from Jones (1967), Markusen and Melvin (1979), and Markusen (1981) that the foreign offer surface can be specified as follows:

$$(33) \quad e_1 = E(p^*, \theta^*), \quad E_p < 0, \quad E_\theta < 0,$$

where θ^* is the foreigner's export tax (or import tariff). The signs of E_p and E_θ follow from the assumption that it is never rational to operate on the inelastic section of the foreigner's offer curve.

In Cournot-Nash behavior of the type modelled by Johnson (1954) and Gorman (1958), each country optimizes with respect to p^* while viewing the other country's distortion as fixed. The resulting equilibrium involves a lower world real income but not necessarily a lower real income for both countries relative to free trade (Johnson (1954), Markusen (1981)).

It is an implication of the previous section that an MM marketing board will impose a smaller distortion for any level of the foreign distortion relative to the optimal export tax, given constant elasticity offer surfaces and Cournot-Nash behavior. It then follows directly from Gorman, Johnson and Markusen that the values of θ and θ^* characterizing the Cournot-Nash MM equilibrium will both be lower than the corresponding values of θ and θ^* characterizing the Cournot-Nash SW equilibrium. This in turn implies that the Cournot-Nash MM equilibrium involves a higher level of world real income relative to the Cournot-Nash SW equilibrium⁶.

One reaches the opposite conclusions by comparing two marketing boards that behave in a collusive fashion relative to two governments which "collude". Two marketing boards maximizing their joint profits will in general impose some distortions on the system. Two governments colluding to maximize joint welfare will achieve a Pareto optimal allocation (either free trade or free trade plus some transfer payment). Thus the choice between export taxes and marketing boards in an interdependent, two-country setting depends in part on behavioral assumptions.

VII. Summary and Conclusions

The purpose of this paper was to compare on efficiency grounds a profit-maximizing marketing board with the more traditional notion of an optimal export tax. Three versions of the marketing board problem were considered:

- A. the board could not price discriminate between domestic and foreign customers (the MN board),
- B. price discrimination was permitted (the MD board), and
- C. for reasons of government regulation or domestic competition the board was constrained by domestic, marginal-cost pricing (the MM board).

It was shown that all three marketing board equilibria produced a level of welfare less than the social optimum level. Perhaps more worrying is the fact that only the domestic marginal-cost-pricing case is assured of producing a welfare level which is equal to or greater than the free-trade level of welfare. The most (and perhaps only) surprising result here is that the MM board is not equivalent to the optimal export tax. Despite the domestic marginal-cost pricing constraint, a profit-maximizing as opposed to a welfare maximizing agent finds it in his interests to distort domestic prices.

Regarding the level of production of the export good, it was shown that the MM equilibrium involved production in excess of the welfare optimum level while the MD equilibrium involved a level less than the optimum level. The MN equilibrium could go either way, but a sufficient condition for production to be less than the optimum level is that domestic demand be less elastic than foreign excess demand.

One implication of these different production levels involves foreign welfare. We were able to show that the MD and MM equilibria involved lower prices for the domestic export good and thus a higher level of foreign welfare relative to the SW equilibrium. The MD and MM boards thus in a sense transfer income abroad relative to the optimal export tax. The MN board may on the other hand possibly increase the relative price of the domestic export good and thus deteriorate the welfare of both countries relative to the SW optimum.

The paper concludes with a brief discussion about retaliation and collusion in a two-country setting. Given Cournot-Nash behaviour, it was argued that two MM marketing boards would in fact produce a level of world welfare higher than that produced by the retaliatory imposition of export taxes. Collusive behaviour would on the other hand lead two marketing boards to a solution inferior to that achieved by two "collusive" or cooperative governments.

The case of Cournot-Nash retaliation aside, the policy implication seems to be that marketing boards are at best a second-best policy option. I say "at best" because the MN and MD type boards can in fact prove inferior to unilateral free trade. Suppose we then adopt a "mini-max" attitude of asking what is the worst possible outcome in each of the relevant cases. The export tax is clearly the first-best option, while the MM board is unambiguously the second-best choice. Unilaterally free trade comes third in the ranking, while the MN and MD marketing boards finish in fourth place.

FOOTNOTES

¹Recent papers by Auquier and Caves (1979), Fishelson and Hillman (1979), and Brander (1980) consider closely related normative issues. The first two papers consider the optimal tariff policy for a given degree of domestic monopoly power while Brander analyzes commercial policy in the presence of foreign monopoly power. The positive questions considered in the present paper are in particular closely related to several of the normative issues considered by Auquier and Caves. Analogies between the two papers will be offered from time to time.

²The MN and MD equilibria are analogous to the case and considered by Auquier and Caves where there exists a single monopolist producing the export good. Both the discriminating and non-discriminating versions are considered. They do not however, consider an equivalent of the present MM equilibrium.

³This type of result really goes back to Bhagwati and Ramaswami (1963) and Bhagwati (1971) and represents a simple example of the theory of distortions or the theory of the second best: removing one distortion (barriers to trade) in the presence of other distortions (domestic monopoly power) may not improve welfare. Melvin (1970) demonstrates a similar result in the presence of domestic commodity taxes.

⁴This indeterminacy is reflected in the results of Auquier and Caves who note that the sign of the optimal export tax in the presence of a non-discriminating domestic monopolist is indeterminate. In their case as in ours, the result turns on the elasticity of domestic demand relative to the elasticity of foreign excess demand.

⁵This finding is consistent with that of Auquier and Caves for the case of the non-discriminating monopolist. They note that if foreign demand is more elastic than domestic demand, then the optimal export tax is a subsidy while if domestic demand is more elastic, then the optimal tax may be of either sign.

⁶By higher level of "world real income" I mean a world consumption bundle (and price ratio) which is revealed preferred to alternate consumption bundles (see Markusen (1980b)).

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