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9. ABSTRACT

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WHAT TO DO ABOUT FOREIGN DIRECT INVESTMENT:  
A HOST COUNTRY PERSPECTIVE

by

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Summer, 1973

The author is Assistant Professor of Economics at The University of Wisconsin. This paper reports research related to the National Science Foundation Grant No. GS-34581, on Distribution of Gains, Wealth and Income from Development. Program Discussion Papers are preliminary materials circulated to stimulate discussion and critical comment. References in publications to Discussion Papers should be cleared with the authors to protect the tentative character of these papers.

What to Do about Foreign Direct Investment  
A Host Country Perspective

For the government of an LDC one of the really important policy questions is how to treat foreign direct investment so as to maximize national welfare. In a world where expertise is a factor of production controlled by a few large firms, where markets are not perfect, and where internal prices are heavily dependent on tariff decisions of the government, some explicit policy is necessary. What guidelines should it follow? That is the question I would like to explore here.

To decide whether foreign direct investment is desirable or not, the standard economic analysis measures benefits and costs,<sup>1</sup> which is certainly germane to the evaluation of a particular direct investment. But it is not sufficient in countries where markets are small and entry is limited because foreign firms control access to necessary factors of production. To take an extreme example, suppose that at most one producer will supply a particular product in a small LDC. For this case the standard benefit-cost analysis is misleading. What we want to know is whether the subsidiary of a

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<sup>1</sup>G.D.A. MacDougall, "The Benefits and Costs of Private Investment from Abroad: A Theoretical Approach," Economic Record, 26 (March, 1960), pp. 13-35; Harry G. Johnson, "The Efficiency and Welfare Implications of the International Corporation," in Charles P. Kindleberger, ed., The International Corporation (Cambridge: MIT Press, 1970); Stephen Hymer, "The Efficiency (Contradictions) of Multinational Corporations," American Economic Review, 60 (May, 1970), pp. 441-48; Ronald W. Jones, "International Capital Movements and the Theory of Tariffs and Trade," Quarterly Journal of Economics, 50 (Feb., 1967), pp. 1-38; M.C. Kemp, "The Gain from International Trade and Investment: A Neo-Heckscher-Ohlin Approach," American Economic Review, 56 (Sept., 1966), pp. 788-809; Richard E. Caves, "International Corporations: the Industrial Economics of Foreign Investment," Economica, 38 (February, 1971), pp. 1-27.

multinational firm will, over the relevant future, supply the particular product at minimum social cost. To decide that we must compare its costs to those of the alternative sources of supply, imports or domestic production. What the standard analysis fails to consider is the possibility that either of these alternatives may be preferable to foreign direct investment, even though the net social benefit of the latter is positive.

Devising policy is complicated by the fact that the goals of the country and the foreign supplier are in conflict. The firm attempts to maximize after tax profits, but since profits are repatriated, they are a cost to the country. Therefore, if the government leaves the foreign firm free to maximize profits, the cost of supply is likely to be maximized, not minimized. In most LDC's, therefore, one should think of the situation as that of two opponents trying to get the best of each other. On the one side is the foreign firm, controlling a valuable factor of production, knowledge, from which it is attempting to wring maximum monopoly profit. On the other side is the host country government controlling access to the domestic market and trying to find a way to import knowledge at the lowest social cost. It is in this air of inescapable antagonism that governments must make policy. Hopefully this paper will provide some assistance in that task.

The paper is organized as follows. In part one, I explore the implications of introducing knowledge explicitly as a factor of production. A welfare comparison is made between foreign and domestic producers both operating with the same production function but with different levels of the factors, particularly knowledge. In part two, I show that the profit maximizing solution for the foreign firm is usually non-optimal from the host country's point of view, and derive an optimal tax strategy to minimize this

problem. Finally, in part three, I derive some rules of thumb government regulations for foreign investment in different industries where the key distinguishing feature between the industries is the role of knowledge in the production process. These rules of thumb are a second-best approximation to the optimal tax rule where information about industrial production functions is scarce and costly to obtain.

### Part I

What is it that distinguishes a foreign firm from a potential domestic producer? I will follow Johnson's suggestion that the differences can be reduced to variations in the ownership or use of expertise or knowledge.<sup>1</sup> Formally one should think of knowledge as a factor of production, in most respects like a capital good. It is a factor of production in the sense that it is substitutable for the other factors, labor and machinery, and it enters in the firm's short-run cost function, as other capital does, to reduce costs. Like other capital goods it is produced by investment, either in the laboratory, if the knowledge is new processes, or products, or in short-term operating losses, if the knowledge is organizational. The latter sort of investment is known as "learning by doing."

Knowledge once created is a free good which the creating, or owning firm, tries to use as profitably as possible. It has many choices. It can use the knowledge internally to reduce costs--thus earning a profit in production, it can sell or rent the expertise, it may take over another firm so as to apply its expertise in a new product market, or it may set up a subsidiary in a different locality. It can afford to purchase a firm because

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<sup>1</sup>Johnson, op. cit.

the seller's profits rise in the presence of the complementary factor of production.<sup>1</sup> For the firm, considering how to sell its expertise in the foreign market, the choices obviously are: export, sell royalties, licenses or advisory fees, or set up a foreign subsidiary. At present, it does not appear that there is a very well developed market for the direct sale of knowledge by the firm so that the choices confronting the firms and the country often appear to be limited to one and three. It is not obvious whether this limited marketability of knowledge is due to the monopoly power of the owners or some technical problem making knowledge transfer difficult. As we will see later, the central issue in devising a strategy for foreign investment is the nature of the knowledge each foreign firm controls and the difficulty of buying or reproducing it.

Formally let us suppose that each firm produces a single product according to the general production function:

$$Q = f(L_1 \dots L_n, K_1 \dots K_j, K_{j+1} \dots K_n) \quad (1)$$

$L_i$  = variable factor  $i$

$K_i$  = fixed factors, where index  $1$  through  $j$  stand for fixed capital and  $j+1$  through  $n$  stand for different types of knowledge or expertise.

We can derive a cost function depending on the different types of capital, knowledge, output and all variable factor prices. We assume that knowledge is always cost decreasing.

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<sup>1</sup>Admitting knowledge as a factor of production is useful in understanding the growth of the firm. See Edith Penrose, The Growth of the Firm (New York: J. Wiley, 1959).

$$C = c(W_1 \dots W_n, K_1 \dots K_n, Q) \quad (2)$$

$W_i$  = price, or wage of factor  $i$

$$\frac{\partial C}{\partial K_i} \geq 0$$

Some kinds of expertise are strictly necessary before production can take place. A die maker cannot use numerical controlled milling machines without knowing how to write the required computer programs. In that case the cost function would be discontinuous with respect to the particular  $K_i$ , infinite in its absence and some well-behaved function of the other arguments in its presence. One important type of expertise typically possessed by foreign firms is marketing skill. This is not a factor which would enter the cost function, except indirectly through scale effects which are captured by  $Q$ . While this is an important factor we will ignore it and assume instead that demand is exogenous.

Assume that there is a single, unique cost function for each product. Foreign and domestic firms differ only in their ability to acquire or use the different factors which are the arguments of that function. In the case of trademarked consumer products such as automobiles, it may not be possible for a domestic firm to produce a car which buyers think is equivalent to a Chevrolet. When comparing the benefits of foreign and domestic production in such cases, I will ignore the difference in utility which a buyer feels when he purchases a "real" Chevrolet as opposed to a domestically produced one which merely does all the same things. Thus, we assume that it is possible to reproduce any production process in any country, provided that the necessary expertise can be rented or bought. The problem facing the policymaker

is whether imports, domestically licensed production or foreign directed investment is the lowest-cost way to acquire the products desired by its consumers.

The reason that we are forced to make a comparison of supply costs is that for the market size and production conditions of most LDC's, each product will probably be supplied by one producer only. There are two reasons for this: control of expertise and market size. Where the product requires expertise which is under the control of one of the supplier firms, that expertise will not be for sale to potential competitors if the owner firm has already established its own production facility. If the product is one in which one firm has a cost advantage, then the low cost firm will be established first. When the market reaches the size where other potential suppliers are profitable, they are forced to reckon with the fact that they must split the market with the firm that is already there. For small markets it seems reasonable to assume that by the time potential late entrants split with the initial firm, their sales would not be sufficient to justify establishment. This assumption is an assertion that economies of scale are sufficiently important that, once one firm is producing, invasion of the market by another firm is not profitable and will not occur.<sup>1</sup>

When only a single supplier is possible, the standard foreign investment benefit-cost calculation must be revised. The question is no longer whether the net benefit of the foreign subsidiary is positive, but whether it is larger than that of any other potential supplier. With perfect freedom of entry the evaluation of each supplier is independent of the evaluation of all

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<sup>1</sup>Of course, our cost function is perfectly general, so that for large markets the problem can be restated as finding the least cost combination of foreign and domestic firms.

other potential suppliers. Disregarding possible externalities, if private profit for a firm is positive, its social benefits exceed social costs and it should be established. Thus, with freedom of entry the appropriate policy is to allow any firm to supply a market if it wishes to--no government intervention is necessary. Private firms maximizing profits lead to socially optimal supply patterns. That is true whether the firms are foreign or domestic. Once we abandon freedom of entry, this happy picture fades. For then the evaluation of all potential suppliers is mutually dependent, and the question is not whether the costs of a particular foreign or domestic supplier are less than price, but whether the costs are lower than those of any other supplier. In other words, if it is appropriate to abandon the assumption of perfect entry, then the analysis of the benefits and costs of foreign direct investment must be revised. Imports, the domestically owned firm and the foreign subsidiary are alternatives whose benefits and costs must be compared. It is to that comparison that we now turn.

Consider first the static benefit comparison. This compares the net benefits of the alternative suppliers at a single point in time, or a given market size. Assume that the products in question are internationally traded, that the internal price is equal to the world price plus tariffs, and that domestic factor prices represent real scarcity values to the economy. This means that we will ignore any externalities from labor training, foreign exchange saving or reducing unemployment. Under these assumptions, the social cost of importing the product is just equal to the opportunity cost of the exports which have to be sold to pay for it. If the export industries are competitive and there are no tariffs, that is just the world price of the import. The net benefit of importing the product is zero. This means that if

the domestic price is high enough to induce domestic production, that is preferable to imports. At the very least the country makes a supernormal producer's profit by using its resources in domestic production rather than exports. Suppose now that both domestic and foreign subsidiary production are profitable at this price. Which is preferable? To answer that question we compare the net benefits derivable from the two alternative methods of production.

The comparison is between the social profit obtainable from a national and a foreign-owned production facility. For the domestic firm social profit is the difference between price and total cost, including royalty payments, and a normal return on capital. For the foreign subsidiary the social profit, or net benefit to the host country is the tax payments received by the subsidiary. Total profits are not a benefit because they are repatriated, and that costs the host country an equivalent value of exports. Note that we are making the simplifying assumption here that all profits are repatriated immediately. In actual practice, host countries usually make a substantial debtor's profit from delayed repatriation.

For the domestic firm the per unit net benefit of the domestic operation is:

$$B_d = p - C_d - R.$$

$B_d$  - net benefit of domestic firm, (Supernormal profits)

$p$  - domestic price.

$C$  - average total cost excluding royalty payments. It is equation (2) evaluated at the levels of fixed inputs possessed by the domestic firm.

$R$  - per unit royalty payments.

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<sup>1</sup>MacDougall, op. cit.

Benefits for the foreign firm are its tax payments. Thus:

$$B_f = (p - C_f)T.$$

$B_f$  = net benefit of foreign firm.

$T$  = tax rate on subsidiary earnings.

$C_f$  = average total cost for the foreign subsidiary.

Incidentally this formulation implies that a foreign subsidiary confers no net benefit on the host country if the tax rate is zero. For then the country must pay the full price in repatriated profits plus factor costs, and would be indifferent between imports and direct investment.

Given all of this, the decision rule is to pick the foreign firm if  $B_f > B_d$ . That is, the foreign firm is preferable if:

$$(p - C_f)T > p - C_d - R. \quad (3)$$

For later purposes it is useful to rewrite (3) in terms of social cost.

(3) implies that the foreign firm is preferable if:

$$C_f + (1-T)(p - C_f) < C_d + R. \quad (4)$$

The LHS of (4) is the social cost of production by the subsidiary, and the RHS, the social cost of production by a domestically owned firm. Equation (4) says: pick the foreign subsidiary when its social cost of production is less than that of the domestic alternative.

The welfare comparison we have just made is for a point in time. Unfortunately, it is not satisfactory under the assumptions we have made about entry. For if control of expertise or the small size of the market precludes entry by more than a single firm, the benefit comparison must be expanded to include not just the present, but the entire future. One important feature of the foreign investment question that has been ignored in the literature is its irreversibility. If our assumptions about market size and

control of critical expertise are appropriate, supply will be in foreign hands once the foreign firm establishes its subsidiary, even if later changes in demand make domestically owned production preferable. And such changes in demand are likely. For over time the domestic demand curve will be shifting out, allowing more output to be sold at the world price. Since the cost functions of both the subsidiary and the domestic producer depend on output, the net advantage of one form of supply over the other will also be changing. To account for this we must rewrite equation (4) to include future periods. Where there are barriers to entry, the foreign subsidiary is preferable if and only if the present value of its cost is less than that of the domestic firm. Formally, the foreign subsidiary is preferable if:

$$\sum_{i=1}^{\alpha} \left[ \frac{C_F^i + (1-T^i)(p^i - C_F^i)}{(1+r)^i} \right] < \sum_{i=1}^{\alpha} \left[ \frac{C_D^i + R^i}{(1+r)^i} \right]. \quad (5)$$

This completes our benefit cost comparison, and we now turn to an examination of the investment or set-up decisions facing the potential firm, either domestic or foreign.

## Part II

We have developed a rule telling us whether the foreign or domestic operation is preferable. But since we are interested in devising a government strategy to lead to the preferred supply arrangements, we need to explore the solution that the market will generate if left to react to price signals.

Consider the investment decision problem facing the foreign firm. It can export, set up a foreign subsidiary, or sell its expertise to a foreign producer. We assume it does not ever do two of these activities at once.

Its goal is to maximize profits at home. Whether to export or set up a subsidiary is a question of cost minimization. It is worthwhile to make the overseas investment only if the cost saving from not having to pay tariffs and transportation is greater than the user cost of capital less any difference in variable costs between the overseas and the domestic production. The firm sells royalties, or rights to its expertise, when they are greater than the profits earnable from exports or a subsidiary.

Assuming a unitary exchange rate, the per unit profits from each of the alternative ways of using expertise are:

- a) exports :  $(1-t)p - C_f^h$
- b) subsidiary :  $(p - C_f)(1 - T)$
- c) royalty sales: R.

$C_f^h$  = average costs at the foreign firm home plant.

t = tariff rate plus transportation cost.

p = domestic price.

In order to get a determinate solution for market supply we are going to assume that both domestic and foreign firms follow a rule of thumb investment plan which says start production in the host country market as soon as current price and cost conditions make production profitable, or to be exact for the foreign firm more profitable than exports or royalty sales. It has been shown elsewhere<sup>1</sup> that such a myopic rule is an approximation to a true dynamically optimal investment plan which economizes on costly predictions about the future.

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<sup>1</sup>Richard W. Day, S.A. Morley and K.R. Smith, "Myopic Optimizing and Rules of Thumb in a Micro-Model of Industrial Growth," American Economic Review (forthcoming).

For the foreign firm the investment rules are:

(1) Set up a subsidiary if:

$$C_f - C_f^h + T(p - C_t) < tp$$

$$\text{and } R < (1 - T)(p - C_f).$$

Rule one says produce abroad if the additional costs incurred at the subsidiary are less than the cost saving of tariffs and transportation costs.

(2) Sell royalties if:

$$R > (1-t)p - C_f^h$$

$$\text{and } R > (1-T)(p - C_f).$$

(3) Export in all other cases.

For given states of knowledge and factor prices, these three rules completely describe the behavior of a foreign firm following our investment rules. Since we know that average costs at the subsidiary and royalty payments are both functions of output, the rules can be interpreted as setting various thresholds on quantity beyond which different production activities become most profitable and will take place. As I envisage the process, over time the domestic demand curve shifts out allowing larger quantities to be sold at the given world price. If the average cost function of the subsidiary is a decreasing function of output, increases in demand over time will move the market out of the export range and into the range where either the foreign subsidiary or royalty sales are most profitable. At the point where the foreign subsidiary after tax profits are first greater than profits from exports, if royalties are still more profitable, the market will be abandoned to the domestic producer, providing that he also can produce at a profit for

that output level. Otherwise a subsidiary will be established. Thus, which producer, foreign or domestic, supplies the market depends on relative cost or the importance of expertise as a factor of production.

Consider next the investment decision facing the domestic firm. Its rule is commence operations when the quantity sold is large enough to bring average costs below the exogenous market price. That is, produce if:

$$p > C_{d1} + R.$$

and if the foreign firm will sell its expertise for a payment  $R$ .

The cost of learning by doing is included in the average cost function, just as the cost of any other capital good is. The firm accepts current operating losses during the learning period, but is assumed to know what its final cost function will be. It makes its investment decision based on that cost, not costs during the break-in period. Profits have to be sufficient to cover the user cost of the knowledge it acquires during the break-in period.

It is convenient to bring all the investment rules and welfare conditions together in a diagram at this point. We will use as an example a product for which royalties are a significant cost and for which the foreign firm has a cost advantage apart from the royalty payment. The diagram shows profits and social costs as a function of output, which is exogenously set as the quantity demanded at world prices.

The lower horizontal line labelled  $p - C_f^h$  gives the per unit profit from exports. The line  $\pi_f$  gives the per unit profits of the foreign subsidiary.  $C_f$  and  $C_d + R$  give the average costs of foreign and domestic production. Line  $PP$  is the market price, expressed in local currency. Line  $R$  gives per unit royalties. The line  $SC_f$  is the LHS of (4) and shows the social cost of the

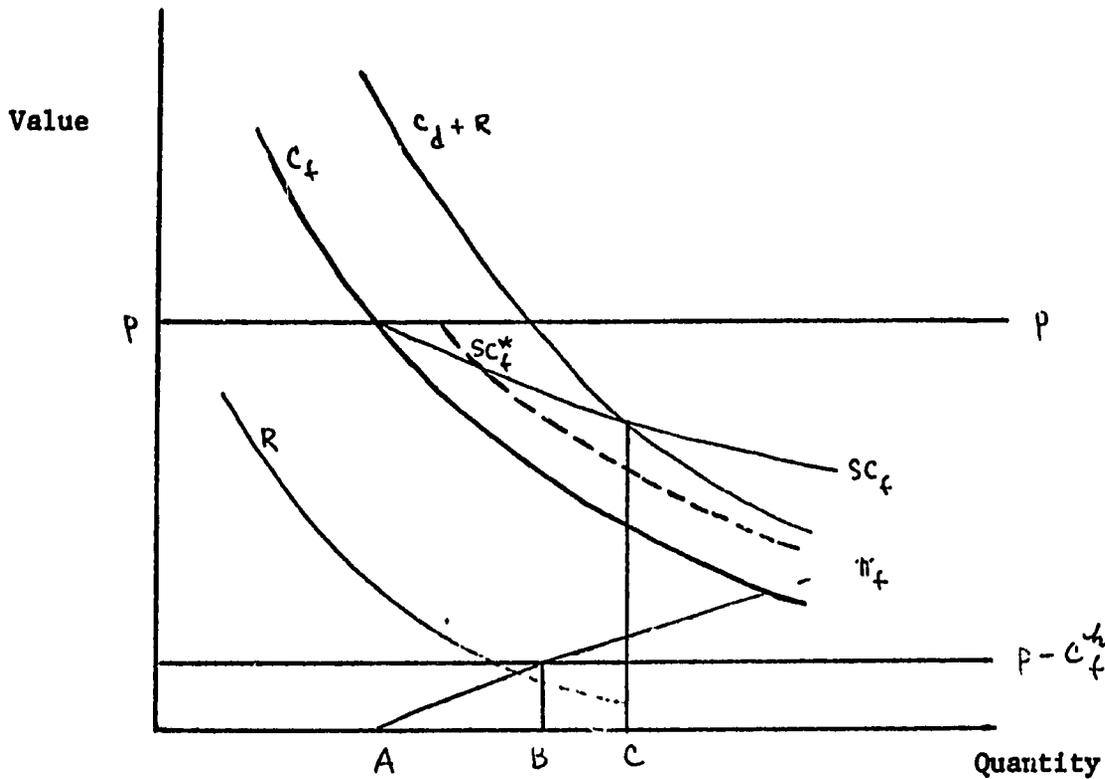


Figure 1: The Market Solution for Foreign and Domestic Investment

foreign subsidiary. The higher the tax rate, the closer  $SC_f$  is to  $C_f$ . By the definitions of profits and costs, it follows that the profit line,  $\pi_f$ , is the vertical distance between  $SC_f$  and  $C_f$ . The dotted line  $SC_f^*$  will be discussed below. Finally, correcting for discounting, (5) can be interpreted as comparing the areas between  $C_d + R$  and  $SC_f$  to the right and left of their intersection at point C.

Consider now the market solution which our investment rules would give us at various output levels. To the left of point B the foreign firm supplies the market with exports since the profits of the subsidiary would be smaller than those from exporting. When the market size reaches B, a subsidiary is established. There is no point at which the firm is both willing and able to

sell royalties, since at the output levels for which royalties are preferred, the domestic firm is not yet profitable. Under these relative cost conditions, we would predict that the market would be supplied by exports until internal demand expansion generates a sufficiently large market for import substitution by a foreign owned subsidiary to take place. Domestic production will not occur in the absence of government intervention.

Is this sequence of market solutions over time an optimal one? Clearly it is not for most of the different output levels which will be produced over time. The lowest cost form of supply is exports to the left of A, the foreign subsidiary between A and C, and the domestic firm at output levels greater than C. Comparing that with the market solution we see that the latter is non-optimal in the ranges AB and beyond C. In the first of those ranges the subsidiary has the lowest costs but the market has no mechanism to force the company to establish the subsidiary. For if the foreign firm makes supernormal profits in its export business, it will not produce locally except at higher supernormal profit rates. At output levels greater than C, the domestic firm has a social cost advantage over the foreign subsidiary, but that advantage will not be realized in the market because the profits that the subsidiary can earn by producing itself are greater than those it could earn through royalties.

For the cost conditions used in the example the host country can look forward to non-optimal product supply over most of the future, if the market solution is not circumvented. What we have here is a kind of market failure resulting from the fact that the firm is foreign and that it controls entry to the market through its ownership of necessary expertise. As we have seen, the foreign firm attempts to maximize profits in its own country. Those profits

are host country costs. They confer no net benefit on society because they must be paid for with exports. This is why leaving the foreign firm free to respond in its best interest to market incentives is likely to maximize the social cost of producing a good, not minimize it. Broadly speaking the firm is trying to maximize exactly that thing that the host country is trying to minimize, namely, after tax profits. The conflict of interest between the host country and the foreign firm would not be a problem if there were freedom of entry. For then the potential domestic firm would produce as soon as it was profitable, while the host country would split the profits of the subsidiary through tax collections. For the typical LDC, however, the model with foreign firms and imperfect entry seems more reasonable. In that model there is a market failure which implies that while a government may wish to rely on prices and markets to allocate productive resources, the results will probably not be optimal from the host country's point of view.

How should an LDC government react to the possibility that the market solution may be perverse? I am forced to the conclusion that it should intervene in the market with industry-specific policies, two of which I will now discuss. The reason that the policies must be industry-specific is that the probability of market failure is different for industries with different production functions.

Consider first a tax policy designed to force the foreign firm to act in the national interest. The difficulty with taxes is that if they are raised, the social cost of the subsidiary falls but its establishment is delayed. In terms of diagram one, raising the tax rate rotates both  $SC_f$  and  $\pi_f$  clockwise which moves point B to the right, increasing the non-optimal range AB. The appropriate tax is, therefore, one which varies

with output, and which is the maximum amount that the subsidiary can be taxed so that it will produce locally when that is in the host country's interest. Going back to our two investment rules, we set the tax rate so that the firm is just willing to set up the subsidiary in the quantity range where  $C_f < C_f^h$  and is willing to sell royalties beyond  $C^*$ . By  $C^*$  we mean the intersection of the domestic cost function and  $SC_f^*$ , the social function of the subsidiary using optimal tax rates.<sup>1</sup>

The appropriate tax rates are:

$$\text{range AC*}: T^* = \frac{C_f^h - C_f - \sigma}{p - C_f}, \text{ for } C_f^h - C_f - \sigma \geq 0.$$

$\sigma$  = small positive quantity

$$\text{Beyond } C^*: T^* = \frac{p - C_f - R + \sigma}{p - C_f}$$

It turns out that if average costs are declining, the optimal tax on the subsidiary will be increasing as output increases. What the optimum tax does, in the range AC\* is to tax away all subsidiary profits above the supernormal profits it could earn from exporting. Those profits are an unfortunate cost of acquiring foreign capital. When the market is still so small that  $C_f^h$  and  $C_f$  differ by no more than  $\sigma$ , the tax rate is zero, but it gradually rises over time as increases in the size of the internal market reduce subsidiary costs. Beyond  $C^*$  the tax rates become even higher to force the foreign firm to consider seriously the possibility of selling royalties rather than continuing in business. With the optimum tax, the social cost function of figure one shifts from  $SC_f$  to the dotted line  $SC_f^*$ , which lies above  $C_f$  by the

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<sup>1/</sup>  $SC_f^* = C_f + p - C_f^h + \sigma$  for  $SC_f^* < C_d$ ,  $SC_f^* = C_d$  thereafter.

amount of supernormal export profits,  $p - C_f^h$ . With such a tax scheme, the minimum social cost of market supply is the world price up to point D, the dotted line  $SC_f^*$  up to its intersection with the domestic cost function, and the latter thereafter. This variable tax corrects the market failure and guarantees that output is always supplied at minimum social cost.

It is interesting that an approximation to the optimal tax policy is often followed by LDC governments. They give tax holidays, subsidized credit, and special import permits to foreign firms willing to set up subsidiaries. Over time as the market expands the treatment of the subsidiary becomes a good deal less generous. One could interpret the demand that the firm turn over its operation to nationals after a specified number of years as an approximation to the change in tax treatment that occurs beyond the output level at which the domestic operation becomes socially optimal. As we saw, beyond that point, taxes should become quite confiscatory. A substitute policy which may minimize conflict is to have firms relinquish ownership after a given number of years, to be agreed upon in advance.

Some people may object that it is not fair to change the rules of the game after the foreign firm has established its subsidiary. That objection strikes me as unfounded. With barriers to entry, the host country government must use its control of access to the market to offset the foreign firm's control over expertise. With falling average costs and barriers to entry, it is justifiable to change the rules of the game because the game changes. Profits will be rising over time as the market expands and there is no reason why the tax rate should not rise with them. Again, it might minimize conflict to have these changes openly linked to output levels, and agreed upon in advance.

### Part III

In part two we explored the market solution for products where expertise was a significant factor of production and devised a variable tax strategy to make the market solution optimal. The trouble with a variable tax policy from a practical point of view is the large amount of information needed to implement it. It requires perfect knowledge of the cost functions of both foreign and potential domestic suppliers as well as the profitability of exports. That kind of information is generally not available. Even so, governments must make policy. Under these circumstances, one alternative is to use a constant tax rate and to intervene in the market when comparative cost conditions appear to warrant prohibiting foreign investment, that is, foreign investment is accepted or rejected on the basis of the likely sign of the inequality in equation (5). Such a procedure is a second-best rule of thumb approximation to optimality when the cost of acquiring information about cost functions is high. What we do is make an educated guess about the sign of equation (5) for different products.

Looking at equation (5) we see that the relative attractiveness of foreign investment over the domestic firm depends on four things, the difference between domestic and foreign costs, the size of royalty payments, the tax rate on foreign profits, and the future growth in the market. Consider first the cost differentials. We have argued that each potential producer is operating with the same production function, but with differential access to or use of factors of production which we are calling expertise. Products differ in their requirements of such privately controlled knowledge. That is, they differ with respect to potential royalty payments.

Is that the only difference? Perform the following mental experiment. Consider two potential producers, one domestic and the other a subsidiary of a foreign firm. Suppose that the domestic producer has access to all purchasable expertise. Will his costs, apart from the royalty payments, be the same as those of the subsidiary, and if not why not? If there is a difference as we have set up the production possibilities it must be because one firm has more of some factor of production than the other. We would like to argue that the differentially owned factor of production is also knowledge, but a kind of knowledge which is not easily transferable.

Not too much attention has been paid to the question of the transferability of knowledge, but it seems to be a key explanation of cost differentials between firms. Some kinds of knowledge cannot be purchased, not because of unwillingness on the part of the owner, but because the buyer and the seller cannot agree on what it is that is being purchased, or because of the difficulty of transmitting the knowledge. Some expertise should be easy to teach or transmit, some hard. For example, it must be comparatively easy to teach a domestic entrepreneur how to organize an inventory control system or the reactions in a new chemical process. It is something else again to teach him what to do for each one of the possible breakdowns and problems that could occur on a complicated assembly line. That sort of expertise is embodied in individual experience--it is stored up in memory, and it is difficult to purchase because it is impossible to know in advance which part of the knowledge is relevant. Thus, I would think that organizational knowledge, the ability to choose the right alternative in a wide range of possible situations or to devise remedies for as yet unforeseen problems, is the kind of expertise which must be learned. It probably cannot be bought.

If the distinction we have made between different types of expertise is valid, complicated assembly industries, or ones with highly variable input qualities, or inputs of difficult and exotic materials should be those in which foreign subsidiaries would have a cost advantage even after all transferable knowledge had been bought by a domestic competitor. On the other hand, process information, knowledge that can be patented, should be fairly easy to transfer. This does not mean that such information will be easy to buy. Firms are not used to selling information--since they have generally found it more profitable to sell the products of which it is an intermediate input. But they will sell it, if there is no other way to profit from its possession.

With this discussion in mind, we can divide all products into the following six possible production classes, based on the importance of transferable and non-transferable knowledge in their production functions:

TABLE 2: Industry Characteristics

	<u>Royalty Payments</u>	<u>Cost Differential</u> $C_d - C_f$
Case 1	high	large
Case 2	high	small
Case 3	low	large
Case 4	low	small
Case 5	high	negative
Case 6	low	negative

Though we will not do so, it is easy to include externalities in this taxonomy. Where there are economic benefits to the foreign presence, factor prices or profits should be adjusted accordingly in the cost functions. Where the host country attaches a non-economic cost to the mere presence of foreigners because of possible political domination or interference, subsidiary costs should be adjusted upward. In the extreme case of xenophobia all products fall into classes five or six. Large, modern economies with well developed research capabilities and a high level of organizational expertise embodied in the labor force should also fall in classes four through six. That is, royalties aside, they should be able to match the cost of production of any product.

Consider next the influence of market growth on the relative attractiveness of foreign and domestically owned production. Looking at either (5) or figure one it is evident that the larger the market, the less desirable foreign direct investment is. This results from the assumption of falling average costs, and is true even if we assume that economies of scale benefit both producers equally. The reason is that the country benefits from the cost reduction at the foreign subsidiary only to the extent of the extra tax payments resulting from the higher profits. With the domestic firm, all of the cost saving accrues to someone within the country. The implication of this is that countries with large markets, or with the expectation of future rapid growth in demand, should, other things equal, prefer domestic to foreign production.

With these general considerations out of the way we now turn to a discussion of whether to accept or reject foreign investment for the various different types of industrial products. The case one product is one in which the domestic firm is less efficient than the foreign subsidiary even with large royalty payments. It should be the kind of industry which has many special

patented processes as well as complicated assembly problems, non-standardized products and/or work with exotic and difficult materials. Jet aircraft, computers and possibly automobiles seem to be products which answer to this description. This is the case that is pictured in figure one. As we have seen, in the range where some sort of production could be established within the country the market solution is optimal only in the range BC. If the subsidiary is accepted, it will be set up when the market size reaches B and will be optimal until the market expands to C. Beyond C, the country would prefer the domestic firm because its social costs are lower. If foreign investment is prohibited, the optimality conditions are reversed. Thus the choice between accepting or rejecting foreign investment in this case boils down to comparing the length of time the economy will be in range BC and beyond C.

Given the small market size of most LDC's for the types of products in this class, and given the relative cost and royalty conditions stipulated, these are the products in which foreign investment should have the greatest comparative advantage over the domestic alternative. I would, therefore, recommend the second-best policy of accepting foreign direct investment in case one industries. I would further attempt to approximate the optimal tax by offering profit tax reductions on a temporary basis when the foreign subsidiary commences operations.

Let us now look at the situation in the other classes of industry. We will do one diagrammatically and simply state the results for the others. The case two industry has high royalty payments and small cost differentials. Following our classification of expertise, this should be the type of industry with patented processes or trademarks but fairly standardized production.

Among the process products which might fit into this class are many chemicals, plastics, special papers and some drugs.

For the purposes of figure two we assume that foreign and domestic costs, exclusive of royalty payments, are identical. As we have drawn it, the market solution is: export until market size reaches point B and then set up a subsidiary. As before, this market solution is statically optimal from the host country point of view only in the range BC, and to the left of A. In the range AB the subsidiary is cheaper than imports, but it will not be set up because imports are more profitable to the foreign firm. Beyond C the domestic firm is preferable, but it will not be able to buy necessary expertise because that expertise can be used more profitably by a subsidiary.

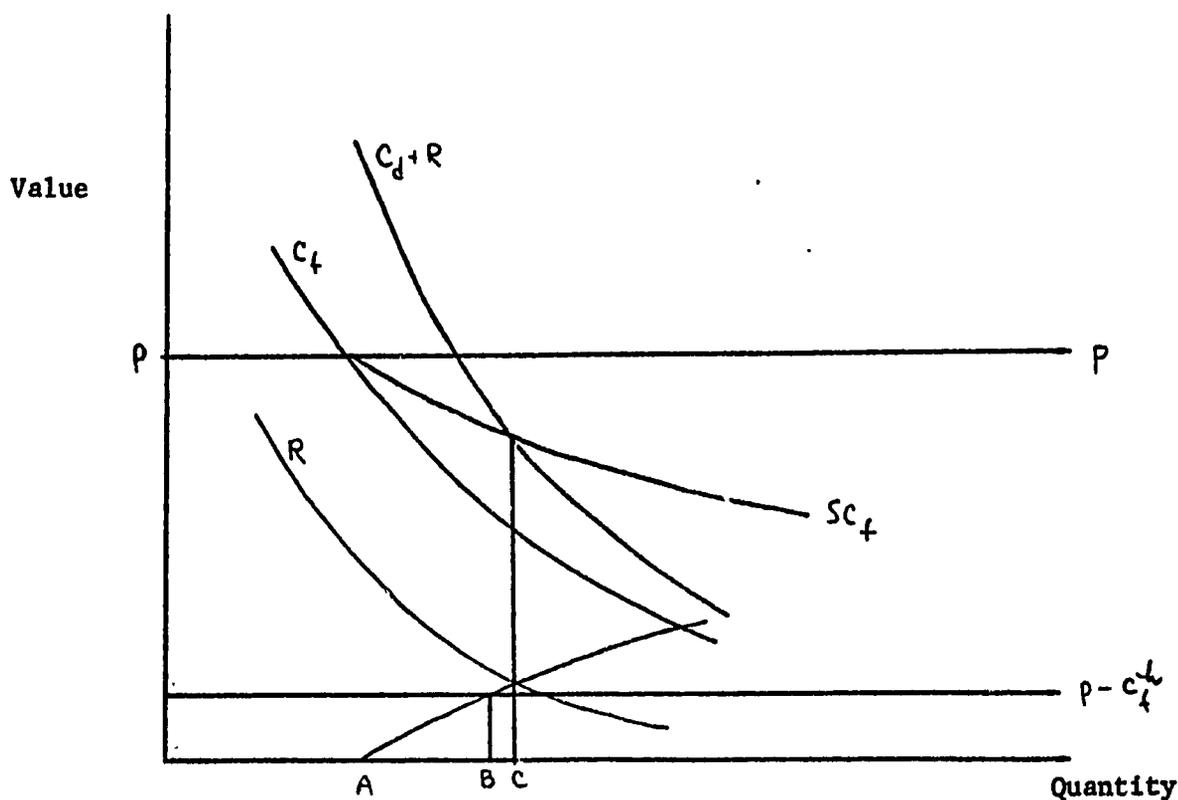


Figure 2: Industry with High Royalties  
and  $C_d = C_f$

As before, the choice of whether to accept or reject foreign investment boils down to a comparison of the size and length of time the market is in the range BC and beyond C. BC, the range where foreign investment is optimal, is smaller for case two than for case one industries because the cost advantage is chiefly royalty payments, which diminish in importance as the volume of sales increases. I conclude that a large economy should consider banning foreign investment in case two industries, while a small one should probably accept it. What is small and what is large must be decided on a case by case basis, for that is the key factor in determining over how much of the future the foreign firm will represent least cost supply.

Note how the disability of the foreign firm changes with the tax rate. As we have shown, lowering the tax rate rotates  $SC_f$  and  $\pi_f$  counterclockwise. The range BC, where foreign investment is preferable, shrinks until with a zero tax rate it disappears altogether. Indeed, with a zero rate the country should never allow foreign investment since its total cost is equal to that of imports. As a general rule, the lower the tax rate, the less likely it is that the country should accept foreign investment. Unless there are significant positive externalities to the foreign presence, a country should never grant tax breaks except as a temporary measure along the lines of the optimum tax we discussed in section two.

A special problem is presented by royalty payments for trademarked products rather than expertise. Many of these trademarks protect products whose performance is really not different than a producible domestic substitute. Our analysis has been conducted at the product level, and it would logically consider Firestone tires or Bayer aspirin as different from a domestic substitute if the consumers of the country consider them different. Now it may be the case that in such products, the foreign firm is unwilling to

sell its trademark, in which case strictly speaking no domestic substitute is available. Without getting too far into questions of consumer sovereignty, I would argue that in such cases the government should seriously consider overruling its consumers by lumping the foreign product and the close domestic substitute together as one product. If that is done, the trademarked product moves into our class four category, where royalties and cost differentials are small. In such products, as we shall see, a good second-best rule is to prohibit all foreign direct investment.

Case three industries have low royalties but high cost differentials. These should be products with well-known, but complex production processes for which it is difficult to purchase expertise. Products like radios, refrigerators, bicycles, televisions, lathes, tractors and fabricated plastic products like toys seem to answer to these production characteristics. Here the range over which the foreign firm is preferable is relatively large because its cost differential does not diminish with volume as the royalty payment in the case two industry did. The appropriate rule seems to be to accept foreign investment. Note that with an optimal variable tax, it may well be the case that domestic production is never preferable to the foreign, regardless of market size. That is because the benefits of economies of scale are captured by the country through its variable tax.

The rest of the industries fall in the category where foreign investment should never be optimal because foreign and domestic production is practically identical. Indeed, domestic entrepreneurs may have special expertise lacked by foreigners regarding such things as market conditions, special features of the labor force, local regulations and so forth. Lumber, furniture, textiles, clothing, ceramics, standard papers, cement, leather products, standard food products and beverages seem to conform to this description. Other industries

may also be included because of the negative externalities of a foreign presence. For such products the appropriate second-best rule is to prohibit foreign investment, since there is no point in using foreign exchange to repatriate earnings for an activity that a national entrepreneur can do as well as the foreign firm. Strictly speaking, such a rule may be unnecessary in many of these cases since domestic production will be established first, thus blocking the foreign competitor.

We conclude by summarizing the results we have obtained. Our purpose in this paper was to explore the ramifications of abandoning the assumption of perfect competition or freedom of entry on the analysis of foreign direct investment and the design of policy. In the absence of perfect competition we showed that foreign investment has to be compared with a domestically owned alternative. In contrast to previous studies, private profitability of foreign investment does not guarantee social desirability. Furthermore, since the foreign firm controls access to production through its ownership of expertise, and since it is maximizing a function which represents a cost to the host country, the market solution obtainable by letting such firms maximize profits is not likely to be optimal. Government intervention is called for. We considered two. The first was a variable profit tax policy in which the tax rate on foreign profits increases as the market expands, and which becomes quite confiscatory as soon as domestic production is feasible. This variable tax corrects the market imperfection so that no further government intervention is needed if the tax can be implemented. However the tax policy requires detailed information on cost functions which may not be available. In its absence we developed second-best rules of thumb, which direct the host country to either accept or prohibit foreign investment depending on whether the

present value of costs is likely to be higher or lower at the subsidiary or the domestic firm. The general rules are: (1) prohibit foreign investment in products where foreign firms have no cost advantage. This includes products where the only foreign advantage is consumer recognition of a trademark.

(2) Accept foreign investment in products which are complicated to produce and in which the foreign firm has a cost advantage which cannot be overcome by the purchase of expertise. (3) For countries with large internal markets,

prohibit foreign investment in products where the only significant cost differential between domestic and foreign producers is royalty payments.

(4) Never grant permanent tax incentives to foreign firms. If a tax break is offered, it should be part of an optimum variable tax strategy.

It is important for governments in LDC's to realize that they cannot depend on the market for the correct solution to foreign direct investment where multinational firms own expertise which is an important factor of production. Neither can they use one simple standardized policy. Their appropriate strategy for the present would seem to me to be to fit industrial products into the broad classes that I have suggested and then apply the rules of thumb I have developed. At the same time they should busy themselves acquiring the industry-specific information on expertise prerequisites, royalties and relative costs that is a necessary input to the design of an optimal variable tax policy.

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