DISCUSSION PAPER SERIES

No. 3419

FOREIGN DIRECT INVESTMENT AND THE SINGLE MARKET

J Peter Neary

INTERNATIONAL TRADE

Centre for Economic Policy Research

www.cepr.org

Available online at: **www.cepr.org/pubs/dps/DP3419.asp**

ISSN 0265-8003

FOREIGN DIRECT INVESTMENT AND THE SINGLE MARKET

J Peter Neary, University College Dublin and CEPR

Discussion Paper No. 3419
June 2002

Centre for Economic Policy Research
90–98 Goswell Rd, London EC1V 7RR, UK
Tel: (44 20) 7878 2900, Fax: (44 20) 7878 2999
Email: cepr@cepr.org, Website: www.cepr.org

This Discussion Paper is issued under the auspices of the Centre's research programme in **INTERNATIONAL TRADE**. Any opinions expressed here are those of the author(s) and not those of the Centre for Economic Policy Research. Research disseminated by CEPR may include views on policy, but the Centre itself takes no institutional policy positions.

The Centre for Economic Policy Research was established in 1983 as a private educational charity, to promote independent analysis and public discussion of open economies and the relations among them. It is pluralist and non-partisan, bringing economic research to bear on the analysis of medium- and long-run policy questions. Institutional (core) finance for the Centre has been provided through major grants from the Economic and Social Research Council, under which an ESRC Resource Centre operates within CEPR; the Esmée Fairbairn Charitable Trust; and the Bank of England. These organizations do not give prior review to the Centre's publications, nor do they necessarily endorse the views expressed therein.

These Discussion Papers often represent preliminary or incomplete work, circulated to encourage discussion and comment. Citation and use of such a paper should take account of its provisional character.

Copyright: J Peter Neary

CEPR Discussion Paper No. 3419

June 2002

ABSTRACT

Foreign Direct Investment and the Single Market*

This Paper extends the theory of multinational corporations, identifying three distinct influences of internal trade liberalization by a group of countries on the level and pattern of inward foreign direct investment (FDI). First, the *tariff-jumping* motive encourages plant consolidation. Second, the *export platform* motive favours FDI with only a single union plant relative to exporting, and may induce a firm that has never exported to invest. Finally, reduced internal tariffs increase *competition* from domestic firms, which dilutes the other motives and may induce a 'Fortress Europe' outcome of multinationals leaving union markets even though external tariffs are unchanged.

JEL Classification: F12, F15 and F23
Keywords: foreign direct investment, market integration, multinational corporations and single market

J Peter Neary
Department of Economics
University College Dublin
Belfield
IRL - 4 Dublin
IRELAND
Tel: (353 1) 706 8334
Fax: (353 1) 283 0068
Email: peter.neary@ucd.ie

For further Discussion Papers by this author see:
www.cepr.org/pubs/new-dps/dplist.asp?authorid=100319

* I am grateful to Frank Barry, Rodney Falvey, Dermot Leahy, Massimo Motta, George Norman, Lars Persson and Tony Venables and to participants at a seminar at LSE, at a CEPR Workshop in University College Dublin, at ETSG 2001 and at a University of Nottingham Conference on *Foreign Direct Investment and Economic Integratio*n, for helpful discussions. This research is part of the Globalisation Programme of the Centre for Economic Performance at LSE, funded by the UK ESRC. This paper is produced as part of a CEPR research network on Foreign Direct Investment and the Multinational Corporation: New Theories and Evidence, funded by the European Commission under the Training and Mobility of Researchers Programme (Contract No ERBFMRX-CT98-0215)

Submitted 28 May 2002

1. Introduction

The reduction in barriers to trade within the European Union has had important but disputed effects on inward direct investment. On the one hand, fears have been expressed that the Union could become a "Fortress Europe", with foreign firms effectively excluded from the internal market. On the other hand, there is considerable empirical evidence for the importance of the Single Market in encouraging more foreign direct investment into the European Union. (See Neven and Siotis (1996) and Pain (1997), for example.) In the case of smaller and more peripheral countries, such as Ireland, Spain and Portugal, this effect has been particularly significant. (See Barry (1999), for example.) However, empirical work tends to concentrate on those firms which have in fact located in the EU, and hence may miss the "Sherlock Holmes" cases: potential multinationals which, like the dog that did not bark in the night, have chosen not to locate in or even to supply EU markets.

In this paper, I present a simple framework in which some of these issues can be considered. I focus on a single industry (so general equilibrium repercussions are ignored), and on the location decisions of a single potential multinational firm. I begin by paying more attention than usual to the non-strategic bench-mark case where the multinational firm has a monopoly and faces no competition from domestic firms. Subsequently I relax this assumption, but even then I simplify by allowing a limited role for domestic firms.

These modelling choices should be seen in the context of the rapidly-growing literature on foreign direct investment. Much of this literature, from Helpman (1984) to Markusen and Venables (2000), assumes free entry and exit of firms. This facilitates general-equilibrium analysis, but at the cost of restricting the degree of strategic interaction between firms. A different tradition focuses on strategic behaviour,[1] and has been extended to consider the

---

[1] See Smith (1987), Horstmann and Markusen (1992), Motta (1992), Rowthorn (1992) and Sanna-Randaccio (1996).

effects of internal trade liberalisation on the pattern of FDI into a two-country economic union by Motta and Norman (1996) and Norman and Motta (1993). A feature of most papers in this tradition is that all firms are assumed to be equally likely to engage in FDI. This symmetry is theoretically pleasing, but it tends to lead to highly complex analyses. My approach, which assumes the potential multinational has a first-mover advantage, is more restrictive. However, it allows a clearer focus on the key economic issues and extends straightforwardly to an arbitrary number of countries. It also fits well the case of a foreign firm which possesses some technological or organisational advantage which makes it more likely then domestic firms to become a multinational in the first place.

Section 2 presents the simplest version of the model, in which all union countries are identical, and there are no union firms. Hence the focus is on when and how a potential multinational firm will supply the union market: will it export from abroad?; will it operate branch plants within the union?; and, if the answer to the latter is "yes", how many will it operate? Section 3 extends the analysis to allow for incumbent domestic firms. Now, the liberalisation of trade between union countries allows improved market access by firms from partner countries as well as by the foreign multinational. Finally, Section 4 allows for some degree of heterogeneity between union countries and examines how the conclusions of earlier sections must be qualified in that case.

2. Exporting vs. FDI

I begin with the simplest framework in which the effects of market integration on the incentive for inward investment can be examined. The model is partial equilibrium and abstracts from strategic considerations to focus on the choices facing a single firm located outside the union.

2.1 Equal Internal and External Barriers

Consider a group of n countries which form an economic union. Assume until Section 4 that all the countries are identical. The potential multinational firm located outside the union has fixed marginal production costs, and faces a unit cost t on sales to union customers. This may include transport and other transaction costs, though it is convenient to refer to it as a common external tariff. Initially, shipments from one union country to another face the same unit cost t. Throughout the paper, I assume that the multinational's costs and revenues arising from sales outside the union are unaffected by its decisions on supplying union customers and so can be ignored.

The net operating profits which the firm earns from supplying a single country facing a tariff t are denoted by $\pi(t)$. Naturally, π is decreasing in t. If the firm chooses not to locate in the union and to export to each of the n member countries, it earns operating profits of $\pi(t)$ in each one. Its total profits in the export regime, denoted by Π^X, are therefore:

$$\Pi^X = n\pi(t) \qquad \textbf{(1)}$$

For a sufficiently high tariff, defined implicitly by $\pi(\tilde{t})=0$, it is not profitable to export to any union country.[2]

Alternatively, the multinational may choose to locate a single plant in one of the union countries, say country i. (Which one it chooses is arbitrary, since all n are identical.) This gives it improved market access in country i, though no benefit on sales to the other $n-1$ member countries. In addition, it incurs the fixed cost of operating a plant, denoted by f. Its total profits in this single-plant FDI regime, denoted by Π^{F1}, are therefore:

---

[2] In the equations that follow, the level of profits attainable for any value of t above the threshold $\tilde{t}$ is always zero.

$$\Pi^{F1} \quad = \quad \pi(0) - f + (n-1)\pi(t) \tag{2}$$

The difference between this and the profits from exporting can, from (1), be written as:

$$\Pi^{F1} - \Pi^{X} \quad = \quad \gamma(t,f), \qquad \text{where:} \qquad \underset{+\ -}{\gamma(t,f)} \equiv \pi(0) - f - \pi(t) \tag{3}$$

The function $\gamma(t,f)$ measures the net gain from tariff-jumping into an individual union market: supplying it from a local plant with fixed cost f, rather than incurring the additional unit cost t of supplying it from outside. It is clearly increasing in t and decreasing in f. Other things equal, the multinational will engage in FDI if and only if $\gamma(t,f)$ is positive.

However, under the assumptions made so far, it does not make sense to locate in only one union country. The total profits from locating plants in m member countries ($m \leq n$), denoted by Π^{Fm}, equal:

$$\Pi^{Fm} \quad = \quad m[\pi(0) - f] + (n-m)\pi(t) \tag{4}$$

Now the firm enjoys improved access to m markets (though it must incur the fixed costs of operating m plants), and unchanged access to the other $n-m$. Extending the logic which led to (3), the profit gain from operating an additional plant is:

$$\Pi^{Fm} - \Pi^{F,m-1} \quad = \quad \gamma(t,f) \tag{5}$$

Clearly, if it pays to set up a plant in one union country (i.e., if $\gamma(t,f)$ is positive), it pays to set up in all. The only form which FDI can take in this case is a different plant located in each of the n member countries. This leads to total profits denoted by Π^{Fn}:

$$\Pi^{Fn} \quad = \quad n[\pi(0) - f] \tag{6}$$

Because all union countries are identical, and because there is no production cost advantage to locating inside the union, it never pays to produce with less than n plants.

Figure 1 illustrates the possible regimes in $\{f,t\}$ space. Exporting is profitable only for tariffs below the threshold level $\tilde{t}$. FDI is profitable only for fixed costs below a threshold level which, from (6), equals $\pi(0)$. If both of these thresholds are breached, in the region labelled "*O*", the potential multinational will not supply any of the union countries. Otherwise, the union will be supplied either from exports or from *n* domestic plants, for parameters in the regions labelled "*X*" and "*Fn*" respectively. The boundary separating the *X* and *Fn* regions is, from (3), defined by $\gamma(t,f)=0$, and must be increasing and concave as shown.[3]

2.2 A Reduction in Internal Tariffs

Suppose now that internal barriers between union partner countries are reduced from *t* to τ, while the common external tariff remains at *t*. If τ is above the prohibitive level $\tilde{t}$, nothing in the previous sub-section is affected. So, suppose instead that τ is set below $\tilde{t}$. The returns from exporting only are still given by (1). However, the profits from operating a single plant within the union, Π^{F1}, now equal:

$$\Pi^{F1} = \pi(0) - f + (n-1)\,\pi(\tau) \qquad (7)$$

Compare this with the profits from exporting:

[3] Concavity holds irrespective of the functional form of the demand function. The profit function $\pi(t)$ is the outcome of maximising operating profits in country *i* by choice of sales *x*: $\pi(t) \equiv Max_x\,[p(x)-c-t]x$, where $p(x)$ is the demand function and *c* is the unit production cost. By the envelope theorem, $\pi' = -x$, and so $\pi'' = -dx/dt$. From the first-order condition it is easily shown that *x* is decreasing in *t*, and so π is convex in *t*. Since the boundary separating the *X* and *Fn* regions is defined by $f=\pi(0)-\pi(t)$, it follows that it must be concave in *t*.

$$\Pi^{F1} - \Pi^{X} = \gamma(t,f) + \chi(t,\tau)$$
$$\text{where:} \quad \underset{+}{\chi}(t,\tau) \equiv (n-1)[\pi(\tau) - \pi(t)] \qquad \textbf{(8)}$$

Now the full gains from FDI relative to exporting come from two sources. There is a potential gain to tariff-jumping into an individual market, $\gamma(t,f)$, as before. In addition, the reduction in internal barriers yields an extra return to FDI, denoted by $\chi(t,\tau)$. A plant located anywhere in the union now benefits from preferential access to the other $n-1$ markets, and so can serve as an "export platform". This gain is always positive, since $\pi(t)$ is decreasing in t. Hence, FDI may be preferable to exporting from outside the union even when the gain to tariff jumping into a single union country, $\gamma(t,f)$, is zero or negative.

Similarly, the profits from operating plants in m union countries, Π^{Fm}, are now:

$$\begin{aligned} \Pi^{Fm} &= m[\pi(0) - f] + (n-m)\pi(\tau) \\ &= \Pi^{F,m-1} + \gamma(\tau,f) \end{aligned} \qquad \textbf{(9)}$$

Compare this with (4) and (5). Once a single plant has been established in the union, it is less profitable to establish additional plants: lower internal tariffs mean lower gains from internal-tariff-jumping. Since we have already seen in (8) that the relative profitability of exporting has *fallen*, we can conclude that, for some parameter values, it is now profitable to have only one plant. However, it is never profitable to have more than one and less than n plants. Since all union countries are identical and all *intra*-union tariffs are the same, there is nothing to be gained from multiple union plants short of one in each country. The profits of the latter, Π^{Fn}, are still given by (6).

The relative attractiveness of FDI with a single union plant rises as internal tariffs are progressively reduced. Differentiating (7):

$$\frac{d\Pi^{F1}}{d\tau} = (n-1)\,\pi'(\tau) \qquad \textbf{(10)}$$

This is unambiguously negative: lower internal tariffs raise profits on intra-union exports to all $n-1$ partner countries, making an export platform more attractive. By contrast, the profits from exporting (in (1)) and from operating n union plants (in (6)) are unaffected by internal trade liberalisation. Putting this differently, the export-platform gain $\chi(t,\tau)$ is *decreasing* in τ; whereas the internal-tariff-jumping gain $\gamma(\tau,f)$ is *increasing* in τ. Hence, as τ falls, FDI with a single plant becomes more attractive relative to both other options.

Figure 2 illustrates. Relative to Figure 1 (the loci from which are indicated by dotted lines), the reduction in internal tariffs induces a new region *F1* in which foreign direct investment with only a single plant is profitable. This region corresponds to high but not prohibitive fixed costs and any level of external tariffs.[4] It has emerged at the expense of all three regions in Figure 1, as indicated by the arrows. Note one interesting sub-region in particular, denoted by shading, where regime *O* has been replaced by regime *F1*. For combinations of f and t in this region, the union market is not served at all when internal and external tariffs are equal. However, lowering τ below t encourages the firm to jump to FDI, without ever passing through a phase of exporting. As the figure shows, this region applies to firms which face prohibitive external trade costs and which have relatively high fixed costs.

2.3 No Internal Tariffs

Finally, consider what happens when internal tariffs are abolished altogether. Foreign direct investment is now even more attractive relative to exporting or not serving the union

---

[4] Since t is greater than τ by assumption, the region to the left of τ in Figure 2 can be ignored.

markets. So, in Figure 3, the *F1* region expands to its maximum extent relative to the *X* and *O* regions. Moreover, there are now no gains to jumping internal tariffs: $\gamma(0,f)$ is non-positive even if f is zero.[5] Hence it is never profitable to have more than one union plant: the *Fn* region vanishes.

2.4 A Linear Example

To facilitate comparison with later models, it is useful to illustrate the results for a concrete example. Assume therefore that the inverse demand function in each member country is linear, given by:

$$p = 1 - x \qquad \textbf{(11)}$$

It is convenient to normalise the intercept and slope to equal unity. We also simplify, without loss of generality, by setting the constant marginal cost of production equal to zero.[6]

Under these assumptions, the multinational's sales in any market facing a tariff t equal $(1-t)/2$, and so its operating profits are:

$$\pi(t) = \left(\frac{1-t}{2}\right)^2 \qquad \textbf{(12)}$$

Hence, the threshold tariff, which cuts off sales into each market, is: $\tilde{t}=1$; and the threshold

---

[5] Strictly speaking, when fixed costs are zero, the firm's profits are the same irrespective of the number of plants it builds. To avoid more tedious qualifications of this kind, I assume throughout that, when the profits in two regimes are identical, the firm chooses the option with the least possible number of plants.

[6] Because of these normalisations, the tariff levels should be interpreted as measured with respect to the size of the market. Suppose instead that the demand function (11) were written as $p = a-bx$ and the marginal cost of production as c. Then each expression for output must be multiplied by $(a-c)/b$; each expression for profits must be multiplied by $(a-c)^2/b$; and both tariffs t and τ, must be deflated by $a-c$. The term $(a-c)/b$ is the maximum level of sales consistent with breaking even, and can be interpreted as a measure of market size. See Rowthorn (1992) for further discussion.

level of fixed costs consistent with locating inside the union when internal and external barriers are equal is: $\tilde{f}=0.25$. The resulting sales levels in each regime are summarised in the first three rows of Table 1.

3. Domestic Firm Response

Consider next how the story told in Section 2 must be amended when there are existing firms in the union countries. As explained in the Introduction, I confine attention to the case where there is a single incumbent firm in each union country, and assume that these firms do not engage in cross-border investment. Even with these simplifications, a number of new issues must be considered. Although I do not allow for entry by new firms, the possibility that reduced internal barriers will encourage incumbents to exit from some markets must be considered. In addition, I have to specify the nature of competition between firms. I assume throughout that firms treat individual union markets as segmented.[7] In the text, I also assume that firms engage in Cournot competition, and to fix ideas I give detailed results for the case of linear demands. The Appendices show that the conclusions are only slightly modified for general demand functions and for Bertrand competition.

3.1 Access Costs and Equilibrium Sales

I begin by showing how the costs of serving a market affect the equilibrium sales of different firms. My approach draws on Dixit (1986) and is related to the literature on cost changes in oligopoly. (See, for example, Kimmel (1992) and Zhao (2001).) The demand function is (11) with x replaced by $\bar{x}$, the total sales of all firms in market i. (The superscript

[7] Venables (1990) considers the possibility that trade liberalisation may encourage firms to treat markets which were previously segmented as integrated, so that output and pricing decisions are taken for the union as a whole.

i can be suppressed without ambiguity.) Write the operating profits of firm *k* in market *i* as:

$$\pi_k = (1 - t_k - \bar{x}) x_k \qquad \textbf{(13)}$$

where t_k is the access cost which firm *k* faces on sales in market *i*: it equals zero for a local firm ($k=i$); *t* for the multinational ($k=0$) if it is located outside the union; and τ for a firm located in a partner country ($0<k\neq i$). Differentiating (13), the first-order condition for output by firm *k* can be written as:

$$x_k = 1 - t_k - \bar{x} \qquad \textbf{(14)}$$

which implies from (13) that equilibrium profits equal the square of output: $\pi_k=(x_k)^2$.

Equilibrium in market *i* can now be calculated easily. Consider the case where it is profitable for all firms to serve the market. (Recall that *n* is the number of union countries, so *n+1* is the total number of firms.) The results apply with minor amendments to cases where some firms are inactive. Summing (14) over all active firms we can solve for total sales in market *i*:

$$\bar{x} = \frac{n + 1 - \bar{t}}{n+2} \qquad \textbf{(15)}$$

where $\bar{t}$ is the sum of the access costs of all firms in market *i*: $\bar{t}\equiv\Sigma t_k$. Substituting back into (14), the output of each firm is:

$$x_k = \frac{1 - (n+1) t_k + \bar{t}_{-k}}{n+2} \qquad \textbf{(16)}$$

where $\bar{t}_{-k}$ is the sum of the access costs of all firms *excluding* firm *k*. The results of evaluating this equation explicitly for all three types of firm (multinational, local and partner-country) in each of the three regimes (*X*, *F1* and *Fn*) are given in the fourth to sixth rows of Table 1.

Recall that each firm's operating profits equal the square of its sales in a given market. Hence, from (16), the main conclusion of this sub-section is that each firm's operating profits in market *i* are *decreasing* in its own access cost t_k, and *increasing* in the sum of the access costs of its local competitors $\bar{t}_{-k}$:

$$\pi_k = \pi(t_k, \bar{t}_{-k}) \qquad (17)$$

A further property which proves useful later concerns the effects of a simultaneous change in the access costs facing firm *k* and *n−1* rival firms. It is clear from (16) that in this case the direct effect dominates and so outputs and profits fall:

$$d\bar{t}_{-k} = (n-1)dt_k \quad \Rightarrow \quad \frac{dx_k}{dt_k} = \frac{\partial x_k}{\partial t_k} + (n-1)\frac{\partial x_k}{\partial \bar{t}_{-k}} < 0 \qquad (18)$$

As shown in the Appendix, these properties also hold in Cournot competition with general demands (provided demand is not too convex) and in Bertrand competition with linear demands. The Appendix also shows that the effect of rivals' access costs diminishes as goods become less close substitutes: the case considered in Section 2 is the limiting one where the multinational produces a good which has no domestic substitutes.

3.2 Equal Internal and External Barriers

Consider next the incentives faced by the potential multinational when internal and external barriers are equal. If it serves union markets by exporting only, its profits are:

$$\Pi^X = n\pi[t, (n-1)t] \qquad (19)$$

By contrast with equation (1) in Section 2, the multinational now faces competition from all *n* union firms in each of the union markets. However, *n−1* of these face the same access cost

t as the multinational, so the sum of rivals' access costs, $\bar{t}_{-k}$, equals $(n-1)t$. From the fourth row of Table 1, the multinational's total profits in the linear case are:

$$\Pi^X = n\left[\frac{1-2t}{n+2}\right]^2 \qquad \textbf{(20)}$$

Thus the prohibitive tariff $\tilde{t}$ in this case is ½. Indeed, with equal internal and external barriers, the same threshold is sufficient to eliminate all intra-union trade.

Suppose instead that the multinational establishes a single plant in the union. In the market where it sets up (call it market i) it has preferential access, under-cutting and hence out-selling the firms from other union countries. For sufficiently high tariffs, these firms will be squeezed out of market i, so it becomes a duopoly, with only the local firm providing competition for the multinational. Denote the threshold tariff at which this happens by t^D.[8] From the fifth row of Table 1 (recalling that $\tau=t$ in this sub-section), t^D equals ⅓ under linear demands. For the present, defer consideration of that case: i.e., assume that t is less than t^D.

With t less than t^D, the multinational competes against the local firm and $n-1$ partner-country firms in market i, where it faces no trade barriers, while it continues to face a tariff of t in the other markets. Hence its total profits are:

$$\Pi^{F1} = \pi[0,(n-1)t] - f + (n-1)\,\pi[t,(n-1)t] \qquad \textbf{(21)}$$

From (19), this can be rewritten as:

$$\Pi^{F1} = \Pi^X + \gamma(t,f), \qquad \text{where:} \qquad \underset{+\ -}{\gamma(t,f)} \equiv \pi[0,(n-1)t] - f - \pi[t,(n-1)t] \qquad \textbf{(22)}$$

As in Section 2, the function $\gamma(t,f)$ measures the net gain from tariff-jumping, which is

---

[8] When the multinational locates in market i, firms from partner countries face more intense competition there. A firm from country j earns profits of $\pi[t,(n-1)t]$ on its sales in market i without FDI, but only $\pi[t,(n-2)t]$ if FDI occurs. This implies that the threshold tariff on intra-union sales, t^D, is lower than the value of $\tilde{t}$ implied by (19).

increasing in t and decreasing in f.[9] But now it applies to the case where $n-1$ of the rival firms with which the multinational competes in the market in question also face an access cost of t.

What about the gains from establishing extra plants? It turns out that the argument from Section 2 continues to apply: it *never* pays to establish less than n plants. Just as in Section 2, the total profits from m plants equal:

$$\Pi^{Fm} = \Pi^{F,m-1} + \gamma(t,f) \qquad \textbf{(23)}$$

Hence, if $\gamma(t,f)$ is positive, so tariff-jumping is profitable, then profits are maximised by establishing a plant in each union country.

Now, turn to the case where the tariff rate exceeds t^D (⅓ under linear demands). If it also exceeds $\tilde{t}$ (½ under linear demands), then there can be no intra-union trade whatsoever, just as in Section 2. But the same outcome arises for tariff rates between t^D and $\tilde{t}$. For all tariffs greater than t^D, the multinational's total profits when it operates one plant are now:

$$\Pi^{F1} = \Pi^{X} + \gamma^{D}(t,f), \qquad \text{where:} \qquad \underset{+\ -}{\gamma^{D}(t,f)} \equiv \pi^{D} - f - \pi[t,(n-1)t] \qquad \textbf{(24)}$$

Here $\gamma^D(t,f)$ denotes the gain from tariff-jumping which results in the multinational becoming a duopolist in the new market, earning duopoly profits π^D (equal to *1/9* with linear demands) there. In this case too, the multinational will not stop with only one union plant. If $\gamma^D(t,f)$ is positive, then it pays to establish a plant in each market, and the multinational, like the union firms, ceases to export within the union.

In summary, the presence of domestic firms reduces the multinational's profits in all

---

[9] The derivative of $\gamma(t,f)$ with respect to t is proportional to $1+(n-3)t$. Even when n equals *2*, this cannot be negative, since the expression for γ is only relevant for external tariffs less than *0.5*.

regimes, as we would expect. However, it does not change the qualitative pattern of the equilibria relative to what was found in Section 2. The dotted lines in Figure 4 delineate the regions corresponding to different modes of serving the union, when internal and external tariffs are equal. Region *O* corresponds to tariffs above $\tilde{t}$ and fixed costs above π^D, the threshold at which the profits from FDI, with a plant in each country and no intra-union exports, are zero. The remainder of the space is occupied by regions *X* and *Fn*, with the dividing line between them corresponding to the case where either $\gamma(t,f)$ or $\gamma^D(t,f)$ is zero, i.e.:

$$f = \begin{cases} \pi[0,(n-1)t] - \pi[t,(n-1)t] = \left[\frac{1+(n-1)t}{n+2}\right]^2 - \left[\frac{1-2t}{n+2}\right]^2 & \text{when } t \le \frac{1}{3} \\ \pi^D - \pi[t,(n-1)t] = \left(\frac{1}{3}\right)^2 - \left[\frac{1-2t}{n+2}\right]^2 & \text{when } \frac{1}{3} \le t \le \frac{1}{2} \end{cases} \quad \textbf{(25)}$$

The kink in this curve at $t=⅓$ reflects the exit of partner-country firms from each market in the *Fn* regime, so that intra-union exports cease, whereas in the *X* regime they continue until $t=½$.

3.3 A Reduction in Internal Barriers

Suppose now that internal barriers are lowered. The first difference from Section 2 is that this reduces the *absolute* profitability of exporting and not just its profitability relative to foreign direct investment. The total profits from exporting are now:

$$\Pi^X = n\,\pi[t,(n-1)\tau] \quad \textbf{(26)}$$

Setting this equal to zero, the threshold external tariff $\tilde{t}$ is increasing in τ, and hence it falls as τ falls. In words, reducing internal barriers makes exporting less attractive for a new reason, additional to those already noted in Section 2. Competition from partner-country firms in each union country is increased, which makes it less profitable for the multinational

to supply any union countries externally. With linear demands, the threshold external tariff is:

$$\tilde{t} = \frac{1+(n-1)\tau}{n+1} \qquad \textbf{(27)}$$

This falls from a maximum of *0.5* when internal and external barriers are equal, to a minimum of *1/(n+1)* when internal barriers are abolished. In Figure 4, the vertical locus separating the *X* and *O* regions shifts to the left.[10]

Turn next to the FDI case. As in the previous sub-section, we need to distinguish between two cases. If τ is below *⅓*, then the multinational faces competition from all other union firms in every market where it locates. By contrast, if τ exceeds *⅓*, then firms from other union countries are not competitive in any market where the multinational locates. In this case, FDI leads to the multinational behaving like a duopolist, facing competition only from the local firm in each market.

Consider first the case where τ is below *⅓*. If the multinational establishes a plant in only one country, its profits become:

$$\Pi^{F1} = \pi[0,(n-1)\tau] - f + (n-1)\,\pi[\tau,(n-1)\tau] \qquad \textbf{(28)}$$

Now the effects of a reduction in τ on the profitability of FDI are ambiguous. Differentiating

[10] A complication arises with non-linear demands. It is shown in the Appendix that the derivative of π with respect to *t* could be positive if demand is highly convex. This in turn raises a further possibility that the derivative could change sign as falls in *t* alter the curvature of the demand function. As a result, the *X* and *O* regions could overlap in Figure 4. This possibility must be considered rather esoteric, and I ignore it henceforward.

(28) with respect to τ:[11]

$$\frac{d\Pi^{F1}}{d\tau} = (n-1)\,\underset{-}{\pi_1^{\tau}} + (n-1)\{\underset{+}{\pi_2^{0}} + (n-1)\underset{+}{\pi_2^{\tau}}\} \qquad \textbf{(29)}$$

The first negative term shows that, as in Section 2 (see equation (10)), lower internal tariffs encourage FDI, since it gives preferential access to all other $n-1$ union markets. However, the second positive term shows that lower internal tariffs also tend to *reduce* the profitability of FDI, since they increase competition within the union. The net effect is ambiguous. In the linear-demand case, equation (29) becomes:

$$\frac{d\Pi^{F1}}{d\tau} = -\frac{2(n-1)}{(n+2)^2}\left[1-(n+3)\tau\right] \qquad \textbf{(30)}$$

So, for internal tariffs higher than $1/(n+3)$, the effect of increased competition dominates.[12] Figure 4 is drawn for an internal tariff of 0.1 and for two firms. Hence, the increased competition effect does not dominate and the locus between the *O* and the *F1* regions shifts up as τ falls, though it shifts up by much less than in Section 2.

The difference between the profits from establishing a single union plant and from exporting now becomes:

$$\Pi^{F1} - \Pi^{X} = \gamma^{1}(t,\tau,f) + \chi(t,\tau) \qquad \textbf{(31)}$$

where *both* the tariff-jumping and export-platform gains are diluted by the extra competition

---

[11] The notation for the partial derivatives of π is hopefully obvious. The superscript on π denotes the tariff facing the multinational at which the derivative is evaluated: either *0* or τ; while the subscript indicates the partial derivative: "*1*" for the (negative) derivative with respect to the tariff which the multinational firm itself faces, and "*2*" for the (positive) derivative with respect to the sum of the tariffs facing its rivals.

[12] Motta and Norman (1996, p. 767) obtain this result for $n=2$.

from union firms:[13]

$$\begin{aligned} \gamma^1(t,\tau,f) &\equiv \pi[0,(n-1)\tau] - f - \pi[t,(n-1)\tau] \\ \chi(t,\tau) &\equiv (n-1)\left\{ \pi[\tau,(n-1)\tau] - \pi[t,(n-1)\tau] \right\} \end{aligned} \qquad \textbf{(32)}$$

By contrast, establishing further plants yields only the tariff-jumping gain:

$$\Pi^{Fm} = \Pi^{F,m-1} + \gamma(\tau,f) \qquad \textbf{(33)}$$

This is identical to equation (9) in Section 2 and so the implications are the same. The lowering of internal tariffs may make it profitable to establish a single plant in the union, since that plant can serve as an export platform, enjoying preferential access to all union markets. However, if it is profitable to establish more than one plant, then it is profitable to locate in every union country.

Finally, the case where internal tariffs τ are greater than ⅓ but less than ½ introduces no new considerations. Now, firms from other union countries cannot compete in any third market where the multinational locates. If the multinational is already established in the union, the gains to it from setting up a new plant equal the gains from tariff-jumping leading to a duopoly, defined in (24), but now evaluated at the internal tariff τ: $\gamma^D(\tau,f)$. If this expression is positive, then the multinational will locate plants in all *n* union countries. Even if it is negative, the multinational may still choose to locate a single plant rather than exporting, if the net gains from having an export platform within the union are positive. The profits in this regime are given by an expression similar to (31):

---

[13] Note that the tariff-jumping gain from establishing a first plant in the union is more complex than that from establishing additional plants. The two are related as follows: $\gamma(\tau,f) = \gamma^1(\tau,\tau,f)$.

$$\Pi^{F1} = \pi^{D} - f + (n-1)\,\pi[\tau,(n-1)\tau] \quad \textbf{(34)}$$

Hence:

$$\Pi^{F1} - \Pi^{X} = \gamma^{D1}(t,\tau,f) + \chi(t,\tau) \quad \textbf{(35)}$$

where $\gamma^{D1}(t,\tau,f)$, the tariff-jumping gain from establishing a single plant which leads to a local duopoly, is defined by obvious analogy with (32). In this case too, therefore, lower internal tariffs make exporting less attractive and FDI with only one plant relatively more attractive. Moreover, the relatively high internal tariff partly insulates the multinational from competition from other union firms.

The conclusions of this sub-section are illustrated in Figure 4. As already noted, reductions in τ cause the *O* region to expand at the expense of the *X* region and possibly of the *F1* region. In addition, the *F1* region expands at the expense of both the *X* and *Fn* regions. This tendency reaches its limit when internal tariffs are completely abolished. In that case the *X* region contracts to its smallest extent, as the prohibitive external tariff reaches its lowest level of $1/(n+1)$. In addition, the *Fn* region vanishes, since there is no justification for more than one union plant.

3.4 Conclusion

To conclude this section, it is clear that the presence of incumbent domestic firms modifies the results of Section 2 in a number of respects. Not surprisingly, they reduce the profitability of both exporting and FDI, for any given configuration of internal and external tariffs. Moreover, as internal tariffs are reduced, the multinational firm faces increased competition from partner-country firms in every union market. As a result, for some parameter values, multinational firms which found it profitable to export when internal

barriers were high may withdraw altogether from serving union markets. Competition within the union may also become so intense that a multinational firm which previously found it profitable to engage in FDI may no longer do so. These two cases illustrate different types of a "Fortress Europe" outcome.

However, in other respects the conclusions of Section 2 continue to apply. There are always some parameter values for which a multinational firm which exports to the union when internal barriers are high finds it profitable to switch to FDI when they are reduced. In addition, lower internal barriers always encourage consolidation of union plants by multinational firms, with only a single union plant being profitable when internal barriers are abolished.

4. Heterogeneous Countries

So far, I have assumed that all union countries are identical, so that the multinational is indifferent about where in the union it locates. Three interesting kinds of heterogeneity immediately suggest themselves. First, countries could differ in the costs of locating there, due in turn to underlying differences in factor endowments, government policies, institutions, etc. Second, countries could differ in market size. Third, countries could differ in their geographical location, so that the costs of transporting goods produced in more peripheral countries to other union markets are greater. Here, I confine attention to the first type of difference, and explore how it affects the conclusions reached in earlier sections. For simplicity, I return to the case of Section 2, where the potential multinational does not face any competition from union firms.

Assume specifically that the fixed costs of locating a plant differ between union countries. Let $f(i,\phi)$ be the fixed cost of locating in country i, where ϕ is a shift parameter.

By convention, and without loss of generality, assume that f is increasing both in i (so the countries are ordered by fixed cost) and in ϕ. The form of f is otherwise completely general, but a simple specification which is helpful to fix ideas is: $f(i,\phi)=w_i\phi$, where ϕ is the level of labour input needed to operate a plant wherever it is located, and w_i, increasing in i, is the wage in country i.

Consider first the case where internal and external barriers are equal. Suppose the multinational has already established plants in $m-1$ union countries (where m may equal anything between 1 and n). The gain in profits from establishing one additional plant may then be written as follows:

$$\Pi^{Fm} \quad = \quad \Pi^{F,m-1} + \gamma[t,f(m,\phi)] \qquad m=1,n \tag{36}$$

Here $\gamma(t,f)$, the gain from tariff-jumping into an individual union country, is as defined in (3). However, unlike in earlier sections, fixed costs depend on the country under consideration. Setting γ equal to zero, we can solve for the threshold value of the shift parameter in fixed costs at which it is just profitable to set up a plant in country m:

$$\gamma[t,f(m,\phi)] = 0 \qquad \Rightarrow \qquad \phi = \phi(\underset{+}{t},\underset{-}{m}), \qquad m=1,..n \tag{37}$$

The threshold value of ϕ is increasing in t, since a higher external tariff increases the gains from tariff-jumping, requiring a compensating rise in ϕ to leave the multinational indifferent about locating in country m. It is also decreasing in m, since locating in a country with a higher fixed cost reduces profits, and a reduction in fixed costs is needed if that country is to remain marginal for the multinational. These relationships are indicated by the dotted lines in Figure 5, which bound the values of ϕ and t consistent with profitable location of different numbers of plants, when internal and external tariffs are equal. (For t above the threshold

level $\tilde{t}$, exports are zero and so the loci defined by (37) are independent of t, and become horizontal lines.)

Next, assume that internal tariffs are reduced. If the multinational has no union plants, then, just as in earlier sections, there is an additional export-platform gain from establishing one. Extending the logic which led to (8), the profits from a single plant relative to exporting equal:

$$\Pi^{F1} - \Pi^{X} = \gamma[t, f(1,\phi)] + \chi(t,\tau) \qquad \textbf{(38)}$$

Setting this equal to zero, we can solve for the threshold value of the fixed cost parameter at which it is just profitable to locate a single plant in the union:

$$\gamma[t, f(1,\phi)] + \chi(t,\tau) = 0 \qquad \Rightarrow \qquad \phi = \phi^{1}(t,\tau) \qquad \textbf{(39)}$$
$$(+,-)$$

The crucial feature is that this is *decreasing* in τ. Hence a reduction in internal tariffs makes it *more* attractive to locate a single plant in the union than to export to it.

By contrast, if the multinational has at least one union plant, then the gain from establishing another one is given by (36) with τ replacing t. The threshold loci between regions with different numbers of plants are therefore given by (37) with τ replacing t:

$$\gamma[\tau, f(m,\phi)] = 0 \qquad \Rightarrow \qquad \phi = \phi(\tau,m), \qquad m = 2,..n \qquad \textbf{(40)}$$
$$(+,-)$$

Unlike (39), this is *increasing* in τ: as τ falls, it becomes profitable to locate fewer plants within the union. Combining (39) and (40), as Figure 5 shows, the *F1* region expands relative to all three contiguous regions, while all the loci separating the regions where two or more plants are optimal shift downwards as shown.

Although introducing country heterogeneity complicates the analysis in detail, the

broad thrust of the results of Section 2 continues to apply. A reduction in internal tariffs makes FDI more likely; and, given that FDI takes place, the optimal number of plants falls. Note a further implication. The literature on multinationals has often distinguished between vertical and horizontal multinationals, and has suggested that the latters' location decisions are determined mainly by market access rather than by cost considerations. (See Markusen (1995) for example.) In this model, however, multinational activity is purely horizontal, and yet cost considerations are crucial in determining where in the union a new plant will locate.

5. Conclusion

This paper extends the theory of multinational corporations to explore the effects of internal trade liberalisation by a group of countries on the level of inward direct investment.

The analysis identifies three distinct influences on how a multinational corporation chooses to serve the union markets. First is the *tariff-jumping* motive. As is familiar from earlier literature, this favours FDI over exporting the higher the external tariff and the lower the fixed costs of a new plant. Less familiarly, reductions in internal tariffs reduce the tariff-jumping incentive to operate more than one union plant, and so encourage plant consolidation. Second is the *export platform* motive. As internal tariffs fall, this favours FDI with only a single union plant relative to exporting. It may also induce a firm which has never exported to invest: this is more likely for multinationals with high access *and* fixed costs, and which face less competition from union firms. Finally, reduced internal tariffs lead to increased *competition* from domestic firms, which dilutes both the tariff-jumping and export platform motives. This works against *both* FDI and exports and may lead to the "Fortress Europe" outcome of multinationals leaving union markets even though external tariffs are unchanged.

These results have clear empirical implications. The results confirm the importance

of the trade-off between improved market access (lower marginal costs) and higher fixed costs, which has been extensively analyzed in empirical work. They also point to two less familiar issues. One is the effect of intra-union tariff cuts in encouraging plant consolidation by foreign multinationals. The other is the set of determinants which may lead external firms not to serve the union market. This may occur if both access and fixed costs are high, and, especially when competition from union firms is tough, may lead firms to withdraw from union markets even as they are liberalised.

No explicit welfare analysis has been presented, but it is clear that consumers in each country gain from lower prices, and that any losses to the local producer will be more than compensated by the gains from greater competition. This gives countries an incentive to compete in attracting foreign investment, even in the absence of employment effects or spillovers to local firms.[14]

Further work is needed to explore other implications of liberalising trade between a group of countries while maintaining external barriers. It would be desirable to allow for FDI by domestic firms. Since FDI frequently takes the form of mergers and acquisitions rather than greenfield investment, it would be even more interesting to allow for the effects of integration in changing the incentives for firms to merge.[15] It would also be useful to explore the implications of allowing firms to make continuous rather than discrete investment decisions. Finally, the analysis should be embedded in general equilibrium to investigate the implications of trade liberalisation and FDI on factor markets in individual member countries and in the union as a whole.

---

[14] Oman (2000) documents the extent of such competition, and Barros and Cabral (2000) and Haaparanta (1997) model its occurrence.

[15] Falvey (1998) and Horn and Persson (2001) explore the impact of trade policy on merger incentives in two-country models.

Appendix

The key result of Section 3.1 was that, in Cournot competition with linear demands, each firm's sales in each market are decreasing in its own access cost and increasing in the sum of its rivals' access costs. The purpose of this Appendix is to show that these properties also hold in Bertrand competition with linear demands; in Cournot competition with general demands (except when demands are highly convex and the firm in question has a relatively small market share); and in Cournot competition with linear demands and differentiated products.

A.1 Bertrand Competition

Assume a symmetric linear demand system. The direct demand function for sales by firm k in any market i is:

$$x_k = 1 - [(1+\varepsilon)p_k - \varepsilon\bar{p}] \qquad \textbf{(41)}$$

where ε is an inverse measure of product differentiation and $\bar{p}$ is the sum of the prices charged by all $n-1$ firms. Proceed as in Section 3.1. Operating profits of firm k in market i are $\pi_k=(p_k-t_k)x_k$; the firm's first-order condition is: $x_k=p_k-t_k$; and so profits equal the square of output: $\pi_k=x_k^2$. Summing the first-order condition over all active firms gives:

$$\bar{p} = \frac{n + 1 + \bar{t}}{2-n\varepsilon} \qquad \textbf{(42)}$$

where, as in Section 3.1, $\bar{t}$ is the sum of the access costs of all firms in market i: $\bar{t}\equiv\Sigma t_k$. Combining this with (41), we can solve for the output of each firm:

$$x_k = \frac{2 + \varepsilon - [2-(n-1)\varepsilon - n\varepsilon^2]t_k + \varepsilon \bar{t}_{-k}}{(2+\varepsilon)(2-n\varepsilon)} \qquad \textbf{(43)}$$

This confirms, as required, that x_k is increasing in $\bar{t}_{-k}$, the sum of the access costs of all firms *excluding* firm *k*. By contrast, the sign of the effect of own access cost on sales appears to be ambiguous. However, it can be shown that it must be negative. The substitutability parameter ε in (41) cannot be a primitive one, since if it was then demand for good *k* would increase without bound as the number of goods increased. It is shown in Neary (2002) that, if demands are generated by a symmetric quadratic utility function with substitutability parameter *e*, then ε and *e* are related as follows: $\varepsilon = e/[1+(n-1)e]$. Making this substitution, the coefficient of t_k in (43) can be seen to be unambiguously negative, as required. It is also sufficiently negative to offset the effects of an increase in $\bar{t}_{-k} = (n-1)t_k$. Hence the result in (18) continues to hold.

A.2 Cournot Competition with General Demands

Return to the Cournot case, with homogeneous products, but now allow for a general demand function: $p = p(\bar{x})$. The first-order condition for firm *k* is: $bx_k = p - t_k$; where *b* is (minus) the demand slope: $b \equiv -p'(\bar{x})$. Summing over all $n-1$ firms and totally differentiating gives:

$$(n+2+r)\, b\, d\bar{x} = -d\bar{t} \qquad \textbf{(44)}$$

where $r \equiv \bar{x}b'/b$ is a measure of the concavity of the demand function, and the coefficient of $d\bar{x}$ must be positive for stability. Next, totally differentiating the first-order condition for firm *k*:

$$b\, dx_k = -(1+\alpha_k r)\, b\, d\bar{x} - dt_k \qquad \textbf{(45)}$$

where $\alpha_k \equiv x_k / \bar{x}$ is the market share of firm k and $1+\alpha_k r$ must be positive if goods are strategic substitutes. Combining (44) and (45):

$$dx_k = \frac{-[n+1+(1-\alpha_k)r]\,dt_k + (1+\alpha_k r)\,d\bar{t}_{-k}}{b(n+2+r)} \qquad \textbf{(46)}$$

The cross effect is positive if and only if goods are strategic substitutes. The own effect is negative if demands are concave ($r \geq 0$). With strictly convex demands ($r<0$) the effect could be positive. However, this requires that demand be highly convex: r must be less than $-(n+1)/(1-\alpha_k)$. In addition, if goods are strategic substitutes (which implies that $r>-1/\alpha_k$), a positive own effect requires that firm k be relatively small in the market: α_k must be less than $1/(n+2)$.

A.3 Cournot Competition with Linear Demands and Differentiated Products

Return to the case of Cournot competition with linear demands, but now allow goods to be symmetrically differentiated. Write the demand function facing firm k as:

$$p_k = 1 - [(1-e)x_k + e\bar{x}] \qquad \textbf{(47)}$$

An identical series of steps to those in Section 3.1 now leads to:

$$x_k = \frac{2 - e - [2+(n-1)e]\,t_k + e\bar{t}_{-k}}{(2-e)(2+ne)} \qquad \textbf{(48)}$$

Clearly, this exhibits the desired properties, being decreasing in own access cost and increasing in rivals' access costs. In addition, as goods become more differentiated, so e falls from one towards zero, the competition effect becomes less important, and the model approaches the monopoly case of Section 2.

References

Barros, P.P. and L. Cabral (2000): "Competing for foreign direct investment," *Review of International Economics*, 8:2, 360-371.

Barry, F. (1999) (ed.): *Understanding Ireland's Economic Growth*, London: Macmillan.

Dixit, A. (1986): "Comparative statics for oligopoly." *International Economic Review*, 27:1, 107-122.

Falvey, R. (1998): "Mergers in open economies," *The World Economy*, 1061-1076.

Haaparanta, P. (1997): "Competition for foreign direct investment," *Journal of Public Economics*, 63, 141-153.

Helpman, E. (1984): "A simple theory of international trade with multinational corporations," *Journal of Political Economy*, 92, 451-471.

Horn, H. and L. Persson (2001): "The equilibrium ownership of an international oligopoly," *Journal of International Economics*, 53:2, 307-333.

Horstmann, I.J. and J.R. Markusen (1992): "Endogenous market structures in international trade (natura facit saltum)," *Journal of International Economics*, 32, 109-129.

Kimmel, S. (1992): "Effects of cost changes on oligopolists' profits," *Journal of Industrial Economics*, 40:4, 441-449.

Markusen, J.R. (1995): "The boundaries of multinational enterprises and the theory of international trade," *Journal of Economic Perspectives*, 9:2, 169-189.

Markusen, J.R. and A.J. Venables (2000): "The theory of endowment, intra-industry and multi-national trade," *Journal of International Economics*, 52, 209-234.

Motta, M. (1992): "Multinational firms and the tariff-jumping argument: A game theoretic analysis with some unconventional conclusions," *European Economic Review*, 36:8, 1557-1571.

Motta, M. and G. Norman (1996): "Does economic integration cause foreign direct investment?," *International Economic Review*, 37:4, 757-783.

Neary, J.P. (2002): "Foreign competition and wage inequality," *Review of International Economics*, 10:4, November (forthcoming).

Neven, D.J. and G. Siotis (1996): "Technology sourcing and FDI in the EC: An empirical evaluation," *International Journal of Industrial Organization*, 14:5, July, 543-560.

Norman, G. and M. Motta (1993): "Eastern European economic integration and foreign direct

investment," *Journal of Economics and Management Strategy*, 2:4, 483-507.

Oman, C. (2000): *Policy Competition for Foreign Direct Investment*, Paris: OECD.

Pain, N. (1997): "Continental drift: European integration and the location of U.K. foreign direct investment," *Manchester School of Economic and Social Studies*, 65, 94-117.

Rowthorn, R.E. (1992): "Intra-industry trade and investment under oligopoly: The role of market size," *Economic Journal*, 102, 402-414.

Sanna-Randaccio, F. (1996): "New protectionism and multinational companies," *Journal of International Economics*, 41, 29-51.

Smith, A. (1987): "Strategic investment, multinational corporations and trade policy," *European Economic Review*, 31, 89-96.

Zhao, J. (2001): "A characterization for the negative welfare effects of cost reduction in Cournot oligopoly," *International Journal of Industrial Organization*, 19, 455-469.

Venables, A.J. (1990): "International capacity choice and national market games," *Journal of International Economics*, 29, 23-42.

Table 1: Sales of Different Firms under Alternative FDI Regimes

FDI Regime	Sales in Country i by			Sales in Country j by		
	MNC: x_0^i	Firm i: x_i^i	Firm j: x_j^i	MNC: x_0^j	Firm i: x_i^j	Firm j: x_j^j
0: X	$\frac{1-t}{2}$	–	–	$\frac{1-t}{2}$	–	–
0: F1	$\frac{1}{2}$	–	–	$\frac{1-\tau}{2}$	–	–
0: Fn	$\frac{1}{2}$	–	–	$\frac{1}{2}$	–	–
n: X	$\frac{1-(n+1)t+(n-1)\tau}{n+2}$	$\frac{1+t+(n-1)\tau}{n+2}$	$\frac{1+t-3\tau}{n+2}$	$\frac{1-(n+1)t+(n-1)\tau}{n+2}$	$\frac{1+t-3\tau}{n+2}$	$\frac{1+t+(n-1)\tau}{n+2}$
n: F1	$\frac{1+(n-1)\tau}{n+2}$	$\frac{1+(n-1)\tau}{n+2}$	$\frac{1-3\tau}{n+2}$	$\frac{1-2\tau}{n+2}$	$\frac{1-2\tau}{n+2}$	$\frac{1+n\tau}{n+2}$
n: Fn	$\frac{1+(n-1)\tau}{n+2}$	$\frac{1+(n-1)\tau}{n+2}$	$\frac{1-3\tau}{n+2}$	$\frac{1+(n-1)\tau}{n+2}$	$\frac{1-3\tau}{n+2}$	$\frac{1+(n-1)\tau}{n+2}$

Notes: Operating profits in country i are equal to the square of sales there in all cases.
"*0*" and "*n*" denote the number of domestic firms, where n is the number of union countries.
X: The potential multinational corporation ("MNC") is located outside the union.
F1: MNC located in one union country (country i) only.
Fn: MNC located in *all* union countries.

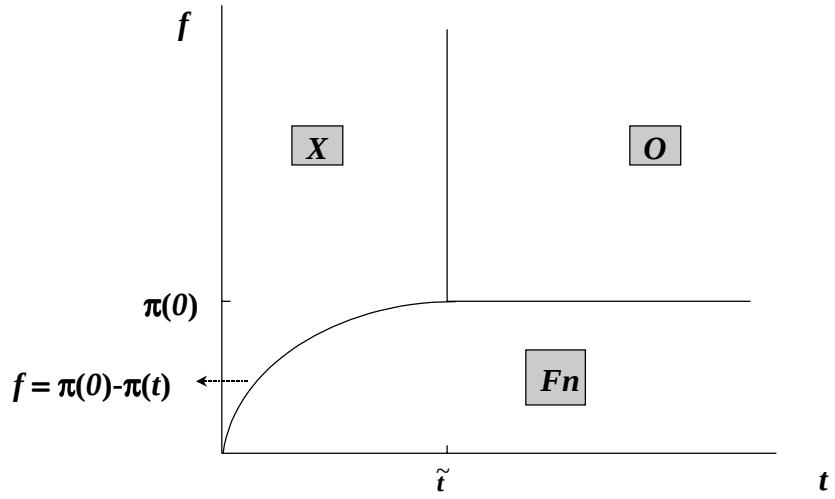

Fig. 1: Possible Regimes with Equal Internal and External Tariffs

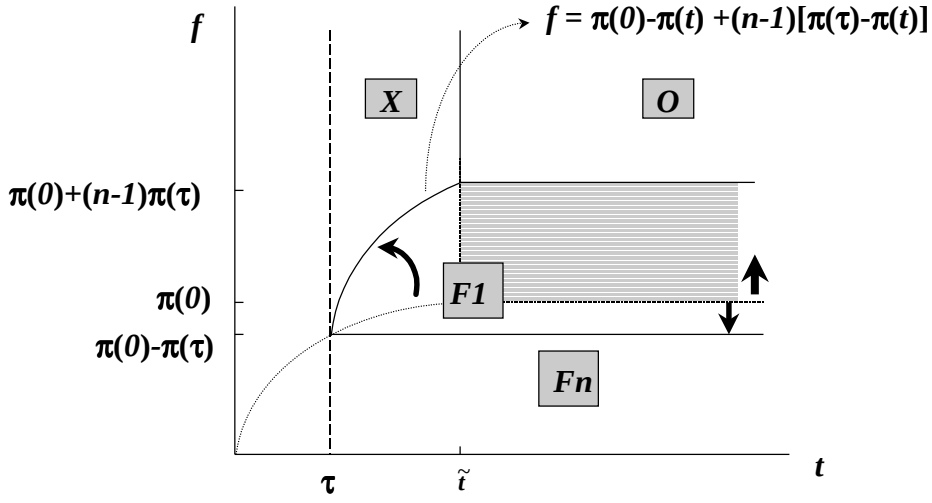

Fig. 2: Regimes with a Lower Internal Tariff
[Shaded area has FDI although X was never profitable there]

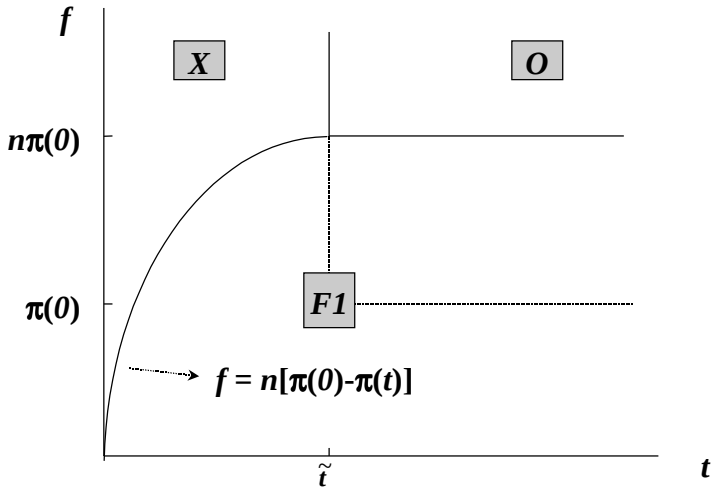

Fig. 3: Regimes with No Internal Tariffs

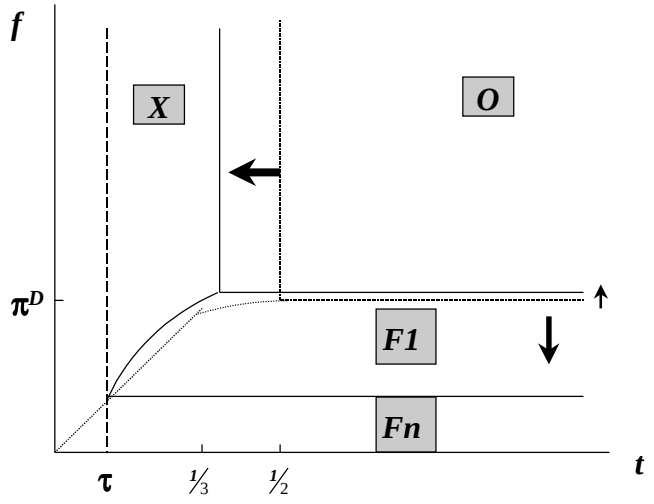

Fig. 4: Regimes with Domestic Firms and a Lower Internal Tariff

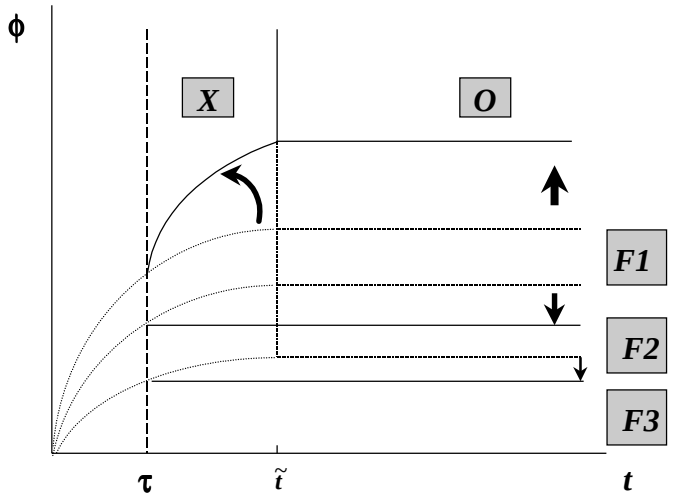

Fig. 5: Possible Regimes with Heterogeneous Countries