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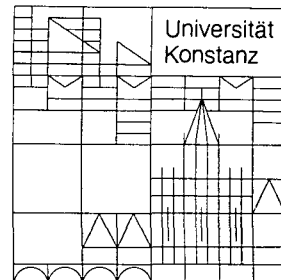
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wissenschaften und Statistik


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in a Model of Multibehavioural Trade**

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MULTIBEHAVIOURAL TRADE

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THE EXPORTING MONOPOLIST IN A MODEL OF MULTIBEHAVIOURAL TRADE

by

Emmanuel S. de Dios*

Both as a cause and consequence of the debt-crisis, large corporations in many developing countries have become heavily indebted to their home-governments, if they have not been entirely taken over. In some cases this situation has arisen ex post, as governments were compelled to assume private obligations in the course of overall debt-renegotiations. In others the process began earlier upon the initiative of governments themselves, which wisely or wrongly took out sovereign debt and lent these on to the local private sector through parastatal financial institutions. It is known that in a few countries, the allocation of credit by such financial institutions has proceeded according to criteria which were highly questionable, to say the least. (For the example of the Philippines, see de Dios (1984, 1987).)

A question validly raised is whether such large changes in the financial structure of these firms operating in both domestic and international product markets have any effect on their behaviour. Now it is a well-known concern of the recent principal-agent literature on the firm (e.g. Jensen and Meckling (1976) or Fama (1980)) that the dichotomy between security ownership and control of the firm may lead to incentive-compatibility problems in which, without further assumptions, the interests of owners and managers do not coincide. Indeed the interest of this "new" view of the firm is to investigate what mechanisms might possibly set limits to managerial discretion and

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mitigate the principal-agent problem, which is the basic starting point. This outlook, in which profit-maximising behaviour is regarded not as a universal assumption but a result demonstrable under particular circumstances, is really a development of the earlier behaviourist literature (e.g. Berle and Means (1932), Simon (1959), Baumol (1959), Encarnación (1964) and Williamson (1964)). It was this earlier strain which first observed that, owing to divergent interests within the firm, it was not self-evident that profit-maximisation would be the norm.

In the typical cases we are concerned with, moreover, the incentive-compatibility problem is worsened, if anything, since the "principal" is the government itself or some parastatal entity, presumably facing its own problems of accountability. This leads one to suppose an even weaker assertion of owner-interests within the highly-leveraged firm than if this were indebted to a private entity. On the other hand, the magnitude of government exposure to such firms and their typically large size relative to the economy encourages these firms to ask for, and the government to grant, protection and privileges (e.g. higher tariffs or import bans, subsidised credit, and fiscal credits). This tendency is stronger if granting protection allows the reduction of net lending by government to such firms and, hence, the narrowing of budget deficits.

On the part of the agents, the incentive to maximise revenue rather than profits becomes attractive when various privileges from government (e.g. credit, apart from the usual perquisites) attach to size variables such as employment or market-share. In the extreme, the profits arising from the firm's operations may represent only an incidental byproduct of the benefits obtained from running a business.

Following Baumol (1959), Encarnación (1964) and Williamson (1964), we postulate that managers behave so as to maximise some utility, U , which for simplicity we take to be a function of income, Y , i.e., $U = u(Y)$, with $u'(Y) > 0$. Y in turn consists of a managerial fee or salary, w , and perquisites, e . In this one-period model, w is taken to be constant while e is an increasing function of a scale-variable, S , such as total sales. The possibility of dismissal is the only form of control allowed the principals in this simple model (a not unreasonable assumption, considering the imperfect monitoring exercised by government agencies). Dismissal is depicted as a discontinuity, so that w and e are identically zero if profits Π should fall below some threshold level Π^0 set by the principals. We therefore have the following description of the functions w and e :

$$e(S, \Pi, \Pi^0) = \begin{cases} f(S) & \text{for } \Pi \geq \Pi^0, f'(S) > 0 \\ 0 & \text{otherwise} \end{cases} \quad w(\Pi, \Pi^0) = \begin{cases} \bar{w} & \text{a constant, for } \Pi \geq \Pi^0 \\ 0 & \text{otherwise} \end{cases}$$

These considerations serve to motivate discussion of the case where the firm behaves so as to maximise profits but some scale variable such as sales, subject to profits not falling below some minimum level. For it is fairly evident that under the above specification the utility of managers will be maximised when both w and e are positive-valued, and when S is set as high as possible.

In their survey of positive trade theory, Jones and Neary (1984:45) introduce the phrase "multibehavioural trade" to refer to "departures from purely competitive behaviour". The investigation that follows may be classed aptly under that heading as well, although Jones and Neary hardly mention models which drop the profit-maximising assumption. The relevant question is what the consequences on trade might be of changing the firm's objective

function along lines suggested by the principal-agent approach. The rest of the paper is organised as follows. The first part is a recapitulation of known results for the exporting monopolist under the profit-maximisation assumption, which serves to provide a basis of comparison. The second section examines the case of the sales-maximising firm, contrasting the equilibria attained in the two regimes. The third section is concerned with comparative-static results, while the last contains a general discussion.

Consider the situation where the relevant firm is a monopolist at home but a price-taker abroad. Let the domestic demand function be given by $p_1 = f(x_1)$, where x_1 and p_1 stand for domestic output and price relevant to the monopolist, respectively. Let x_2 represent output exported and p_2 the fixed export price received by the firm. For simplicity, assume that costs are commonly shared by domestic and exported output through a cost function $c(x)$, where $x = x_1 + x_2$.

1. The profit-maximising firm. If the domestic monopolist is a profit-maximiser and is able to segregate home and world markets owing to the existence of some import-barrier, e.g. a prohibitive tariff or quota, then it would face the single-period problem given by:

$$\begin{aligned}\max \Pi &= x_1 f(x_1) + p_2 x_2 - c(x) \\ &= R(x_1) + p_2 x_2 - c(x)\end{aligned}\tag{1}$$

where $R(x_1) = x_1 f(x_1)$ is the domestic revenue function, with $R'(x_1) > 0$, $R''(x_1) < 0$ assumed to hold for the relevant range. An interior solution to problem (1) yields the following first-order conditions:

$$R'(x_1) = c'(x) \tag{2a}$$

$$p_2 = c'(x) \tag{2b}$$

$$\text{which, together, imply that } R'(x_1) = p_2 = c'(x) \tag{3}$$

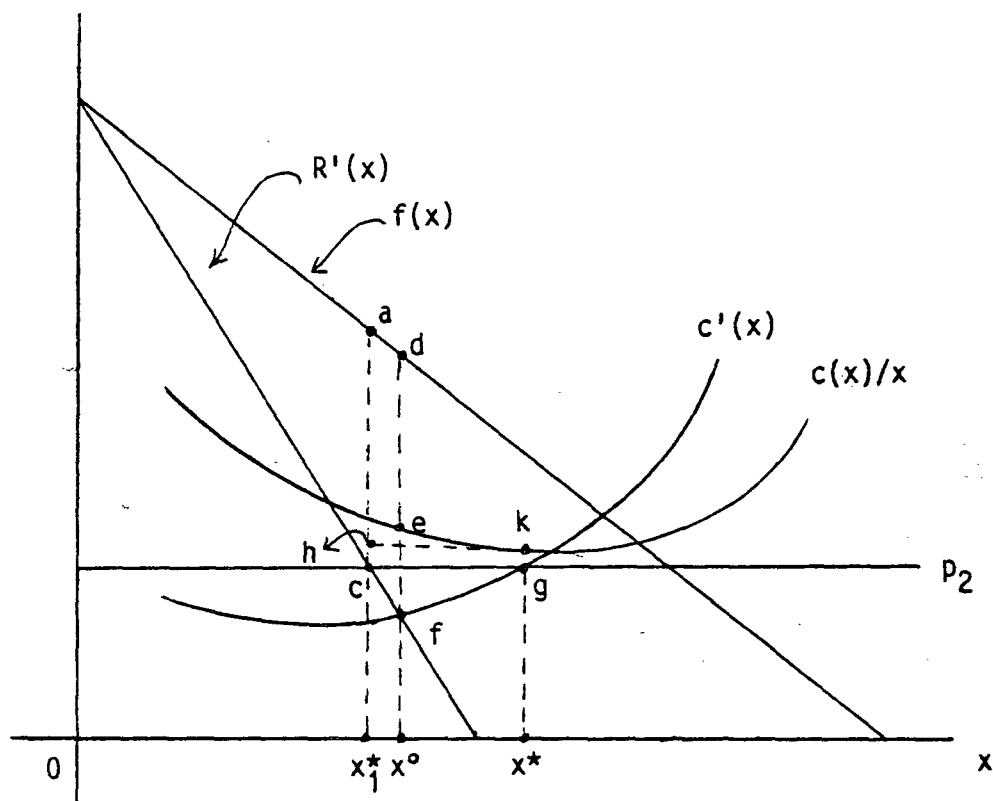


Figure 1

The figure shows the equilibria for the profit-maximising monopolist before and after exports become possible.

Before exports, total output is equal to output sold on the domestic market, i.e. x^0 , and profits are x^0 multiplied by de . Upon exporting, domestic output falls to x_1^* , arrived at as the point where marginal revenue equals the world price, and total output is x^* , arrived at where marginal cost equals world price (points c and g , respectively). Now profits are equal to x_1^* times ha on the domestic market (where $ha = kg$), while losses equal kg multiplied by $x^* - x_1^*$ ($= x_2^*$) on exports. It is seen that total profits have increased, since the losses incurred on the export market are compensated for by higher domestic profits. This occurs despite the situation depicted in the figure where the world price is below average cost. The proposition holds a fortiori when p_2 exceeds average cost.

The same problem was first described by Basevi (1970) and Pomfret (1975), with the latter using L-shaped cost curves.

The second order conditions require that

$$R''(x_1) - c''(x) < 0 \quad (4a)$$

$$\{R''(x_1) - c''(x)\} \{-c''(x)\} - c''(x)^2 > 0 \quad (4b)$$

(4b) may be rewritten as $-R''(x_1)c''(x) > 0$. A sufficient condition for fulfilling these is if $c''(x) > 0$ in the relevant range.

The first-order conditions require the monopolist to equate domestic marginal revenue to marginal cost and both to world price. This is a simple application of the discriminating-monopolist rule, which states that marginal revenue in different markets should be equated to common marginal cost. In this instance, however, a special interest attaches to the world price, since it is the parameter for the firm's decision. Upon closer inspection, p_2 is sufficient to determine total output by condition (2b), since it requires the firm to operate at that point on its total cost curve where marginal revenue equals world price. Given total output from (2b), condition (2a) then determines its division into home and export sales. A simple illustration of the case is given in Figure 1. The second-order conditions require among other things that marginal cost be rising at the exporting equilibrium.

Basevi (1970) argued some time ago that for exports to be positive, a necessary condition is that the world price exceed the marginal cost (= marginal revenue) at the equilibrium for a purely domestic monopoly. It is not necessary (as the example in Figure 1 shows) that world price cover average cost at the exporting equilibrium. More formally, we show that:

P.1 If x^0 solves the problem, $\max R(x) - c(x)$, while $x^* = x_1^* + x_2^*$ solves the problem, $\max R(x_1) + p_2 x_2 - c(x)$, with $c(x)$ monotonically increasing between x^0 and x^* , then for $x_2^* > 0$, it is necessary and sufficient that $p_2 > R'(x^0)$.

Proof. To show necessity, suppose it were otherwise, i.e.

$p_2 \leq R'(x^0)$. Then, since the exporting equilibrium requires $R'(x_1^*) = p_2$, this would imply $R'(x^0) \geq R'(x_1^*)$, and since $R'' < 0$ by assumption, one would have $x^0 \leq x_1^*$. Furthermore, since $x_2^* > 0$ by hypothesis, it follows that $x^* = x_1^* + x_2^* > x^0$, or that total output should expand.

On the other hand, since we also require $p_2 = c'(x^*)$ and $R'(x^0) = c'(x^0)$ for the exporting and domestic equilibria, respectively, $p_2 \leq R'(x^0)$ implies $c'(x^*) \leq c'(x^0)$. And since $c'' > 0$ in the relevant range, one concludes that $x^0 \geq x^*$, which contradicts the earlier conclusion that output should expand under the exporting equilibrium.

To show sufficiency, it is enough to show that the export equilibrium is preferred to pure domestic monopoly when $p_2 > R'(x^0)$, which occurs when profits $\Pi^*(x^*) > \Pi^0(x^0)$. Having shown the necessity for $p_2 > R'(x^0)$, it is not difficult to show that this implies total output must expand but that the domestic sales must fall in the export equilibrium, i.e., that $x_1^* < x^0 < x^*$. Thus we may write out profits as follows:

$$\Pi^0 = \int_0^{x_1^*} \{R'(x) - c'(x)\}dx + \int_{x_1^*}^{x^0} \{R'(x) - c'(x)\}dx \quad (5)$$

$$\begin{aligned} \Pi^* = \int_0^{x_1^*} \{R'(x) - c'(x)\}dx &+ \int_{x_1^*}^{x^0} \{p_2 - c'(x)\}dx \\ &+ \int_{x^0}^{x^*} \{p_2 - c'(x)\}dx \end{aligned} \quad (6)$$

Now expression (6) is greater than (5): since the first term is common to both, we only need to show that the last two terms of (6) are greater than the last term of (5). Since $p_2 = R'(x_1^*)$ and $R'' < 0$ by assumption, $p_2 > R'(x)$ for all $x > x_1^*$. This means the second term of (5) is less than the second term of (6). Finally, since $p_2 = c'(x^*)$ and $c'' > 0$ between x_1^* and x^* ,

$p_2 > c'(x)$ over that interval, and the last term of (6) is positive. Thus we have shown that $\Pi^* > \Pi^0$, when $p_2 > R'(x^0)$. This completes the proof.

To summarise what was essential in the previous proposition, we state the following corollary:

C.1 Under the stated curvature assumptions (i.e., $R' > 0$, $R'' < 0$, $c' > 0$, $c'' > 0$ in the relevant range), domestic output is less under the exporting equilibrium than under pure domestic monopoly, domestic price is higher, profits are higher, and total output is greater.

What is significant in this discussion is that domestic output tends to be further removed from what is optimal once exports are introduced or made possible. The equality between the given world price and marginal cost, it is true, implies that total output is equal to what would prevail under competitive conditions. This is misallocated, however, as between the home and foreign markets. Indeed the exploitation of the home market through the monopoly may subsidise exports at prices which do not cover average costs (i.e. export losses being covered by domestic monopoly profits).

2. Sales-maximising monopolist. As a comparison, let us now suppose the firm is a sales-maximising monopolist, facing essentially the same conditions in the previous section. In addition we follow Baumol's hypothesis that the firm maximises sales subject to a minimum profit level, call it Π_0 , below which the firm acts as a profit-maximiser. Writing sales as $S = R(x_1) + p_2 x_2$, the one-period problem is given by:

$$\begin{aligned} \max \quad S &= R(x_1) + p_2 x_2 \\ \text{s.t.} \quad R(x_1) + p_2 x_2 - c(x) &\geq \Pi_0 \end{aligned}$$

If L is the Lagrangean function associated with problem (7), and λ is the multiplier associated with the profit-constraint, then the Kuhn-Tucker conditions for a maximum require that $L_1, L_2 \leq 0$; $x_1, x_2 \geq 0$; $L_\lambda \geq 0$; $\lambda \geq 0$ (where L_1, L_2 , and L_λ are the partials of L with respect to x_1, x_2 , and λ , respectively), with the following complementary slackness conditions:

$$\{R'(x_1) + \lambda R'(x_1) - \lambda c'(x)\}x_1 = 0 \quad (8)$$

$$\{p_2 + \lambda p_2 - \lambda c'(x)\}x_2 = 0 \quad (9)$$

$$\{R(x_1) + p_2 x_2 - c(x) - \Pi_0\}\lambda = 0 \quad (10)$$

From these we may obtain the following result:

P.2 If (x_1^*, x_2^*) represents the profit-maximising solution, and (\bar{x}_1, \bar{x}_2) is the sales-maximising solution to the problem of domestic monopoly facing competitive foreign markets, then if the profit-constraint is binding:

- (a) $\bar{x}_1 = x_1^*$. The sales-maximising domestic output is equal to the profit-maximising level (hence domestic price is also the same);
- (b) costs are not being minimised under sales maximisation;
- (c) $\bar{x}_2 > x_2^*$. The level of exports under sales- is higher than under profits-maximisation;
- (d) $\bar{x} > x^*$. Total output is greater under sales-maximisation.

Proof. To (a): If the profit-constraint is binding, i.e. $\lambda > 0$, then from (8) and (9) above we obtain $(1 + \lambda)R'(\bar{x}_1) = c'(x) = (1 + \lambda)p_2$, from which, $R'(\bar{x}_1) = p_2$. This fixes the level of domestic sales and coincides with that level set under profit-maximisation. (See the first equality in (3) above.)

To (b): Costs are not being minimised for the level of output produced, since $R'(\bar{x}_1) = p_2 = \{1/(1 + \lambda)\}c'(\bar{x})$, with $\lambda > 0$, implies that $c'(\bar{x}) > R'(\bar{x}_1), p_2$.

To (c): This will have been shown if, together with (a), we are able to prove (d), since exports are simply the residual of total output once domestic sales are determined. Thus, if total output is higher while domestic sales remain the same, exports will have increased. Hence we now turn,

To (d): As we already know from (3), the profit-maximiser sets $p_2 = c'(x^*)$, while as discussed in the proof to (b), the sales-maximiser acts so that $p_2 < c'(\bar{x})$. Hence we have $c'(x^*) < c'(\bar{x})$. But since $c'' > 0$ by assumption, $\bar{x} > x^*$, as was to be shown.

In comparison with the profit-maximising situation, then, the sales-maximising equilibrium represents a further movement away from the competitive level of output. The degree to which the domestic market is exploited monopolistically is not diminished, while the "overexpansion" of exports associated with the profit-maximising monopoly is, if anything, carried further.^{1/}

Such results may be worth bearing in mind in view of the tendency of many developing-country governments (undoubtedly less sensitive to the finer points of neoclassical literature) to focus on export performance as a criterion of economic achievement (and sometimes even welfare) without reference to the prevailing industrial structure within the country. The foregoing suggests that without further qualification, an expansion of exports may just as easily be associated with a welfare-reduction as an improvement.

The cost of such export-promotion is not to be found in any direct subsidy (which may enhance its attractiveness to policy-makers) but lies in the monopoly profits extracted from consumers. The latter may be

traced, in turn, to power conferred upon the monopolist (e.g. through some tariff or quota) to segregate domestic and foreign markets. We now proceed to inquire into the effects of changes in the level of protection (on final output in the domestic market) on variables of interest.

3. Changes in the level of protection. We have hitherto assumed that the level of protection to the home market afforded was such that for both cases (i.e. profit- or sales- maximisation) the domestic price could be set independently by the monopolist. This occurs if the tariff set (or tariff-equivalent in the case of a quota) is such that the resulting price is above what the monopolist would have charged.

If this is not the case, however, then the stipulated domestic price (inclusive of the tariff) sets an upper-bound to the monopolistic price, and we may inquire into the changes effected by variations in that stipulated price.

Take first the case of the profit-maximising monopolist. Calling the tariff-inclusive price p_z , the monopolist's problem reduces to:

$$\begin{aligned} \max \quad & \Pi = R(x_1) + p_z x_2 - c(x) \\ \text{s.t.} \quad & f(x_1) \leq p_z \end{aligned} \tag{11}$$

where one recalls that f is the inverse demand function. Again, if J is the Lagrangean of the problem, and μ is the multiplier associated with the price-constraint, the Kuhn-Tucker conditions require that $J_1, J_2 \leq 0$; $x_1, x_2 \geq 0$; $J_\mu \geq 0$; and $\mu \geq 0$, with the following complementary slackness conditions:

$$\{R'(x_1) - c'(x) - \mu f'(x_1)\}x_1 = 0 \tag{12a}$$

$$\{p_z - c'(x)\}x_2 = 0 \tag{12b}$$

$$\{p_z - f(x_1)\}\mu = 0 \tag{12c}$$

If $\mu > 0$, as assumed, then (12c) determines home sales through $f(x_1) = p_z$. On the other hand, total output (and hence also exports) is determined by (12b), namely $p_2 = c'(x_2)$. The discontinuity in the marginal revenue curve caused by the stipulated price is characterised by (12a), from which one may derive (assuming $x_1 > 0$), $R'(x_1) - c'(x) = \mu f'(x_1)$. But since $\mu > 0$ and $f' < 0$, this implies marginal cost is higher than marginal revenue. Finally, profits are given by: $p_z x_1^* + p_2 x_2^* - c(x^*)$, where $x^* = x_1^* + x_2^*$ are the optimal values for problem (11) when $\mu > 0$.

The main result for our purposes is given by the following:

P.3 If the price-constraint is initially binding, a reduction in the level of protection (i.e. a lower p_z) increases the level of domestic sales, reduces exports, and keeps total output unchanged.

Proof. Since $\mu > 0$, if p_z falls, x_1^* increases through (12b), since $f'(x_1) < 0$. On the other hand, x^* is unchanged, being fixed by $p_2 = c'(x^*)$. Hence, with total output unchanged and domestic sales increasing, exported output declines.

The same situation, from the viewpoint of the sales-maximising monopolist, would be represented by the following programme:

$$\begin{aligned} \max \quad & S = R(x_1) + p_2 x_2 \\ \text{s.t.} \quad & R(x_1) + p_2 x_2 - c(x) \geq \Pi_0 \\ & f(x_1) \leq p_z \end{aligned} \tag{13}$$

Once more, if λ and μ are the multipliers associated with the profit- and the price-constraints, respectively, the complementary slackness conditions would be given by the following:

$$\{R'(x_1) + \lambda R'(x_1) - \lambda c'(x) - \mu f'(x_1)\} x_1 = 0 \tag{14a}$$

$$\{p_2 + \lambda p_2 - \lambda c'(x)\} x_2 = 0 \quad (14b)$$

$$\{R(x_1) + p_2 x_2 - c(x)\} \lambda = 0 \quad (14c)$$

$$\{p_2 - f(x_1)\} \mu = 0. \quad (14d)$$

Concentrating on the case where both constraints are binding, i.e., $\lambda > 0$, $\mu > 0$, we obtain from (14a), $(1 + \lambda)R'(x_1) - \lambda c'(x) = \mu f'(x_1)$, and since $\mu > 0$ and $f'(x_1) < 0$:

$$(1 + \lambda)R'(x) > \lambda c'(x), \text{ or}$$

$$R'(x) < \{\lambda/(1 + \lambda)\}c'(x). \quad (15)$$

Furthermore, from (14b),

$$p_2 = \{\lambda/(1 + \lambda)\}c'(x) \quad (16)$$

which implies that $p_2 < c'(x)$. In turn, (15) and (16) imply $R'(x_1) < p_2$.

For the sales-maximising equilibrium, therefore,

$$R'(x_1) < p_2 < c'(x). \quad (17)$$

With this useful result in mind, we now state and prove the main proposition.

P.4 In the case of the sales-maximising monopolist, assuming both profit- and price-constraints are binding, a reduction in the level of protection (i.e., a lower p_2) increases domestic sales, reduces total output, and reduces exports.

Proof. Since $\mu > 0$ both before and after the change, (14d) requires that $p_2 - f(x_1) = 0$, which defines x_1 implicitly as a function of p_2 , with $\delta x_1 / \delta p_2 = 1/f'(x_1) < 0$. Therefore domestic sales rise with a fall in p_2 .

Turning now to total output, since $\lambda > 0$ both before and after the change, the level of profits must be Π_0 before and after. Hence

$$d\Pi = R'(x_1)dx_1 + p_2 dx_2 + x_2 dp_2 - c'(x)dx = 0 \quad (18)$$

where $dx = dx_1 + dx_2$. The latter relation allows us to define x implicitly

as a function of x_1 , with $(dx_2/dx_1) = (dx/dx_1) - 1$ as an identity. In view of this (and disregarding dp_2 which is equal to zero), we may divide through the second equality in (18) by dx_1 in order to obtain:

$$R'(x_1) + p_2[(\delta x/\delta x_1) - 1] - c'(x)(\delta x/\delta x_1) = 0 \quad (19)$$

Upon collecting terms and simplifying, we have

$$(\delta x/\delta x_1) = [p_2 - R'(x_1)]/[p_2 - c'(x)]. \quad (20)$$

But this is negative according to (17). Furthermore we already know that x_1 increases as p_2 falls. Therefore x must decline as p_2 is lowered, and so must x_2 . This completes the proof. 2/

4. Discussion. A comparison of P.3 and P.4 shows that the magnitude of export-reduction is greater under sales- than under profit-maximisation, although the level of domestic output in both is the same, before and after the lowering of protection. The reason, of course, is that exports under sales-maximisation were more overexpanded to begin with, and the export-reduction comes about not merely through the redistribution of a given output but as an absolute cutback in production, as well. The distinction is by no means trivial: one entails losses in employment (at least in the short run) while the other does not. The added instance that the cutbacks occur in export-production is bound not to sit well with governments which are hard-pressed for foreign exchange (and often maintain overvalued currencies to boot).

Even such a simple behavioural model (and partial equilibrium at that) may therefore go some way towards explaining the resistance to tariff-lowering programmes put up by ruling groups in many developing countries. Using the competitive-market as a norm, economic policy-advisers often find difficulty in explaining official persistence in pur-

suing what seem to be obviously "distortive" measures. Gravitating between two extremes, blame might be assigned either naively to "ignorance" or, more cynically, to the existence of "vested interests". Without necessarily contesting that the ultimate explanation may lie in either or both, this note poses a middlebrow explanation, namely the possibility that in some real sense, attempts to move towards greater competitiveness may be accompanied by unfavourable consequences which bureaucrats -- without being either stupid or corrupt -- may in their interest (qua bureaucrats) seek to avoid. In this case, the moves might involve reductions in employment and exports as a consequence (which in turn might be strongly correlated with perquisites).

This, of course, takes nothing away from any urgency of reform. On the contrary, one might validly argue that the "rationality" which is sensitive to such unfavourable consequences is overshadowed by the greater "irrationality" (economists, read "inefficiency") of the status quo in which it presumes to operate, namely one in which government is allied with and protects dominant groups. Such an argument, however, is more what one would expect from a radical and a neoclassical economist, and in any event, even the economic justification for such a "subrationality", if it exists, is a social phenomenon worth examining.

October 1987

NOTES

1/ This result contrasts with that obtained in comparing the level of output produced by profit- and sales-maximisers when these operate solely in the domestic market. When the market is purely domestic, the sales-maximiser produces a level of output that is closer to the efficient competitive level; it charges a lower price, sets marginal cost closer to price, (i.e. utilises capacity better), earns lower profits, and in short exploits its monopolistic position less than the equivalently situated profit-maximiser. An interesting outcome of the model, therefore, is that the export-opportunity induces the sales-maximiser to behave exactly like a profit-maximiser at home, although it may not be its intention to do so.

2/ One should note that the comparative-static effects contained in this proposition are all conditional upon the existence of a solution to (13) with both constraints exactly binding. Conceivably, at some point, for some p_z low enough, it may be impossible to fulfill the profit-constraint and the z problem reduces to one of profit-maximisation, in which case the direction of the changes would be as determined by Proposition 3.

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