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Foreign Entry and Domestic Welfare:

Lessons for Developing Countries

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ABSTRACT

This paper examines the effects of foreign entry, in the form of either imports or direct foreign investment, into an oligopolistic market. Incorporating a possible divergence between private and social costs, it first derives simple conditions under which foreign entry reduces welfare relative to autarky. Then, in a multi-firm Cournot model with linear demand and international cost asymmetries, it shows that foreign entry reduces welfare unless it captures a very large share of the home market. However, it also shows that an optimal tariff can prevent this welfare decline. Some suggestive empirical evidence and extensions to differentiated products and to merger analysis are offered. The paper concludes with implications for trade and investment liberalization, as well as for domestic and international competition policy.

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1. INTRODUCTION

For most developed countries, closer integration into the global economy has meant the reduction of non-prohibitive tariffs and the easing or abolition of quantitative restrictions. For many developing countries and economies in transition, however, it often requires the relaxation of autarkic policies such as the outright *prohibition* of imports or foreign investment in particular sectors.[1] The conventional wisdom in economics is that this kind of reform is highly desirable and long overdue. Its virtues are easy to demonstrate in a standard competitive model, and the case becomes even stronger if the domestic industry is imperfectly competitive, for then trade liberalization serves as a surrogate anti-trust policy, with competitively-supplied imports imposing a price ceiling on the domestic industry. Such imports improve welfare even if they take only a small share of the market, and in certain cases, the mere threat of imports suffices to discipline the domestic industry without any actual imports taking place. A tariff or quota allows the domestic industry to exercise its market power more effectively, resulting in the usual deadweight loss. In this setting, domestic imperfect competition does not alter the welfare ranking obtained under perfect competition: free trade is better than restricted trade, which is better than autarky.

On the other hand, if the foreign industry is oligopolistic, the theory of strategic trade policy that emerged in the 1980s established that free trade is dominated by an optimal tariff that shifts some of the foreign rent to the home country. However, as I argue in the course of surveying the literature in the next few paragraphs, free trade and restricted trade have been compared with autarky only in international oligopoly models that are unsuitable for developing countries, or in special cases of models that are more suitable. This paper develops a more appropriate framework for this comparison, and comes up with some surprising results.

Most of the early international oligopoly models featured firms in different countries

1. Some developed countries also restrict foreign investment in sectors such as domestic air transportation, banking and broadcasting.

penetrating each other's markets on the opening of trade. Those that allowed free entry ruled out integer constraints, and also assumed that entry costs are not sunk, so that exit and entry are symmetric, resulting in a convenient zero-profit closure (Brander and Krugman, 1983; Venables, 1985). These assumptions yield a strong pro-trade result, since free trade in this setting induces entry in response to export opportunities, and the zero-profit condition ensures that greater competition compels firms to move down their average cost curves. The resulting price decline benefits consumers in both countries. However, firms in developing countries do not typically possess market power in export markets; their domestic markets are small relative to fixed costs of entry, so that integer constraints are likely to bind; and in sectors that have been protected by an autarkic trade regime, equipment is typically obsolete and badly maintained, so that a significant part of the fixed cost is likely to be sunk.

Contrary to the free-entry models, welfare comparisons between trade and autarky become ambiguous if the number of firms is fixed. In Dixit (1984), the comparison arose indirectly in examining the effects of mergers, represented by a reduction in the number of firms in a homogeneous-product Cournot oligopoly. The price rise consequent on a foreign merger adversely affects domestic consumers, but confers free-rider benefits on domestic firms. Dixit showed that this trade-off results in a U-shaped relationship between domestic welfare and the number of foreign firms. With linear demand, he showed that the trough of the U occurs at a 50% foreign share of the home market. If foreign mergers reduce the import share below this level, a further reduction in the number of foreign firms would improve welfare, and taken to its logical conclusion, this means that autarky is better than free trade. This comparison was made directly, allowing for product differentiation, by Levy and Nolan (1992) in a model in which home and foreign firms compete only in the home market -- a setting that is more appropriate for developing countries. They showed that if foreign costs are not too much lower than domestic, then protecting a domestic monopoly under autarky is superior to allowing a single foreign firm to compete with the domestic firm in a Cournot duopoly under free trade. That is, foreign entry is welfare-reducing.

Richardson (1998) has recently worked out the real implications of Dixit's insight in a Cournot model with many firms, symmetric costs, and linear demand, but competition again confined to the home market. He derives the critical level of foreign entry not as the trough of the U (which should be more accurately described as a J), but rather the number of foreign firms required for its right-hand branch to rise to the autarky level at which the left-hand branch begins. Under free trade, any foreign entry less than this critical level--which, as we shall see below, could be quite substantial--is welfare-reducing relative to autarky. Finally, in recent papers that allow for asymmetric and non-constant costs as well as general demand in the same domestic market setting, Jensen and Krishna (1996) as well as Denicolo and Garella (1999) show that a little foreign entry reduces welfare, while Reitzes and Grawe (1999) obtain the general features of a U-shaped relationship. These last six papers, however, go to the other extreme from the free-entry models in maintaining a fixed number of firms, thus ruling out the possibility of rationalization of the domestic industry through exit, which can be a source of welfare gains.

Apart from comparing autarky with free trade, most of these authors (and many others) also recognize that with foreign oligopoly, a tariff is superior to free trade. However, they do not compare the welfare level attainable with such a tariff to that under autarky. The general model to be developed below enables us to compare autarky and free trade with or without a zero-profit condition, while the Cournot model with linear demand permits a three-way comparison between autarky, free trade and trade subject to an optimal tariff. Also, protected oligopolies are typically characterized by managerial slack and strong unions, so that employees obtain a share of the rents. The analysis in this paper takes account of these features in a simple way, by allowing for the possibility that domestic firms' private costs are higher than the social opportunity costs of the resources they employ.

In Section 2, I obtain the general features of the U-shaped relationship more cleanly than the earlier authors, in a manner that does not depend on the Cournot behavioural conjecture assumed by them, and highlights the underlying intuition. This result holds for

both the polar cases of a fixed and an endogenous number of firms, and is reinforced by the divergence between social and private costs. In Section 3, I then employ a Cournot model with linear demand, but with many firms (unlike Levy and Nolan) and asymmetric costs (unlike Richardson). To begin with, unlike any of these authors, I allow for exit by domestic firms when they are unable to cover their fixed costs, in order to capture any possible benefits from rationalization. Here I show that if domestic firms are subject to a zero-profit condition, foreign entry has no impact on welfare until the entire domestic industry is shut down. Staying with the linear/Cournot formulation, I then use the idea of sunk costs to allow the domestic firms to survive in the face of foreign entry, and derive a simple formula which shows that regardless of cost asymmetries, foreign firms must capture at least 80% of the home market for unrestricted foreign entry to be superior to autarky.

All these results are applicable to both trade and direct foreign investment (DFI) as alternative modes of foreign entry. The only difference that is relevant to this paper is the possibility of a tariff on imports, and I show that an optimal tariff reverses these pessimistic results, so that greater import penetration always *increases* domestic welfare. However, I review several arguments against relying on such an optimal tariff; in particular, tariff-jumping DFI restores the possibility of a welfare loss. Section 4 points to empirical evidence in support of the model, and argues that the main findings are unaffected by product differentiation. Although the primary concern of this paper is with foreign entry, I also show in this section how the results can extend Dixit's original insight into the impact of foreign mergers. Section 5 concludes by summarizing the results of the paper and their implications for trade and investment liberalization, as well as for domestic and international competition policy.

2. A GENERAL MODEL

This section extends the well known model of Mankiw and Whinston (1986) to an open economy, with the possibility of exit as well as entry, and also the possibility of a divergence

between social and private costs. Assume an oligopoly of n identical home firms and n^* identical foreign firms, each of which supplies respectively q and q^* units of a homogeneous product to the home market. Total supply is thus $Q \equiv nq + n^* q^*$. Domestic firms have cost functions $C(q) = F + cq$. Inverse demand is given by $P = P(Q)$, generated by a quasi-linear utility function that permits the standard measure of consumer surplus. Social welfare in the home country is the sum of producer and consumer surplus:

$$W = \int_0^Q P(r)dr - P(Q)Q + n[P(Q)q - sC(q)]$$

$$= \int_0^Q P(r)dr - P(Q)n^* q^* - nsC(q) \qquad (1)$$

where the price and quantity variables are also functions of the number of firms, and the parameter $s \leq 1$ allows us to capture the possibility that social costs are below private costs, for the reasons given in the previous section. Foreign entry costs are assumed to be met by the foreign firms, and therefore do not enter the domestic welfare calculation. The marginal impact of foreign entry is then given by

$$\frac{dW}{dn^*} = P(Q)[\frac{dn}{dn^*}q + n\frac{\partial q}{\partial n^*} + q^* + n^*\frac{\partial q^*}{\partial n^*}] - [n^* q^* \frac{\partial P}{\partial n^*} + Pq^* + n^* P\frac{\partial q^*}{\partial n^*}]$$

$$- [\frac{dn}{dn^*}sC + n'sC(q)\frac{\partial q}{\partial n^*}]$$

$$= n\frac{\partial q}{\partial n^*}(P - s'C) + \frac{dn}{dn^*}[Pq - sC] - \frac{\partial P}{\partial n^*}n^* q^* \qquad (2)$$

To begin with, let there be no divergence between social and private costs, so that $s = 1$.

Following Mankiw and Whinston (1986), assume that the partial derivative in the first term in (2) is negative, representing the "business-stealing effect" of entry.[2] Consider the middle term, and foreign entry under two alternative scenarios. The expression in square brackets is the profit of a representative domestic firm, which is equal to zero if there is free entry and exit and integer constraints on n are ignored. If on the other hand domestic profits are positive because of an integer constraint, or because some part of F is sunk, then foreign entry cuts into domestic rents, and $dn/dn^* = 0$. In either case, the middle term vanishes. If we then evaluate (2) at n^*q^* very close to zero to represent the impact of marginal foreign entry, we see that it is negative in the presence of a business-stealing effect.

If social costs are less than private costs, then $s < 1$. The (negative) first term in (2) therefore becomes larger in absolute value. The middle term remains zero if domestic firms continue to make profits and do not exit ($dn/dn^* = 0$). However, in the alternative scenario, the zero-profit condition begins to bite: *private* profits P-C being zero implies that the expression in square brackets is now positive, and if domestic firms were earning zero profit, some of them must now exit, so that $dn/dn^* < 0$. The middle term in (2) now turns negative as well. In either scenario, the negative initial impact of foreign entry on welfare is strengthened by social costs being lower than private costs. The intuition here is that domestic output is already below its socially desirable level both because the domestic industry is oligopolistic, and also because private costs are higher than social costs. Greater competition in the form of foreign entry reduces domestic output even further, worsening this double distortion. Further, in the case in which the middle term turns negative, foreign entry can decrease welfare even without a business-stealing effect. A specific example of this is pointed out in the next section.

This analysis helps to isolate the conditions required for welfare-decreasing foreign

2. They downplayed the possibility (highlighted by Seade, 1980) that for very convex demand curves, entry could *increase* output per firm and thus be "business-augmenting" rather than business-stealing. The earlier models in the oligopoly trade literature also ignored this by assuming either linear demand, or an unnecessarily restrictive stability condition which precludes this case. However, the proposition that I derive below shows that

entry to occur, and can be summed up as

PROPOSITION 1: Foreign entry initially reduces domestic welfare, regardless of cost asymmetries and the mode of oligopolistic competition, if at the margin it either (a) causes a contraction in output per domestic firm, or (b) forces the exit of domestic firms whose private costs are greater than social costs.[3]

For non-marginal foreign entry, the last term in (2) (which can be regarded as a terms-of-trade effect) offsets this negative impact, since $\partial P/\partial n^* < 0$. As foreign entry proceeds, this term carries greater weight, while the falling price makes the first term smaller in absolute value. Another, more intuitive, way of looking at this is to recognize that later foreign entrants increasingly steal business from earlier ones, rather than entirely from domestic incumbents, while continuing to confer a beneficial terms-of-trade effect on domestic consumers. For substantial foreign penetration, this should eventually change the sign of (2) from negative to positive. This analysis provides the general framework for the U-shaped relationship between welfare and the number of foreign entrants, which earlier authors obtained for particular cases.

3. A COURNOT MODEL WITH LINEAR DEMAND AND CONSTANT COSTS

Consider the widely-used special case in which firms interact as a Cournot oligopoly, with the domestic market characterized by linear inverse demand

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business-stealing is sufficient, but not necessary, for entry to decrease welfare.

3. The qualification "at the margin" in Proposition 1 actually limits the result to certain kinds of oligopolistic interaction. For example, if post-entry competition is Bertrand with homogeneous products, clearly there is a substantial gain in welfare from foreign entry -- but this involves a discrete reduction in domestic output, so (2) is no longer applicable.

$$P = a - b(nq + n^* q^*) \tag{3}$$

Using this specification, Richardson (1998) obtains an expression for social welfare and shows that, for any given number of domestic firms, welfare first decreases and then increases as n^* increases from zero. This J-shaped relationship is derived under free trade and assuming identical home and foreign firms. Richardson suggests (but does not prove) that lower foreign costs may modify but not reverse his result on welfare-reducing foreign entry, and also that a tariff can claw back some of the profits that foreign firms shift away from domestic firms.[4] I develop a more general model that allows for fixed costs, domestic exit, international cost asymmetries, as well as an optimal tariff, with some unexpected results.

Denote the (constant) domestic and foreign marginal costs as c and c^*, with $a > \max(c, c^*)$. The home government can impose a specific tariff t on imports. Entry costs limit the number of domestic incumbents to n. Profit maximization by n domestic and n^* foreign firms under Cournot conjectures can be shown to yield the following equilibrium (provided all firms are covering their fixed costs):

$$q = \frac{(n^* + 1)(a - c) - n^*(a - c^* - t)}{b(n + n^* + 1)} \tag{4}$$

$$q^* = \frac{(n + 1)(a - c^* - t) - n(a - c)}{b(n + n^* + 1)} \tag{5}$$

$$P = \frac{a + nc + n^*(c^* + t)}{n + n^* + 1} \tag{6}$$

I shall later obtain parameter restrictions required for interior solutions, and also analyze

4. He does refer to another (unpublished) paper in which such an optimal tariff is derived for a very different discrete-choice Logit model with differentiated products.

corner solutions when the restrictions are violated. Three different scenarios can be considered:

3.1: Free trade, endogenous number of domestic firms

Setting $t = 0$ in the above expressions, consider first the case where free entry and exit by domestic firms results in average-cost pricing, so that

$$P = \frac{F}{q} + c \tag{7}$$

Suppose now that foreign firms have a cost advantage that allows them to break into a zero-profit autarky equilibrium once trade is thrown open. This necessarily forces some of the domestic firms to exit. Substituting from (4) into (7) gives two equations, (6) and (7), in two unknowns, n and P, for an exogenously given number of foreign firms n^*. Solving these equations for n gives the number of domestic firms that survive for any given number of foreign entrants:

$$n^e = \frac{a - c - n^*(c - c^*)}{\sqrt{bF}} - (n^* + 1) \tag{8}$$

Substituting back into (6) gives the price consistent with both Cournot equilibrium and a zero-profit condition for the home firms:

$$P^e = c + \sqrt{bF} \tag{9}$$

That is, provided some domestic firms survive, the price remains a constant markup over their marginal costs, regardless of the number of foreign entrants. To understand why, note

from (8) that

$$\frac{dn^e}{dn^*} = \frac{c^* - c}{\sqrt{bF}} \; - \; 1 \qquad (10)$$

which can be shown to be negative for any positive foreign presence. If home and foreign costs are equal, we have one-for-one displacement of home firms by foreign entrants. More interestingly, foreign entry displaces more (less) than an equal number of home firms if and only if c^* is less (greater) than c, and it can be shown that this too results in an "Archimedean" displacement of an equal *volume* of domestic output. It is this that maintains market supply at the same level and hence a constant price. Here, business-stealing takes place through the displacement of incumbent firms, rather than a reduction in their individual output levels.

With domestic firms continuing to earn zero profits, foreign entry does not result in any change in producer surplus, and with no change in the price, there is no change in consumer surplus either. This gives us

PROPOSITION 2: In the linear Cournot model, if domestic firms are subject to a zero-profit condition, domestic welfare is unaffected by foreign entry as long as some domestic firms survive.[5]

The resulting situation is obviously not a typical zero-profit equilibrium, since with no change in the price, foreign firms continue to earn profits and hence continue to enter. In principle, this continues until the domestic industry has been driven out, since any price that

5. It can be shown that if social costs are lower than private costs, then welfare actually decreases with foreign entry until the domestic industry is shut down -- an illustration of condition (b) in Proposition 1 above. Proposition 2 would then state that if domestic firms are subject to a zero-profit condition, foreign entry has no (a negative) impact on welfare until the domestic industry is shut down, if the social costs of domestic production are equal to (less than) their private costs.

is consistent with zero profits for the domestic firms yields positive profits to foreign entrants with lower costs.[6] Welfare improves only after all home firms have exited and further foreign entry reduces market concentration, allowing the price to descend to the lower level justified by the entrants' lower costs. The concluding section of this paper offers possible interpretations of a situation described by (8) and (9), in which only a few foreign firms enter despite rents remaining available, so that some domestic firms survive.

3.2: Free trade, fixed number of domestic firms

I now assume that domestic fixed costs are entirely sunk, so that $F = 0$ from the perspective of the incumbent domestic firms as well as social welfare, while positive entry costs prevent further domestic entry. Although this is as extreme as the zero-profit closure, it is probably closer to the situation that protected industries find themselves in when first exposed to foreign competition, as I suggested in the Introduction. Foreign entry costs are assumed to be lower, and with domestic entry costs entirely sunk, foreign entry does not displace home firms as long as $P > c$. Here the original business-stealing effect returns: from (4) and (5), it can be shown that $\partial q/\partial n^* < 0$ if $q^* > 0$. With linear demand and constant costs, the welfare function (1) now takes the form

$$W = [a(nq + n^* q^*) - b(nq + n^* q^*)^2/2] - cnq - (P - t)n^* q^* \qquad (11)$$

where output levels also depend on t. First, setting t=0, we can substitute (4), (5) and (6) into (11) to yield a cumbersome expression for $W(n^*)$:

6. A zero-profit equilibrium for *both* home and foreign producers allowed both types to survive in the early international oligopoly models because of a combination of export opportunities, transport costs and/or product differentiation, all of which are absent here.

$$W(n^*) = \frac{(n^*)^2[(2n(c-c^*)^2+(a-c^*)^2]+2nn^*(a-c)(a-2c+c^*)+n(a-c)^2(n+2)}{2b(n+n^*+1)} \tag{12}$$

The derivatives of (12) are also cumbersome but can be tamed by evaluating at $n^*=0$:

$$\frac{\partial W}{\partial n^*}_{|n^*=0} = \frac{-n(a-c)[n(c-c^*)+a-c^*]}{b(n+1)^3} < 0 \tag{13}$$

Foreign entry will be viable only if $q^* > 0$ in equilibrium. It can be shown from (5) that this implies that the expression in square brackets in (13) is positive, and hence (13) is negative: foreign entry must initially reduce welfare under free trade. Also,

$$\frac{\partial^2 W}{\partial n^* \partial c^*}_{|n^*=0} = \frac{n(a-c)}{b(n+1)} > 0 \tag{14}$$

showing that lower foreign costs, which would yield greater gains from trade if foreign supply were competitive, result in a sharper initial drop in welfare in the present case.

Further, it can be shown that after falling initially from the autarky level, $W(n^*)$ begins to rise again as the terms-of-trade effect of additional entry begins to outweigh the business-stealing effect, giving a J-shaped relationship between welfare and the number of foreign firms. We can calculate the critical number of foreign entrants that is necessary to restore the autarky level of welfare by solving $W(n^*) = W(0)$ for n^*. This is

$$\tilde{n}^* = \frac{2n(n+1)(a-c)}{2n^2(c-c^*)+3n(c-c^*)+a-c^*} \tag{15}$$

For symmetric home and foreign firms ($c = c^*$), this becomes simply $2n(n+1)$, which was derived by Richardson but misprinted as $2n(n-1)$ in his paper. This highlights the significance of welfare-reducing foreign entry quite clearly: for example, with five domestic firms in the market, the entry of upto *sixty* identical foreign firms reduces welfare relative to autarky!

With asymmetric firms, we must be careful about corner solutions. For $c^* < c$, (4) shows that a combination of low enough c^* and large enough n^* can drive out the domestic firms. By solving (4) for $q = 0$, it is possible to find the number of foreign entrants $\hat{n}^*$ at which this happens, and to show algebraically that it is invariably greater than $\tilde{n}^*$ in (15). More directly and intuitively, domestic firms exit when foreign entry has driven the price down to the level of their average cost, which must be lower than the price they were charging under autarky. Welfare at this corner solution (with $n = 0$ and $n^* > 0$) must therefore be higher than at the "opposite" corner under autarky ($n > 0$ and $n^* = 0$). Thus, $W(0) = W(\tilde{n}^*) < W(\hat{n}^*)$, and therefore by (13) and the continuity of the $W(n^*)$ function, we must have $\tilde{n}^* < \hat{n}^*$. The lower curve in Figure 1 illustrates the welfare impact of different levels of foreign entry relative to autarky for this case.[7]

[FIGURE 1 HERE]

Some other possibilities are not shown in the Figure. Beyond $\hat{n}^*$, the domestic firms exit, and further foreign entry has only a terms-of-trade effect which raises welfare even more. If domestic firms incur fixed costs, then exit commences at some $n^* < \hat{n}^*$, which can be obtained by solving (8), given n incumbents. We are then back in the world of Proposition 2, and further foreign entry leaves welfare unchanged until domestic production ceases. If, on the other hand, $c^* > c$, foreign entry will cease once the price has been depressed to the level

7. The Figure is drawn by simulating the model for a=10, b=1, c=2, c^*=1, and n=5. This gives critical values of $\tilde{n}^* = 6.49$ and $\hat{n}^* = 8$.

of foreign costs. Noting from (15) that $\tilde{n}^*$ is positively related to c^*, this can truncate the J-shaped relationship at $n^* < \tilde{n}^*$ and leave welfare below the autarky level, with no prospects for further entry. In each case ($c >$ or $< c^*$, with or without fixed costs), welfare-reducing foreign entry remains a force to be reckoned with for a discrete number of entrants, and not just marginal entry as in Section 2.

Just how much foreign penetration is required before it improves welfare relative to autarky? After all, if foreign firms enjoy a cost advantage, (14) showed that welfare initially declines more rapidly with foreign entry as compared to the symmetric case, but (15) shows that it also recovers more rapidly to the autarky level. In the simulation depicted in Figure 1, with five domestic firms, only 6.5 foreign entrants instead of sixty are now required to regain and exceed the autarky level of welfare. However, with asymmetric costs, the *number* of foreign entrants required to restore the autarky level of welfare is of limited significance in its own right. More crucial is the foreign market share required for this outcome. This is

$$\tilde{m} \equiv \frac{\tilde{n}^* q^*(\tilde{n}^*)}{\tilde{n}^* q^*(\tilde{n}^*) + nq(\tilde{n}^*)} \tag{16}$$

Substituting from (4), (5) and (15) gives an unexpectedly simple result, which is independent of demand and cost parameters, provided of course that these are consistent with an interior solution:

$$\tilde{m} = \frac{2n+2}{2n+3} \tag{17}$$

PROPOSITION 3: In the linear Cournot model with a fixed number of domestic firms, entry by oligopolistic foreign firms under free trade decreases welfare relative to autarky unless

they capture at least (2n+2)/(2n+3) of the market.[8]

The critical foreign share required for welfare improvement is quite substantial: it is 80% for $n = 1$, and rises asymptotically to unity as n increases. For our standard example with five domestic firms, welfare remains below the autarky level until the domestic industry surrenders over 92% of the market to foreign entrants.

The required foreign penetration may come about through a sufficiently large number of foreign entrants or sufficiently lower foreign costs, or some combination of the two. I have assumed throughout that the cost asymmetry between domestic and foreign firms is small enough to permit an interior solution to the Cournot game, so that the home industry backs down continuously as foreign firms enter. If instead the very first foreign entrant is so much more efficient that it drives out the entire domestic industry, then such entry raises welfare with no J-curve, as shown by Levy and Nolan (1992). This is of course entirely consistent with Proposition 3.

3.3: Optimal tariff, fixed number of domestic firms

8. It is possible to show that if social costs are less than private costs, this critical level of foreign entry is even higher.

I now relax the assumption of free trade. Borrowing from Bhattacharjea (1995), the optimal tariff that maximizes (11) for any given market structure[9] can be derived as:

$$t^* = \frac{(a - c^*)(2n+1) \; - \; n(n - n^*)(c^* - c)}{n^* \; + \; 2(n+1)^2} \tag{18}$$

As usual in the strategic trade literature, the home government must commit to this tariff before the firms decide on their outputs. This means that the tariff must be adjusted as firms enter but before they supply the market. (It can be shown that $dt^*/dn^* < 0$, so the tariff must be steadily reduced.) Alternatively, and slightly more realistically, the government in this world of full information can compute the number of foreign firms that will eventually enter and impose the corresponding tariff, and the firms in turn enter taking this tariff as given. Substituting (18) back into (4), (5), and (6), then substituting these in turn into (11), and finally differentiating (11) with respect to n^* yields

$$\frac{\partial W \; (t^*)}{\partial n^*} = \frac{[a - c + (c - c^*)(n+1)^2]^2}{b[n^* + 2(n+1)^2]^2} \; > \; 0 \tag{19}$$

In contrast to the J-shaped relationship derived under free trade, we now have

PROPOSITION 4: In the linear Cournot model with a fixed number of domestic firms, if the government imposes an optimal tariff conditioned on the equilibrium market structure, welfare is strictly increasing (although at a decreasing rate) in the number of foreign firms.

9. It is well known that with domestic oligopoly, a combination of domestic production subsidy and tariff is first-best. However, building on observations by earlier authors, Bhattacharjea (1995) advances several reasons why the domestic subsidy is infeasible in this context. An entry subsidy for *foreign* firms, which Reitzes and Grawe (1999) suggest as a remedy for insufficient foreign entry, is even more impractical on political grounds.

The upper curve in Figure 1 illustrates how the welfare impact of foreign entry is modified by the optimal tariff.[10] Such a tariff is not only optimal for a given oligopolistic market structure, as demonstrated many years ago in the strategic trade literature, it is also a guarantee against welfare-decreasing foreign entry, at least in the linear Cournot model. This result also qualifies the conclusion at the end of the previous subsection, where it was argued that welfare increases if the foreign cost advantage is large enough for marginal foreign entry to drive out the entire domestic industry. In light of Proposition 4, this should not be interpreted to mean that a domestic industry that cannot survive under free trade must be shut down; it is welfare-improving for it to be protected by an optimal tariff.

However, Proposition 4 should not be taken too seriously as a policy prescription, for several reasons. First, optimal tariffs of this kind are very hard to calculate even for a given number of firms; calibrating one to an evolving or potential market structure would be virtually impossible, and would open the door to rent-seeking lobbies. Second, Bhattacharjea (1995) showed in a similar model that an optimal tariff is likely to induce excessive *domestic* entry. Third, the tariff remedy against welfare-decreasing foreign entry is ruled out if it takes the form of direct foreign investment,[11] and finally the tariff may itself result in inefficient tariff-jumping investment by the foreign firms.

This last possibility can be spelt out in a little more detail. Since all foreign firms are identical, if it is profitable for one to jump the tariff, it is profitable for all. If the number of firms and their costs remain unchanged after relocation inside the domestic tariff area, the outcome is identical to that derived under free trade. For any given number of firms, the consequences of tariff-jumping DFI can be then be seen as a vertical drop from the upper curve in Figure 1 to the lower one.

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10. The curve is drawn for the same parameter values as the one representing free trade, and is actually concave even though it appears to be linear. Calculations show that domestic firms now remain viable until $n^* > 16$.
11. The interesting suggestion by Levy and Nolan (1992) that in the case of DFI the effect of a tariff can be replicated by a discriminatory sales tax on the foreign firm's output would run into "national treatment"

4. EMPIRICAL EVIDENCE AND EXTENSIONS

4.1: Empirical evidence

The two bodies of theoretical literature on which this paper has drawn--strategic trade policy and inefficient entry--have both evolved over two decades, and remain notoriously difficult to implement empirically. While several calibrated models based on heroic assumptions and outside estimates of costs and demand elasticities have come up with optimal tariffs and subsidies for various high-profile industries, only very recently Berry and Waldfogel (1999, on radio broadcasting) could claim to be the first to attempt an empirical assessment of inefficient entry, and that too in a closed economy. It would be rash to pretend that a model like the one developed in this paper can be applied empirically.

There is, however, accumulating evidence on the various ingredients that went into the making of the model. On the crucial business-stealing effect of foreign entry, cross-country evidence presented by Tybout (1992) shows that increasing trade exposure results in contraction of the scale at which plants operate. More recently, Head and Ries (1999) show that, contrary to earlier assessments, liberalized imports into Canada as a result of NAFTA had a negative impact on output per plant. Aitken and Harrison (1999) have argued that by forcing domestic firms to contract up their declining average cost curves, the increased competition provided by DFI can actually reduce their productivity. Their analysis of a large Venezuelan panel data set shows that this negative effect on purely domestic firms (with evidence of "business stealing" within industries) neutralizes the positive impact of foreign equity participation on productivity growth, with no evidence of cross-firm spillovers. Similarly, empirical evidence surveyed by Blomstrom and Kokko (1998) shows that if there is limited domestic competition, or if domestic firms lack the ability to imitate, foreign presence can lead to negative spillovers on domestic output and productivity. These authors

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provisions in international agreements.

were concerned with firm scale and productivity rather than the empirically more elusive concept of welfare used here, and some of them play down the adverse effect of liberalization on domestic output by arguing that there is no perceptible loss of internal economies of scale. However, the results derived above do not rest on scale economies: it is the output contraction itself -- which would be a sign that trade liberalization was working in the right direction in a competitive model -- that is the culprit behind the fall in welfare. And at a much more aggregative level, Greenaway *et al* (1998) use a very large panel data set and find that the impact of trade liberalization (measured by various proxies) on GDP growth follows a relationship that they too describe as a J-curve.

4.2: Homogeneous vs differentiated products

The assumption of homogeneous products was necessary to obtain sharp results, which go beyond those of the earlier literature that employed this assumption. It can also be justified in two other ways. First, it captures the situation in many chemical and metallurgical industries that were set up in several developing countries under autarkic import-substitution policies, and have recently been forced to confront import competition. Second, for other industries, although product differentiation moderates the business-stealing effect of foreign entry, and also provides an additional source of welfare gains in the form of greater variety, the problem of welfare-decreasing foreign entry does not go away. Since entrants cannot fully appropriate the externalities they bestow on consumers by introducing new varieties, product diversity actually provides another reason (in addition to entry costs) for insufficient entry, with business-stealing possibly outweighing the benefits of competition and greater variety. A negative net effect on welfare (provided that foreign costs are not much lower, or the foreign product not "too" different) was demonstrated by Levy and Nolan (1992) as well as Denicolo and Garella (1999), using differentiated-product Cournot duopoly; Jensen and Krishna (1996), using a CES utility function that exhibits "love of variety" but allows for different degrees of substitutability across varieties within and between countries; and also Richardson

(1998), in a discrete-choice Logit model. Thus, a result similar to Proposition 1 seems to be robust across a range of differentiated-product models. Richardson also showed that an optimal tariff can prevent the decline in welfare in his framework, and it is easy to demonstrate this in a differentiated-product Cournot duopoly as well, so that a result corresponding to Proposition 4 can also be obtained for models with product differentiation.

4.3: Foreign mergers

Although this paper is primarily about foreign entry, the model of section 3 can also be used to assess the impact of foreign mergers, as Dixit (1984) did with his original international oligopoly model. However, my approach yields additional insights. Return to the J-shaped relationship between welfare and the number of foreign firms, but read it in the reverse direction. If foreign mergers and export cartels can be treated as a reduction in the effective number of foreign firms, this can actually reduce home welfare below the autarky level, as the free-rider benefits that greater concentration bestows on domestic firms who are not party to the merger is insufficient to compensate for the loss it inflicts on domestic consumers. Recall that Dixit had suggested the crucial level of foreign merger was the one corresponding to the foreign market share at which welfare reaches the trough of the J, whereas it is actually the higher level $\tilde{m}$ identified here. Also, Dixit analyzed the welfare effect of foreign mergers by examining the sign of the partial derivative $\partial W / \partial n^*$. The problem with this is that with Cournot competition, a horizontal merger is not profitable for the participating firms themselves, due to the free-rider problem and the expansion of output by "outsider" firms, unless it either brings about a cost reduction, or unless a substantial proportion of the firms in an industry internalize the externality by merging.[12] This means that, absent a cost reduction, a viable merger is almost certain to drag the home country into the trough of the J-curve. Nor

12. See Salant, Switzer and Reynolds (1983), who show in a linear Cournot model that a merger is unprofitable if less than 80% of the firms in the industry merge. In an international trade context, Head and Ries (1997) show that profitable cost-reducing mergers may be approved by regulators because they increase welfare in their home jurisdictions, even though they reduce world welfare.

is the optimal tariff of much use: (19) shows that it can only mitigate the adverse effect of greater foreign concentration, not prevent it. And since the optimal tariff rate in (18) is inversely related to the number of foreign firms (and to their costs), such mergers will entail higher tariffs, which are more likely to be jumped.

Recent theoretical literature has investigated another way in which a country could respond to foreign mergers: by altering the number of *domestic* firms through changes in its own merger policy. Horn and Levinsohn (2001) provide a recent survey, and use the sign of the mixed derivative (in our notation) $\partial^2 W / \partial n \partial n^*$ to determine the direction of the home country's best response, in a model in which firms in both countries sell in both markets. Although this analysis of marginal changes in the number of foreign firms is subject to the same criticism as Dixit's model, it is worth briefly investigating the sign of the derivative in our model. Horn and Levinsohn found that tractable results were obtained only with linear demand and symmetric home and foreign costs, and even then the results were ambiguous. The same is the case here. From (12), setting $c = c^*$, we get

$$\frac{\partial^2 W}{\partial n \partial n^*} = \frac{(2n - 4n^* - 1)(a - c)^2}{b(n + n^* + 1)^4} \tag{20}$$

The sign of this is indeterminate, but as a rough guide, the home country will have an incentive to harmonize its merger policy with the rest of the world (in the sense that domestic concentration should move in the same direction as foreign concentration) only if the number of home firms is more than double the number of foreign firms. The comparable result in Horn and Levinsohn only requires (again roughly) that the number of home firms exceed the number of foreign firms for this conclusion to hold. Our model differs from theirs only in the absence of home exports to the foreign market -- a more likely scenario for oligopolistic firms in developing countries. This seems to increase the likelihood of discordant merger policies, at least in this very special case of linear demand and symmetric costs.

5. CONCLUSIONS

This paper has shown in a variety of ways that limited foreign entry can reduce welfare relative to autarky. An obvious question that arises here is why there should be limited foreign entry if there are still rents to be earned. This can be answered at several levels. One approach is to regard all the results as representing a transitional scenario in an economy which has recently been opened up, so that foreign firms are just beginning to enter. A second possibility, briefly mentioned in section 3.2, is the corner solution with $c^* > c$, where the foreign firms' higher variable costs (which must include transport costs) stop their entry while home firms continue to earn profits. A third approach, familiar from the strategic trade literature, is to confine the applicability of the model to industries where high firm-level fixed costs (or access to patented technology) limit the number of producers globally, while transport and marketing costs may further limit the number that supply a particular country's market.[13] A fourth and final approach is to think of entry as direct foreign investment, with the number of entrants limited either by high plant-specific fixed costs relative to the size of the host country market, the need to establish marketing networks, or the licensing of foreign firms that some developing countries still require even after they have opened up.

At the level of theory, the main results of this paper can be summarized as follows. As I pointed out at the beginning, the strategic trade literature established that a tariff is generally superior to free trade under international oligopoly, but did not make comparisons with autarky except in special cases. Proposition 1 demonstrates in a more general framework the possibility of welfare-decreasing foreign entry and consequently of autarky being superior to free trade. Proposition 2 shows that even allowing for rationalization of the domestic industry through exit, welfare does not improve until it shuts down altogether.

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13. An interpretation based on research and development is perhaps the only one consistent with the setting in section 3.1, in which domestic firms continue to make only normal profits while foreign entrants earn rents. High sunk costs of technology development (and patent protection) can limit the number of entrants and also reduce their marginal costs, permitting them to break into the zero-profit equilibrium established by domestic

Without domestic exit, and with a fixed number of domestic firms earning rents, the J-curve and Proposition 3 show that welfare is reduced unless domestic firms surrender a very large share of their home market. Proposition 4 shows that a tariff gives an outcome that is superior to both free trade and autarky. Taken together, these results alter the ranking which is the conventional wisdom in economics, based on competitive models. Denoting welfare under autarky, free trade, and a tariff by A, F, and T respectively, the conventional result is F > T > A, whereas I have shown that with oligopoly T > A > F until foreign penetration exceeds the critical level where A = F, and T > F > A thereafter.[14]

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firms using an older technology which is freely available.

14. Acharyya (2000) shows in a conjectural variations duopoly model with symmetric costs that T > F > A for values of the conjectural variations parameter $dq/dq^* = dq^*/dq < -1/3$ (that is, considerably more competitive than Cournot; see also n.3 above). Otherwise, T > A > F. Taken together with my results, this indicates that foreign entry can improve welfare relative to autarky if it increases competition substantially, in the form of either changes in industry "structure" or "conduct".

What then are the practical lessons to be learned from this paper, since autarky is hardly an option in today's world? The optimal tariff formula used in Proposition 4, while important for completing the welfare ranking of free trade, restricted trade and autarky, cannot form the basis of an alternative policy prescription, for reasons given at the end of section 3. Probably the basic lesson of this paper for trade policy, then, is one of scepticism rather than activism: one should not expect too much from opening up hitherto protected sectors if the market structure will remain oligopolistic. Trade liberalization is not a good substitute for domestic competition policy in this situation, and "market discipline" (to use a phrase due to Levinsohn, 1993) can be excessive. This is, of course, an example of the theory of the second-best. Even if the welfare reduction is seen as a short-run phenomenon, pending the entry of more foreign firms or the exit of domestic firms whose fixed costs may be sunk only in the short run, the results show, like the more famous J-curve which describes the effects of a devaluation, that things can get worse before they get better.

Apart from its sceptical conclusions regarding trade policy, this paper does draw attention to the need for regulating foreign mergers with cross-border effects, export cartels (which are exempted by the competition laws of most countries), and restrictive business practices. However, this raises difficult questions of sovereignty and extra-territorial jurisdiction. While the APEC is actively pursuing a programme of cooperation in antitrust matters, most developing countries are unlikely to be able to take effective action against such practices. Nor are they likely to obtain the "positive comity" the United States and the European Union have granted each other in reviewing offshore mergers and investigating complaints regarding anti-competitive conduct by their firms which adversely affects the interests of parties in each other's jurisdictions. And the possibility of an international competition policy, within or outside the WTO, seems remote in light of the sharply divergent views expressed at the WTO Working Group that has been debating this issue since 1997. The question of whether importing countries should harmonize their merger policies with those of their trade partners was briefly touched on in the last section, and the very

limited result derived there only reinforces this scepticism.

The findings of this paper do however suggest some areas where action on the home front is possible in respect of foreign investment. Since "insufficient" foreign entry is more likely in the case of DFI than imports, due to the additional set-up costs that foreign firms have to incur, there may yet be a case for prohibiting foreign investment in particular sectors, unless it is very likely to be much more efficient or to yield definite spillover benefits to domestic firms. Industries subject to barriers to entry such as economies of scale and product differentiation are the ones where welfare-reducing entry is likely to be a problem. However, the prohibition must be applied at the sectoral level, for firm-by-firm approval of foreign investment proposals, apart from breeding corruption, is itself likely to limit foreign entry and leave the economy wallowing in the trough of the J-curve. In sectors that are to be opened up to DFI at all, the door should be kept wide open, with an active domestic competition policy to regulate mergers between foreign firms and prevent abuse of market power. And it goes without saying that countries should refrain from offering "market power inducements" (such as insulation from domestic and foreign competition, or profit guarantees) to attract DFI.[15]

15. See UNCTAD (1997) for evidence of such inducements provided by developing countries.

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FIGURE 1: Foreign Entry and Domestic Welfare