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ABSTRACT

Inefficient Diversification in Multimarket Oligopoly with Diseconomies of Scope*

This paper considers the incentives of oligopolistic firms to diversify into technologically related markets when there are diseconomies of scope. There is a rent-extraction incentive for firms to adopt flexible technologies, which enable them to enter technologically related markets, thereby increasing competition. This strategic motive leads to inefficiency in production, however, due to diseconomies of scope. This paper shows that the welfare gain from increased competition can be more than offset by the inefficiency in production, which may lead to lower welfare than in the case of pure monopoly.

JEL classification: D24, D43, D61
Keywords: diseconomies of scope, oligopoly, diversification

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NON-TECHNICAL SUMMARY

Since the early 1980s there has been a renaissance in the study of multi-product firms. While most traditional microeconomic theory considers firms that produce only a single product, in reality firms produce a range of products. The reasons why we observe firms that produce more than one product are not difficult to understand.

Much of the economics literature has focused on the role of 'economies of scope', which are said to occur when it is more efficient (in terms of lower total cost) to have one firm producing a particular combination of outputs of different products than it is to have two firms each specializing in only one. The reasons for the existence of economies of scope relate to several factors. Most important here are the concepts of complementarity in production and the existence of 'quasi-public inputs'. An example of complementarity in production occurs when the production of one product enables the employees of the firm to gain experience that helps them to produce other products. Car production is a classic example: many of the skills gained through producing one model can be used in producing other models. The notion of a quasi-public input is likewise easy to grasp. Research and development is an oft cited quasi-public input. In car production, for example, innovations in production technology or product design (such as aerodynamics, materials etc.) undertaken for one model can be used for others. Large capital goods are another example (where 'large' indicates some indivisibility): so long as capacity of the capital good has not been reached, the same capital can be used to produce more than one output.

There are thus good and plausible reasons why we observe multi-product firms as opposed to single-product firms. While most of the existing literature has focused on the efficiency gains from diversification (economies of scope), little attention has been paid to the *limits* to such diversification, however. Clearly, we do observe conglomerate firms with extremely diverse product ranges. If we restrict ourselves to a rather narrower definition of a firm as an integrated production unit, however, we do not observe indefinite diversification.

It would be hard to believe that it is optimal for one firm to produce all outputs. There are clearly limits to diversification, and on the purely technical side *eventual* diseconomies of scope. The reasons for this are again not difficult to understand (although these are not widely discussed). There are advantages to specialization, learning by doing, human and physical capital which are product specific. If the firm trys to do too much it will eventually become inefficient. This

notion underlies many moves towards corporate refocusing which we currently observe.

This paper considers the motivations of firms to diversify in an oligopolistic market environment. In perfectly competitive or contestable markets, the diversification decision of firms is taken solely on the grounds of efficiency: firms cannot diversify beyond the point at which diseconomies of scope set in without incurring a cost disadvantage. In oligopolistic markets, however, matters are more complex. The presence of imperfect competition means that there are supernormal profits to be earned. The presence of supernormal profits, however, acts as an incentive for firms in technologically-related markets to enter, even when it is 'inefficient' in terms of production costs. This 'rent-extraction' motive can thus lead to over diversification, in the sense that firms are more diversified than they would be under purely cost-efficiency grounds.

From the policy and welfare perspective, this 'over diversification' raises some interesting issues. If there are economies of scope, diversification of oligopolistic firms into each others markets will tend to increase welfare. Not only will it tend to make firms more efficient on the cost side, it will further promote competition between firms, leading to lower prices and increased consumer welfare. As we show in this paper, the presence of (eventual) diseconomies makes matters more complex. Against the gain of increased competition is the cost of inefficient production. As we show in a very simple but typical model, the welfare gain of increased competition can be more than outweighed by the inefficiency in production, leading to an overall fall in welfare.

The policy implications of this result are clear. The presence of supernormal profits ('rents') to be earned will act as an incentive in imperfectly competitive markets for firms to diversify beyond the extent necessary to capture economies of scope. Despite the increase in competition engendered by this diversification, social welfare may be reduced.

Introduction

It has long been recognized that an important form of potential competition might come from firms already producing in technologically related industries[1]. This has been particularly emphasized by proponents of contestability theory (see Baumol (1982)), who focus on the role of "hit-and-run" entry as a discipline on incumbent firms. We also observe firms diversifying from a particular technological base to produce a wider range of outputs (for example in electronic goods and vehicles). The type of technology which firms have will clearly determine the scope the firms have for this diversification: firms may have a dedicated technology which is tailor-made for producing one output exclusively ; or a flexible[2] technology which allows the firm to produce a range of outputs. This paper models the strategic choice between dedicated and flexible technologies in an oligopolistic context, to determine the incentives for individual firms to opt for flexibility and a wider product range, the outcome and welfare effects.

One strand of the existing literature on multi-product firms focuses on the role of economies of scope as an explanation of diversification (see, e.g. Panzar and Willig (1981) Eaton and Lemche (1991)).If we wish to understand why multi-product firms exist in competitive or contestable markets, the explanation will focus on the cost-efficiency of diversified versus single-product firms. The reasons for such economies of scope are related to complementarities of production, "quasi-public" inputs and related factors (see Milgrom and Roberts (1990) for a discussion). However, if we wish to explain the limits to diversification, why a multi-product firm has a particular range of products and not a larger one, one must consider (*eventual*) diseconomies of scope. Unless it is optimal for one firm to produce all outputs, there must be *eventual* diseconomies of scope. Furthermore, firms do sometimes contract product ranges. Indeed, the essence of much of the move to corporate divestiture and "re-focusing" in recent years has been to make efficiency gains by limiting the range of activities undertaken by firms. There are many examples in recent years of firms that have become inefficient due to producing too wide a product range (e.g. British Leyland in the mid-1970s (see Murphin (1982)), and more recently the Midland Bank in the UK).

In this paper, I argue that the possibility of over-diversification may be endemic in oligopolistic markets since with rents to be earned, firms have an incentive to diversify through a flexible technology beyond the point where diseconomies of scope set in. By diversifying into technologically related markets, firms are able to extract results from these markets. If firms enter each others markets, this may have a beneficial effect on social welfare by leading to increased competition, lower profits and prices (see Brander and Eaton (1984), Calem (1988), Roller and Tombak (1990)). If, in addition, there are no diseconomies of scope, production by the diversified firms will be no less efficient, leading to an overall increase in social welfare. However in the presence of (eventual) diseconomies of scope, there (may) be a social welfare loss in terms of inefficient production to counterbalance the beneficial effects of more competition. This paper presents a model of diversification with diseconomies of scope in which this inefficiency in production actually outweighs the gain from increased competition, resulting in an overall <u>decline</u> in social welfare. The model presented is in many ways specific, and as such might be considered as an example. However, the assumptions made are not dissimilar or less general to those in existing literature, and by no means atypical. The implication of this paper is that we cannot accept unambiguously that in oligopolistic markets mutual entry through diversification leads to improved social welfare. The benefits of improved competition can be offset by inefficiency in production if there are diseconomies of scope.

1. The Model

There are two firms i = 1,2 and two markets X and Y. The outputs of each firm i in markets X and Y are (x_i, y_i), and the price in market X is given by a linear Cournot inverse demand curve, where without loss of generality we normalize the slope coefficient to unity:

$$p^x = A - (x_1 + x_2) \quad (1)$$

and likewise p^y. Assuming this particular form for the demand curve is a convenient simplification: it would be easy in principle to generalize to allow for the intercept and slope coefficients to differ across markets (as in Calem (1988)), or to allow for the two markets to be related with non-zero cross-elasticities of demand (as in Roller & Tombak (1990)).[3] Our assumption allows a particularly simple and clear closed-form solution.

Turning now to the issue of firms' technology, we assume that each firm has a choice between a flexible technology which allows it to produce both commodities, and a dedicated technology which allows it to produce only a single commodity. Furthermore, we will assume that firm i's "home" market is X, and firm 2's is Y, and that for analytical convenience firms can only possess the dedicated technology for their "home" market (the results in no way depend on this). Roller & Tombak (1990) assume that the choice of a flexible technology as opposed to a dedicated technology has no implication for *marginal* production costs of either output, only in terms of *fixed* costs. However, in this paper we will explore the case where there are diseconomies of scope, so that flexibility may imply a loss of efficiency in terms of marginal cost as well as fixed costs. Dedicated machinery can be tailor-made to suit a particular product, and the firm can accumulate learning-by-doing experience if it specializes in producing only one good. The simultaneous production of two different outputs may raise marginal costs through a loss of learning-by-doing experience, and the fact that production methods cannot be perfectly accommodated to each output. If the firms choose the dedicated technology for their home industry, they incur zero production costs. The idea here is that with a dedicated technology the firm faces zero (constant) marginal cost, any set-up cost F being already incurred and hence sunk (it is precisely this sunk cost which means that a firm has a "home" market). We assume that if a firm wishes to opt for a flexible technology, its joint cost function is given by:

$$C(x_i, y_i) = S + cx_i y_i \qquad (2)$$

This is a special case of the joint cost function used by Eaton and Lemche (1991, equation 1 page 902).[4] $S \geq 0$ is the fixed-cost element of purchasing the flexible technology: for example, buying more expensive capital equipment capable of a wider range of operational capabilities, upgrading existing machinery, or investing in training to make the labour force more flexible. This enables the firm to produce the output of both markets. c is a coefficient capturing diseconomies of scope as defined by Bulow et al (1985), $\partial^2 C/\partial x_i dy_i = c \geq 0$. Thus if $c = 0$, we have the same (zero) marginal cost as the dedicated technology (as in Roller and Tombak (1990) and Brander and Eaton (1984)): a larger c implies that the constant marginal cost of each output is increasing in the output of the other. The restriction $c < 2$ ensures a simple interior maximum to the firms choice of outputs, as explained below. Note that in the absence of a purchase cost $S = 0$, the flexible technology allows for the production of each output <u>on its own</u> as efficiently as the dedicated technology. From the individual firm's perspective, ignoring its purchase cost S, the flexible technology is more efficient, since it not only allows it to produce its home output at the same cost as the dedicated technology, but also allows it to produce any strictly positive combination (x_i, y_i) at a finite cost (such infeasible combinations for the dedicated technology can be interpreted as being infinitely costly). However, what is efficient from the individual firm's perspective need not be socially efficient. Note that we are only allowing firms to diversify through adopting a flexible technology. Firms could of course also enter in the traditional way by purchasing the dedicated technology for the other firm's market at cost F. In this case the entry decision is no different from the entry of any other firm, since the firm would need to purchase the dedicated technology rather than adapting its own to produce both outputs.

As a preliminary to the analysis of the equilibrium in the model, let us consider as useful reference points the pure monopoly outcome when each firm remains an undiversified monopolist with its dedicated technology, the first best social outcome, and the competitive outcome. Under pure monopoly, firm 1 chooses output x_i to maximize profits $\Pi_i = x_i(A-x_i)$ yielding the monopoly outcome (which is the same for firm 2):

$$Y^m = X^m = pm = A/2 \ : \quad \Pi^m = A^2/4 \tag{3}$$

Given that the dedicated technologies are assumed to be free, the first best social outcome is clearly to have each firm choosing the dedicated technology, and producing the competitive output $X^o = Y^o = A$, with both prices at zero. If $S > 0$, the flexible technology can never be socially optimal: any combination of outputs can be produced at less cost by two dedicated single-product firms.

If we compare the social optimum with the pure-monopoly outcome, the monopoly-deadweight Social Welfare Loss (SWL^m) in each market is given by the welfare-loss triangle A/8. Hence the total loss is $\Delta^m = A/4$. The structure of the paper is as follows. In the next section 2, we solve for the second-stage choice of outputs given the technologies of the firms. In section 3 we then step back to the first-stage strategic choice of technology type. In section 4 we undertake a welfare analysis of the equilibrium, to see whether the diversified equilibrium with flexible technologies yields higher welfare than the pure-monopoly outcome. Will the benefits of greater competition and lower prices result in higher welfare even in the presence of diseconomies of scope?

2. Equilibrium and technology

In the case of duopoly with two types of technology, there are three types of outcome possible. First, where both firms choose the dedicated technology, which gives rise to the standard monopoly outcome in each market. Second, where both firms have a flexible technology, so that there maybe mutual entry into each others home markets. Lastly, there is the asymmetric case of one-sided entry where one firm adopts a flexible technology and the other does not. In this section we will examine the two non-standard cases of mutual and one-sided entry.

If both firms have chosen flexible technologies and incurred costs S, the variable profits are given for firm 1 (and analogously for firm 2) by:

$$\Pi_1(\underline{x}, \underline{y}) = x_1(A-x_1-x_2) + y_1(A-y_1-y_2) - cx_1y_1 \qquad (4)$$

where $\underline{x} = (x_1, x_2)$, $\underline{y} = (y_1, y_2)$. This is strictly-concave in (x_1, y_1) for $c < 2$ and yields the first-order conditions:

$$x_1 = \frac{A-x_2}{2} - \frac{c}{2}y_1 \qquad (5a)$$

$$y_1 = \frac{A-y_2}{2} - \frac{c}{2}x_1 \qquad (5b)$$

If $c = 0$, (5) yields the standard reaction functions for duopoly with costless production. If $c > 0$, then there are diseconomies of scope, which leads to a technological link between the choices of outputs in the two markets. Solving (5) yields (x_1, y_1) as a function of (x_2, y_2):

$$x_1 = \frac{A}{2+c} - \frac{x_2}{2-(c^2/2)} + \frac{cy_2}{4-c^2} \tag{6a}$$

$$y_1 = \frac{A}{2+c} - \frac{y_2}{2-(c^2/2)} + \frac{cx_2}{4-c^2} \tag{6b}$$

Solving for the Nash-equilibrium yields the symmetric solution $x_i = y_i = x^F = y^F$; $p^x = p^x = p^F$:

$$x^F = y^F = \left[\frac{2-c}{6-c^2-c}\right] A \tag{7a}$$

$$p^F = \left[\frac{2-c^2+c}{6-c^2-c}\right] A \tag{7b}$$

Each firm's profits are:

$$\Pi^F = \frac{2}{9}\left[\frac{4-2c-c^2+(c^3/2)}{4-(5c/9)+(c^3/9)+(c^4/9)}\right] A^2 \tag{7c}$$

Note that $\Pi^F < \Pi^M$: mutual entry leads to lower profits than the monopoly outcome. If $c = 0$, (7) yields the standard Cournot duopoly with each firm producing A/3 and earning A/9 in each market. As c becomes larger, the smaller the equilibrium outputs and profits, and the higher the equilibrium price (as c tends to 2 from below, x^F and Π^F tend to zero, and P^F to A). It is also useful to note that the equilibrium price-cost margin μ with mutual entry is:

$$\mu(c) = \frac{P^F - cx^F}{P^F} = \frac{2-c}{2-c^2+c} \tag{8}$$

Note that μ is decreasing in c over [0,2), and that (for example) $\mu(0) = 1$, $\mu(1) = \frac{1}{2}$, and as c tends to 2, μ tends to zero.

Whilst equations (7) characterize an equilibrium for c in [0,2), when $c \geq 1$ there is in fact another equilibrium with blockaded monopoly with each firm producing the monopoly output in its own market. To see why, note that if each firm produces A/2 in its home market, there is no incentive for the firms to enter the others market. This can be verified from (5) when non-negativity constraints on outputs are included (note that when c = 1, a solution to (5) is $x_1 = y_2 = A/2;\ x_2 = y_1 = 0$).

In the case that one firm opts for a flexible technology (firm 1, say), and firm 2 has a dedicated technology, there is the possibility of one-sided entry. If $c \geq 1$, there is blockaded entry into firm 2's home market: it deters entry by producing its monopoly output. For $c < 1$, however, there will be equilibrium entry of firm 1 into firm 2's market. The reaction functions and equilibrium outcome in this case are obtained from (5) by setting $x_2 = 0$. The profits the 'raider' firm 1 earn can be denoted by Π^{Ft}: the raider increases its profits from the monopoly level, so that (net of 5) $\Pi^{Ft} > \Pi^{M}$. The raided firm will earn less $\Pi^{F} < \Pi^{M}$. It can be verified that $\Pi^{Ft} > \Pi^{M} > \Pi^{F} > \Pi^{F-}$. This structure of payoffs is a classic Prisoners Dilemma, as noted by Roller and Tombak (1990). In the absence of any fixed cost S to acquiring a flexible technology, the flexible technology dominates the dedicated technology. Both firms do better by "co-operating" and earning monopoly profits Π^{M}. However, each has an incentive to "defect" by adopting a flexible technology ($\Pi^{Ft} > \Pi^{M}$) so that in equilibrium both firms earn Π^{F}, a Pareto inferior outcome.

2. **Welfare Analysis**

If there were no diseconomies of scope, or even economies of scope due to complementarities or 'quasi-public' inputs', the adoption of a flexible technology would, in general, lead unambiguously to greater social welfare. Diversification through the adoption of flexible technologies would lead to mutual entry, thereby increasing competition, leading to lower prices, with no adverse effect on production costs. In this paper, however, we are considering the more problematic and ambiguous case where firms face diseconomies of scope, so that the adoption of flexible technologies can lead to higher production costs. This inefficiency is is strategic in nature, since the incentive for firms to adopt the flexible technology is one of rent-extraction from technologically related oligopolistic markets.

In this section we calculate the Social Welfare Loss (SWL) in terms of consumer and producer surplus relative to the first-best in the two symmetric cases: (a) pure-monopoly, where both firms choose the dedicated technology and enjoy an uncontested monopoly in their home market, (b) diversified oligopolies, where both firms opt for flexible technologies and compete in both markets, leading to duopoly. The key point we wish to make is that with diseconomies of scope, situation (b) can lead to lower social welfare than (a).

If we recall section 1, with pure-monopoly in each market, the SWL is given by the standard triangle $\Delta^M = p^{M2}/2$ in each market, so that the overall SWL is: $SWL^M = 1/4$ where for simplicity, we set A = 1 throughout this section. In the case where both firms choose flexible technologies and diversify, there will be two sources of SWL as depicted in Fig. 1. In addition to the standard SWL triangle Δ^F in each market, there is the rectangular area ABCD reflecting the strategic-inefficiency (SI) due to diseconomies of scale leading to average variable costs exceeding zero, plus the sunk purchase price of the flexible technology S. In this section we will assume that the purchase cost of the technology S is either zero or some very small ε, and focus on the variable cost source of welfare cost.

The presence of fixed costs of flexibility reinforces our argument, representing a further deadweight loss.

Let us turn first to the welfare loss triangle Δ^F in each market, this is equal to $P^{F2}/2$ in each market, so that over both markets $\Delta^F = p^{F2}$, which from (7b) is given by:

$$\Delta^F\ (c) = \frac{(2-C^2+C)^2}{(6-C^2-C)} > \frac{1}{9} \tag{9}$$

Note that $\Delta^F(0) = 1/9 = \Pi^F/2$, the standard duopoly welfare loss. As c gets larger, diseconomies of scope increase so that outputs fall and prices rise, thus increasing the welfare loss. When c = 1, $\Delta^F(1) = \frac{1}{4}$, which is equal to the pure-monopoly welfare loss, since $P^F(1) = p^M$.

Turning to the Strategic Inefficiency, this is given in total by:

$$SI = c.\ x_1^F y_1^F + c\ x_2^F y_2^F$$

$$= 2c\ x^F$$

by symmetry across firms and markets. Since $P^F = 1 - 2x^F$, we have:

$$SI(c) = \frac{c}{2}\ (1-P^F)^2$$

$$= \frac{c}{2}\ \Delta^F(c) + \frac{c}{2}\left[\frac{2+c^2-3c}{6-c^2-c}\right] \tag{10}$$

Clearly SI(0) = 0, and SI is increasing in c; in the limiting case of c = 1, $SI(1) = \Delta^F/2$. Hence the SWL due to diseconomies of scope can be large relative to the standard deadweight loss triangle Δ^F. If we put together the two sources of welfare loss (excluding S) we have the total:

$$SWL^F = \Delta^F + \left\{\frac{c\Delta^F}{2} + \frac{c}{2}\left[\frac{2+c^2-3c}{6-c^2-c}\right]\right\} \tag{11}$$

The term in curly brackets being the strategic inefficiency.

We are now in a position to compare the social welfare losses in the case of monopoly and diversified firms with flexible techniques (again ignoring S). In table 3 we give the total welfare loss SWL^F for three different values of c, broken down into Δ^F and SI. As can be seen, when c = 0 and there are no diseconomies of scope, there is a clear gain from firms adopting flexible technologies and diversifying, since it gives rise to greater competition with no adverse effect on costs (this is essentially the case considered by Roller & Tombak (1990)). In the case of c = 1, there is a clear loss, $SWL^F > SWL^M$. Even though diversification creates a duopoly in each market, the higher marginal costs lead to the monopoly price (hence $\Delta^F(1) = \Delta^M$), and there is the additional loss due to inefficiency in production. We also take the case of $c = \frac{1}{2}$, for which the SWL^F is only slightly less than the welfare loss in the case of pure monopolies. If we include the sunk cost of acquiring the flexible technology, then the comparison between the pure-monopoly and diversified duopoly cases will be even less favourable to the latter. The implications of this analysis are clear. It there are diseconomies of scope, then in oligopolistic markets the rent-extraction motive may lead firms to overdiversify by adopting too flexible technologies. Although this may increase competition within output markets, the social benefits from this competition may be outweighed by the costs of inefficiency in production.

How general are these results? Insofar as we view the results as an example, establishing that the diversification can reduce social welfare, generality is not an issue. Secondly, although the computations become rapidly more complex, there would be no difficulty in principle to generalizing the results. For example, it is straightforward to generalize demand (1) to:

$$P^x = A - (x_1+x_2) - a(y_1+y_2) \tag{12}$$

where $o \leq a < 1$. To see why, note that for small a, the model derived from

(1) is an arbitrarily close approximation to the model derived from (12). Hence the strict welfare inequalities will not be reversed for a small enough.

Conclusion

Diversification by firms in technologically related industries can generate a source of actual or potential competition for incumbent firms. The existence of imperfectly competitive rents also provides a strategic incentive for firms to adopt flexible technologies that facilitate entry into new markets. Diversification has two effects: firstly, it increases competition and leads to lower prices, thus tending to raise welfare; secondly, it leads firms to adopt technologies and capital equipment which can support a range of technologies. With diseconomies of scale, diversification leads to an inefficiency in production which counteracts the effects of increased competition. This paper provides a simple (but by no means atypical) example in which the rent-extraction incentive for firms to diversify can lead not only to lower equilibrium profits for firms, but also lower social welfare than the pure monopoly outcome.

FOOTNOTES

1. See, inter alia, Andrews (1949), Berry (1974-5), Brunner (1961), Lambkin (1988), Yip (1982).

2. The term "flexibility" has different usages. In the literatures on uncertainty and strategic precommitment "flexibility" has to do with the slope of the MC curve for a single output (see Dixon (1986) for a discussion and references). We use the term to relate to the ease of producing more types of outputs as opposed to less.

3. This paper will concentrate solely on externalities across markets on the cost side. For studies of multimarket oligopoly which concentrate on the demand side linkages, see papers by Bernheim and Whinston (1990) and Shaked and Sutton (1990).

4. The variable cost element $c.x_i.y_i$, could be expanded to a more general quadratic form such as $c(x_i+y_i)^2$, and the dedicated technology could itself be quadratic (e.g. cx_1^2 and cx_2^2). In this case the diseconomies of scope would stem from diminishing returns. This interpretation would be particularly relevant as a model of inter industry trade. The form adopted (2) focuses on the interactive term, and this does not alter the qualitative results.

5. The original definition given in Panzer and Willig (1981) relates to subadditivity of the cost function, rather than cross-derivatives on the cost function. The two definitions are not directly related due to fixed-costs. The Bulow et al definition is more directly relevant for this paper since it relates directly to marginal cost, and hence the firms' reaction functions.

Bibliography

Andrews, P.W.S. (1949): Manufacturing Business, London: MacMillan.

Baumol, W. (1982): Contestable Markets, American Economic Review, (72), 1-15.

Bailey, E. Friedlander, A. (1982): Market Structure and Multiproduct Industries, Journal of Economic Literature, (20), 1024-1048.

Bernheim, B.D., Whinston, M.D. (1990): Multimarket Contact & Collusive Behaviour, Rand Journal, (21), 1-26.

Berry, C.H. (1974-5): Corporate Diversification and Market Structure. Bell Journal of Economics and Management Science, 4, 196-204.

Brander, J., Eaton, J. (1984): Product Line Rivalry, American Economic Review, (74), 323-334.

Bulow, J., Geanakopoulos, J., Klemperer, P. (1985): Multimarket Oligopoly: strategic substitutes and complements. Journal of Political Economy, (93), 488-511.

Brunner, E. (1961): A Note on Potential Compettititon, Journal of Industrial Economics, 9, 248-250.

Cairns, R., Mahabir, D. (1988): Contestability: a revionist view, Economica, (55), 269-276.

Calem, P. (1988): Entry & Entry Deterrence in Penetrable Markets, Economica, (55), 171-184.

Dixon, H. (1986): Strategic Investment with Consistent Conjectures, Oxford Economic Papers.

Eaton, B., Lemche, S. (1991): The Geometry of Supply, Demand, and Competitive Market Structure with Economies of Scope, American Economic Review, (81), 901-911.

Lambkin, M. (1988): Order of Entry and Performance in New Markets, Strategic Management Journal, 9, 127-140.

Milgrom, P., Roberts, J. (1990): The Economics of Modern Manufacturing: Technology, Strategy and Organization, American Economic Review, (80), 511-528.

Murfin, A. (1984): "Monopoly and Competition: A Theoretical and Empirical Application to the UK Car Industry", PHD Thesis, London University.

Panzar, J., Willig, R. (1981): Economics of Scope, American Economic Review, Conference Supplement, 268-272.

Roller, L., Tombak, M. (1990): Strategic Choice of Flexible Production Technologies and Welfare Implications, Journal of Industrial Economics, (38), 417-432.

Shaked, A., Sutton, J. (1990): Multiproduct Firms and Market Structure, Rand Journal, (21), 45-62.

Yip, G.S. (1982): Gateways to Entry, Harvard Business Review, 1982, 85-92.

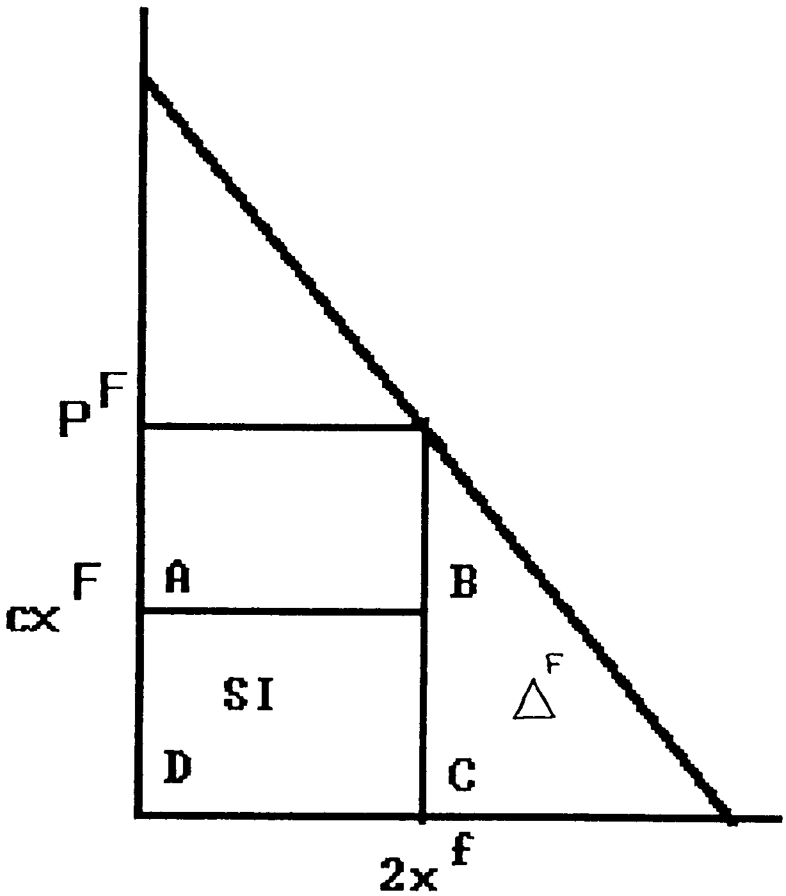

Fig 1: SWL with diversified firms

	Δ^F	S.I.	SWL^F
$c = 0$	1/9 (0.11)	0	1/9 (0.11)
$c = \frac{1}{2}$	9/49 (0.18)	5/98 (0.05)	23/98 (0.23)
$c = 1$	1/4 (0.25)	1/8 (0.13)	3/8 (0.28)

Table 3: Social Welfare Loss with Diversified Technologies. $SWL^M = \frac{1}{4}$