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INTERNAL LIBERALISATION AND ENTRY IN A GENERAL EQUILIBRIUM MODEL WITH OLIGOPOLY

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Abstract: In this paper the authors set out a general equilibrium model with an oligopolistic sector. Entry is found to unambiguously reduce firm and industry profits and individual firm outputs. However, the effect of entry on industry output in the oligopolistic sector depends on whether the industry is an increasing or decreasing average cost industry and on its size in relation to the rest of the economy. Finally, the welfare effects turn out to depend crucially on whether in equilibrium returns to scale are increasing or decreasing.

Key-words: Liberalisation, Entry, General Equilibrium, Oligopoly.

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1. INTRODUCTION

The issue of the effects of entry into a market has assumed increasing importance in recent years because opening up of markets to competition has been an integral part of the debate on liberalisation in less developed countries in particular. Although the question of entry under market imperfections has been the subject of rigorous theoretical analysis within the context of partial equilibrium models, no attempt has yet been made to examine this issue in a general equilibrium framework. For a closed economy an important issue has been the convergence of a Cournot equilibrium to a perfectly competitive one as the number of firms increases to infinity (see, Frank, C. R., 1965; McManus, M., 1964; Vickery, W., 1964). While McManus questioned such a convergence, Ruffin (1971) showed that the Cournot solution does converge to the perfectly competitive one if there are no economies of scale. More recently, Novshek (1980) looked at the issue in a model with homogeneous goods while Hart (1979) considered differentiated commodities.

The other question which has been raised is the behaviour of firm and industry output due to a change in the number of firms *at the margin*. Ruffin (op.cit.) showed that under the assumptions of a Cournot equilibrium, firm output de-

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creases as entry occurs if the elasticity of the slope of the firms marginal revenue curve in equilibrium is less than the slope of the demand curve. Similarly, the *Ruffin condition* for aggregate output to increase, remain constant or decrease is that the slope of the demand curve should be greater, equal to or less than the slope of the cost curve at the point of equilibrium. Seade (1980) in a generalised oligopoly model, extended the analysis to consider the effects of entry on firm and industry profits. In particular, he questioned the 'conventional wisdom' that entry leads to a decline in firm and industry profits so that industry becomes 'more competitive'. He finds that the effects of entry on aggregate profits depends on the firms conjectures and scale economies of production in a crucial way. More recently, Agarwal and Barua (1994) have extended the analysis to a small open economy. However, in all cases the *Ruffin condition* plays an important role.

In this paper we extend the analysis to a general equilibrium framework. It is our contention that in a partial equilibrium model one cannot look at the economy wide effects of policy changes. In particular, many of the current LDCs when viewing liberalisation (entry is used here synonymously with internal liberalisation) have to keep in mind issues like maintenance of full employment. The focus of our attention will be on the marginal effects of entry on outputs, profits and welfare. Such an analysis may have important policy bearings since many developing countries often follow policies affecting only the rates (of tariffs, subsidies, or entry) rather than the complete removal of such distortions of the perfectly competitive framework. Such an approach is necessitated by economy wide resource constraints which, for example, do not allow for entry up to the point where firms' extra-normal profits are eliminated. On theoretical grounds too it has been argued that if firms face fixed costs of production, free entry may not be a socially desirable policy (see, Spence, 1976; Lancaster, 1979; Mankiew, et al., 1986). Finally, we will also allow for the 'Ford effect' where producers recognise the influence of their production decision on the demand functions of consumers. This effect has received little attention in the literature (see, however, d'Aspremont et al., 1988, who incorporate this effect in a different context). This effect was recognised but ignored in Hart (1982, 1985) who assumed 'no feedback effects'.

In the following section the basic model is presented. Section III looks at the comparative static effects of entry on profits, outputs and welfare. Finally, we conclude the paper in Section IV.

2. THE MODEL

The economy produces two goods x and Y using the single factor of production, labour. The commodity Y is homogeneous and produced under a constant returns

to-scale technology.¹ Zero profit equilibrium requires equality of marginal revenue and marginal cost so that

$$P_y = a_y w \quad (1)$$

where P_y is the price of the commodity, a_y the fixed requirement of labor per unit of output and w the wage rate. It is assumed that labor is the only factor of production whose supply is fixed. Taking labour as the numeraire commodity, $w = 1$.

The commodity x is differentiated and produced by a number of firms. Production is characterised by variable returns to scale. Let $l_i = f(x_i)$ be the minimum amount of labour required to produce the output, x_i . Since $w = 1$, $f(x_i)$ is in fact the cost function. It is assumed that the costs consist of an irreversible fixed cost component (since firms have to set up production plants) and a variable cost component which depends on the level of output. This fixed cost can be due to start up costs which are incurred before production is undertaken so that $f(0) = 0$. Alternatively, we can assume that firms face the usual quadratic average cost function so that the average costs initially decline and then increase with output and $f(0) = 0$.

We define the returns to scale parameter, θ , as the ratio of marginal cost to average cost, that is,

$$\theta = x_i f'(x_i) / f(x_i), \quad f'(x) > 0 \quad \text{for } x \geq 0 \quad (2)$$

where the prime refers to the first derivative of the function $f(\cdot)$. Here θ represents the returns to scale effect with θ greater than (equal to) (less than) 1 for decreasing (constant) (increasing) returns to scale. It is easily recognised that θ is nothing but the elasticity of total cost with respect to output. As shown later, θ plays a crucial role in the comparative statics of the next section of this paper.

Consumers preferences are represented as in Dixit and Stiglitz (1977) so that

$$U = (\sum x_j^\beta)^{\alpha/\beta} y^{(1-\alpha)}, \quad 0 < \alpha, \beta < 1 \quad (3)$$

We assume that every firm is also a consumer so that there are n identical consumers.² It is usual in models of oligopoly to assume that the profits of firms fall to zero with entry thus determining the number of firms. We have argued in the earlier section that this is not necessarily true in many LDCs as the number of firms is an exogenous policy determined variable. We assume that every consumer has an initial endowment, I . In addition, since firms may make positive profits their consumption possibilities are enhanced. In the literature this has been

¹ The sector Y could represent a small scale sector with no scale economies and made up of a large number of small firms. This, for example, is the situation in India with its large, highly competitive 'informal' sector and a relatively small group of large oligopolists catering primarily for the domestic market.

² For analytic simplicity and to maintain the symmetry of the problem, it is assumed that there is some firm producing the differentiated good which also manages the production of the Y industry in a separate facility.

referred to as the 'Ford effect' (see d'Aspremont et al., 1988). Other authors who have recognised this effect have ignored this through the 'no feedbacks' assumption (see, for example, Marschak and Selten, 1974; Hart, 1982). In our general equilibrium framework we need to explicitly recognise this effect. The budget constraint of the i th consumer is thus given by

$$\sum P_i x_i + P_y y = I + \Pi^i \quad (4)$$

where y is the consumption of the homogeneous good and Π^i the profit of the i th firm (consumer). Obviously, $\sum y = Y$, the total production of commodity Y .

A two-stage maximisation of consumers utility (see, Dixit and Stiglitz, op.cit.) gives us inverse demand functions,

$$\left. \begin{aligned} P_y &= (1 - \alpha)(I + \Pi^i)/y \\ P_i &= x_i^{\beta-1} \alpha (I + \Pi^i) / \sum x_i^{\beta} \end{aligned} \right\} \quad (5)$$

for the homogeneous and differentiated goods, respectively. Here $i = 1, \dots, n$.

The i th firm maximises profits Π^i given by

$$\Pi^i = P_i x_i - f(x_i) \quad (6)$$

It is assumed that the firms are oligopolists who take account of the actions of other firms in their profit maximisation. Following Koenker and Perry (1981) the conjectural responses of firms are approximated by

$$dx_j/dx_i = \lambda/(n-1), \quad j = i \quad (7)$$

Here $\lambda = 0$ implies firms are Cournot quantity takers while $-1 < \lambda < 0$ implies that a firm conjectures that existing firms will contract output to absorb some of its own expansion. $\lambda = -1$ implies that the total reduction in industry output (summation of the left hand side of (7)) exactly equals the unit increase in new output. We will call this 'perfect adjustment'. Finally, $\lambda > 0$ indicates that existing firms react aggressively to output increases (decreases) by increasing (decreasing) their own output. We will call this 'collusive' behaviour. Hence, (7) allows for a wide variety of firm responses to new entry into the market (see also, Seade, op. cit.). In addition (7) reflects a reasonable hypothesis that the 'strength' of oligopolistic reaction decreases with the size of the industry, n .

All firms face the same demand and cost conditions so that a potential equilibrium is a symmetric one with $P_i = p$, $x_i = x$ and $\Pi_i = \Pi$ for all i . Substituting for P_i from (5) into (6) and using (7) gives us the first order condition for a maximum in a symmetric equilibrium³

$$P\beta\{1 - (1 + \lambda)/n\} = f'(x) \quad (8)$$

³ Ruffin (op.cit.) argued that as n tends to infinity, the equilibrium does not converge to a perfectly competitive one if returns to scale are increasing. Here, we find from (8) that $P > f'(x)$ as long as products are differentiated, that is, $\beta < 1$. On the other hand, if $\beta = 1$, $p = f'(x)$ but now $\Pi > 0$ iff $\theta > 1$, that is, in equilibrium returns are increasing.

An interior solution for output gives the constraint that $\lambda \leq n - 1$.⁴ The firm's profits are defined by

$$px - \Pi = f(x) \quad (9)$$

We assume full employment of labour, that is,

$$nf(x) + a_y Y = L \quad (10)$$

Finally, by the property of the utility function (3), we know that the consumer allocates his income between differentiated goods and the homogeneous good in the proportions α and $(1 - \alpha)$. Equating supply and demand for the two outputs for the economy as a whole we get

$$np_x = \alpha(L + n\Pi) \quad (11)$$

and

$$P_y Y = (1 - \alpha)(L + n\Pi) \quad (12)$$

This completes the specification of the model. The model consists of equations (1), (8)–(12), variables P , P_y , x , Y , and Π . However, not all the six equations are independent of the others. We can eliminate variables and equations to the reduced form of the system.

Eliminating P using equations (1), (8) and (9) we get

$$f(x) + \Pi = f'(x)x/v \quad (13)$$

where $v = \beta(1 - (1 + \lambda)/n)$.

Using the definition of θ in (2) we can write (13) as

$$\Pi = \{(\theta/v) - 1\} f(x) \quad (14)$$

For positive profits in equilibrium we then have $\theta > v$. From the definition of v we also know that $\beta > v$ as long as $\lambda > -1$.

Continuing the solution of the model, eliminating Y in (10) using (1) and (12) we get

$$f(x) = [\alpha L/n] - (1 - \alpha)\Pi \quad (15)$$

The reduced form equations (14) and (15) solve for the two main variables of interest, Π and x , in terms of the parameters of the model, α , β , λ , n and L .

3. COMPARATIVE STATICS

One primary objective in this paper has been to see the effects of entry on profits, outputs and welfare. In our model this translates into the effect of a change in n on Π , x and U .

⁴ It can be shown that, given the assumption of interior solution for output, the second order conditions for a maximum are satisfied if $f'' \geq 0$, that is, in equilibrium marginal cost is non-decreasing.

(i) *Effects of Entry on Profits*: Differentiating (14) and (15) totally with respect to n we can solve simultaneously for $d\Pi/dn$ and dx/dn . We have

$$J(d\Pi/dn) = -\frac{f'(x)}{n} \{A\{f(x) + (1-\alpha)\Pi\} + \{f(x)\theta(\beta-v)\}/v^2\} \quad (16)$$

where $A = [(\theta/v) - 1 + (x\theta'/\theta v)] > 0$ and $J = f'(x)[1 + (1-\alpha)A] > 0$.⁵

Hence $d\Pi/dn < 0$. Thus we get the reasonable result that the firms' profit falls with entry.

What about industry profits, $n\Pi$? To see this we look at the elasticity of firms profit, $\eta_\Pi = (d\Pi/dn)(n/\Pi)$. From (16)

$$\eta_\Pi = -\frac{1}{\Pi\{1 + A(1-\alpha)\}} \{A\{f(x) + (1-\alpha)\Pi\} + f(x)\theta(\beta-v)\}/v^2 \quad (17)$$

Using (14) in (17) it is clear that the denominator of (17) is less than the numerator, that is, $\eta_\Pi < -1$. In other words, *total industry profits fall as entry takes place*. This is intuitively reasonable as otherwise we would have an untenable situation with profits increasing with entry. We have the following proposition:

PROPOSITION 1. *Entry in an oligopolistic market leads to an unambiguous decline in both firm and industry profits.*

Hence, contrary to the result obtained by Seade (op.cit.) the 'common sense' view of entry as increasing competitiveness seems to be vindicated. One interesting implication of our result is that liberalisation experiments which allow for increased entry into domestic markets will have deflationary consequences as industry profits decline thus leading to a contraction of demand. This, however, does not necessarily imply a reduction in consumer welfare as will be shown later on in this paper.

(ii) *Effects of Entry on Outputs*: The effects of entry on output are somewhat more complicated because, in contrast to the partial equilibrium models, here the final effects on output must reflect an interaction of demand conditions, returns to scale (cost conditions) and maintenance of full employment.

One result is immediate. Since we have shown that industry profits decline it follows from (12) that the *output of the homogeneous goods industry, Y , must fall*. Since this industry is characterised by constant returns to scale, labor released from here must be absorbed in the differentiated goods industry.

From the simultaneous solution of (14) and (15) and using (10), (11) and (12) we get,

$$J(dx/dn) = \frac{\alpha L}{n^2} \left\{ s_y \frac{2(1+\lambda) - n}{(n - (1+\lambda))} - s_x \right\} \quad (18)$$

where $s_y (= a_y Y/L)$ and $s_x (= n f(x)/L)$ are the shares of the homogeneous and

⁵ Substituting for θ it can be shown that $A, J > 0$ if $f'' \geq 0$. This is also the sufficient condition for stability as in footnote 3.

differentiated goods respectively in total employment. By definition, $s_x + s_y = 1$.

Inspection of (18) shows that if firms undertake 'perfect adjustment' ($\lambda = -1$) then $dx/dn < 0$. If, however, firms follow Cournot conjectures output falls if $n \geq 2$ (since from (10) $s_y < 1$). However, in general we can write,

$$dx/dn \geq 0 \quad \text{iff} \quad (1 + s_y)(1 + \lambda) \geq n \quad (19)$$

so that in the case of 'collusive' behaviour ($\lambda > 0$) firm output would fall the smaller is s_y (which also implies the larger is s_x), the smaller is λ or the larger the number of firms in equilibrium. We state the following:

PROPOSITION 2. *Entry leads to an unambiguous decline in individual firm output if firms undertake 'perfect adjustment'. If the firms are Cournot quantity takers output falls if $n \geq 2$. In general, firm output falls if the number of firms in equilibrium is large. If the number of firms in equilibrium is small, aggressive collusive response to entry may raise firm output.*

Our results then are in contrast to some of the earlier results in the literature. Thus the 'Ruffin condition' referred to in the introduction has no role to play here. Moreover, our results are independent of the curvatures of the demand or cost functions.

It is instructive to look at the intuition behind Proposition 2 and Equation (18). If the share of the differentiated goods industry, s_x , is relatively very large (and hence the number of firms, n , is large), then the entry of a new firm is likely to have only a very insignificant effect on the price-output decisions of individual firm. The market may be characterized almost like the Chamberlinean type and hence we may assume that the firm behaviour parameter λ is close to zero. If however, s_x is relatively small (and therefore n is small), then the firm is more likely to react positively to the entry of a new firm. In the case of 'collusive' behaviour ($\lambda > 0$) firms respond to entry by increasing output to try to maintain profit shares. Hence this 'complementarity' between firms would tend to increase their outputs. This can be seen from equation (18). The smaller is s_x , for $\lambda > 0$, the more likely that the positive term will dominate the negative term.

However, to increase output the oligopolistic sector has to withdraw labour from the homogeneous goods industry. Hence, the strength of this output increasing effect depends on the shares of the X and Y industries in total employment, s_x and s_y . It can be seen from (18) that the larger the value of s_y (and hence the smaller is s_x) the larger will be the output increasing effect for a firm. On the other hand, as n increases, diversity increases so that individuals now spread out their consumption over a larger number of commodities. Given that individuals initial endowment is fixed and that firm profits, Π , decline with entry, the demand for each differentiated good must decline. This inward shift in the demand curve facing each oligopolist would tend to reduce firm output. It is obvious therefore that while the market behaviour parameter, λ , tends to increase firm output with entry, the income effect (via the decrease in profit due to entry) tends to reduce

firm output. Therefore the final outcome will depend on the relative strengths of each of the two forces.

When the firms undertake 'perfect adjustment', the output increasing effect is absent so that firm outputs decline unambiguously. In the other polar case of Cournot response ($\lambda=0$), $n \geq 2$ ensures that the positive 'complementarity' effect is dominated by the negative demand effect. This is, however, only a sufficient condition with (19) giving the necessary and sufficient conditions for output decline.

The results for industry output follow from the above. The elasticity of industry output, $X=nx$, is given by $v_x=(dX/dn)(n/X)$. Clearly, $v_x=\eta_x+1$ where η_x is the firm elasticity of output with respect to entry. Thus, $v_x \geq 0$ as $\eta_x \geq -1$.

From (18) using the definition of J and with (8) and (11) we get,

$$\eta_x = \frac{\left[\frac{s_y(1+\lambda)}{n-(1+\lambda)} - 1 \right]}{[v\{1+(1-\alpha)A\}]} \left\{ \frac{L}{(L+n\Pi)} \right\} \quad (20)$$

Now the numerator of the first term in parenthesis above is negative (assuming the more interesting case of a decline in firm output with entry) and $L/(L+n\Pi) < 1$. Therefore, substituting the expression for A in (20) we can show that

$$\eta_x > -1 \quad \text{if} \quad \sigma > \left\{ 1 - \frac{\beta\{n-(1+\lambda)\}}{n} \right\} \frac{\alpha}{(1-\alpha)} \quad (21)$$

where σ is the elasticity of marginal cost with respect to output, that is, $\sigma = x \cdot f''(x)/f'(x) > 0$ (see foot note 4). Given the number of firms, n , and λ it is clear that (21) will be satisfied the lower the taste for diversity (higher is β), the higher is σ and the lower is the proportion of income spent on the differentiated goods, α . More generally, given the parameters of the model, industry output is likely to increase the larger is σ in equilibrium, that is, the steeper the marginal cost curve in the neighborhood of equilibrium. Given (21) it follows that $v_x > 0$, that is, industry output increases with entry. We have the following:

PROPOSITION 3. *The higher the elasticity of marginal cost in equilibrium, the lower consumers taste for diversity and the lower the share of incomes spent on the differentiated goods the more likely that output of the differentiated goods industry will increase with entry.*

Intuitively, the lower is α the lower (from 18) the magnitude of the fall in output of the individual firm due to entry and thus the greater the possibility that new entry will increase industry output. In the same way, a higher elasticity of marginal cost leads to a lesser responsiveness of firm output to a change in demand due to entry thus increasing the possibility of industry output increasing with entry.

Another interesting result emerges from (21). Suppose $\sigma > 1$ (that is the firms

are in equilibrium where average costs are increasing).⁶ Then if $\alpha \leq 1/2$, (21) is always satisfied. This is summarised in Proposition 4:

PROPOSITION 4. *If in equilibrium the elasticity of marginal cost is not less than 1, entry always leads to an increase in industry output if the output of that industry constitutes a small part of the economy's output.*

This proposition has obvious relevance to many newly developing economies. We also see that the unambiguous conclusion in Seade (op.cit.) requires some qualification regarding the size of the differentiated goods sector. Further, demand side parameters like β are important in defining the limits on σ . Thus, suppose the taste for diversity disappeared so that $\beta = 1$. Then (21) is always satisfied (for $\lambda = -1$) and industry output increases. This is the same conclusion found in Seade but in our model only holds for a particular case. However, in general the qualification in Proposition 4 is necessary.

Our results differ in many respects from the traditional results in the literature. For one, we find that firm and industry profits decline unambiguously with entry thus restoring the "conventional wisdom". On the other hand, while firm output declines, industry output may or may not decline depending on the relative forces on the supply and demand side. In particular, consumers 'taste for diversity' has an important influence which has been ignored in previous literature on entry. We turn now to effects of entry on welfare.

(iii) *Effects of Entry on Welfare:* By symmetry we can write (3) as

$$U = n^{\alpha/\beta} x^\alpha Y^{(1-\alpha)} \quad (22)$$

Taking logs on both sides of (22) and differentiating totally we get $dW = (1/U)(dU/dn)$ as our measure of a change in welfare with entry.

$$dW = \alpha/n \left[1/\beta + (n/x)dx/dn + \frac{(1-\alpha)}{\alpha} (n/Y)(dY/dn) \right] \quad (23)$$

Equation (23) indicates the three forces operating to determine the effects of entry on welfare: The first two effects within the square bracket relate to the oligopoly sector, namely, the variety effect and the effect of entry on firm output. The third component captures the effect of entry on the output of the homogeneous industry, that is, dY/dn . However, we know from (12) that $dY/dn < 0$. Since $0 < \beta < 1$, the oligopoly sector effect is always positive as long as $\eta_x \geq -1$. This means that the entry has a variety effect which is positive and an output effect which is negative (if firm output falls with entry). The former effect dominates if industry output increases with entry.

Totally differentiating (10) and substituting from (11) and (12) we can write (23) as

⁶ If we assume start up costs so that $f(x) = x^a + c$, where c is the start-up cost, the $\sigma \geq 1$ as long as $a \geq 2$. On the other hand if $f(x) = x^3 - a \cdot x + b \cdot x$, $a, b > 0$, then $\sigma \geq 1$ iff $x \geq (b/3)^{1/2}$.

$$dW = \frac{\alpha}{n} \left[\frac{1}{\beta} - \frac{v}{\theta} + \eta_x(1-v) \right] \quad (24)$$

It is clear from (24) if entry leads to increase or no change in firm output, that is $\eta_x \geq 0$, then there will be unambiguous increase in welfare if $\theta \geq 1$. Thus the returns to scale parameter plays an important role in determining the effect of entry on welfare. It can easily be seen from (24) that the necessary and sufficient condition for welfare change as a result of entry can be stated as:

$$dW \geq 0 \quad \text{iff} \quad \eta_x \geq -\frac{\{1 - (\beta v/\theta)\}}{\{\beta(1-v)\}} = -a \quad (25)$$

where $a = \{1 - (\beta v/\theta)\}/\{\beta(1-v)\}$ and $a > 1$ for $\theta \geq 1$.

It is thus clear that the returns to scale variable, θ , again has an important role to play in determining the direction of welfare changes. Suppose, in equilibrium, returns are non-increasing ($\theta \geq 1$). Then (25) implies that welfare increases if $\eta_x > -a$, where $a > 1$. It then follows that a strong sufficient condition for an increase in welfare is that $\eta_x > -1$, that is, the industry output increases with entry. We have the following:

PROPOSITION 5. *If in the neighborhood of equilibrium returns to scale are non-increasing in the differentiated goods industry, then entry is welfare increasing if the output of the differentiated goods industry increases.*

An alternative derivation of dW gives some additional insights. Substituting for Y from (10) in (22) and differentiating totally we can write⁷

$$dW = \left[\frac{\alpha}{n} \left(\frac{1}{\beta} + \eta_x \right) - \left(\frac{1-\alpha}{n} \right) \left\{ \frac{s_x}{s_y} (1 + \theta \eta_x) \right\} \right] \quad (26)$$

From (26) it is clear that if industry output does not fall with entry ($\eta_x \geq -1$) then $dW > 0$ if s_x is small (or s_y is large). In other words, welfare is likely to increase with entry if the size of the oligopoly sector is small in relation to the rest of the economy. We state the following proposition.

PROPOSITION 6. *Entry is likely to increase welfare the smaller the size of the differentiated goods industry and the greater the increase in output of that industry.*

The intuition behind Propositions 5 and 6 needs some elaboration. In (25) a strong sufficient condition for an increase in welfare is $\theta \geq 1$ and $\eta_x \geq -1$. With $\theta \geq 1$, firms are operating on the rising segments of their AC curves (since $MC > AC$). Hence, a decline in firm output with entry implies that the firms reduce their ACs. Since we have defined AC to be the labour requirement per unit of output $\{f(x)/x\}$ this implies that firms are getting more efficient. This efficiency gain is traded off against the welfare loss due to decline in output of the Y industry.

⁷ We are grateful to an anonymous referee for suggesting this decomposition.

With a large enough θ this efficiency gain outweighs the welfare loss due to decline in Y output. Finally, from (26) it is also clear that welfare increases with entry if s_x is small. The intuition behind this is similar: the labour drawn from the Y industry is small and hence the output of Y declines to a smaller degree than if s_x is large.

The relevance of Propositions 5 and 6 is obvious in the context of newly industrialising countries which are undertaking internal liberalisation. Since models of entry have in general been of the partial equilibrium kind our results are new.

4. CONCLUSION

Our objective here has been to extend the literature on entry to a general equilibrium framework. For one, this allows us to incorporate the 'Ford effect' noted in the literature. Second, we can also investigate the effects of entry on welfare. Third, by allowing for positive profits, we can model the situation in many LDCs where resource constraints do not permit entry up to the point where profits are eliminated. A general equilibrium framework also allows for a full employment constraint which is usually crucial in such countries.

We find that entry tends to unambiguously reduce firm and industry profits and individual firm output. Further, the effect on industry output in general depends on whether costs are increasing or decreasing and on the size of the industry vis-a-vis the rest of the economy. Finally, welfare results depend crucially on whether the industry in question is an increasing or decreasing cost industry.

We have attempted to extend the literature on entry to a general equilibrium framework with some new elements. One obvious direction in which the analysis can be extended is to compare the issue of internal vs external liberalisation. This is of obvious relevance to many newly developing countries.

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