

**Foreign direct investment and industrial
development in host countries ***
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ABSTRACT

The objective of this paper is to provide an analysis of the effects of Foreign Direct Investment (FDI) on host countries economies. Since competition is of monopolistic type in both final (manufactured) and intermediate (services) sectors, our aim is to describe the direct effect of firms entry through FDI in the manufacturing industry (the competition effect) and the indirect effect through externalities (the spillover effect). Combining two different approaches of FDI, the first one, considering FDI as an international movement of capital and the second one, as the entry of new firms in markets with imperfect competition, we show how FDI may act as a positive element for the host country's industrial development. In addition we show that FDI may increase competition and provoke the exit of local firms. With a continuous flow of FDI, the evolution of the number of local firms can be depicted as a « *U-curve* ». The predominant effect is the competition effect which works through the exit of local firms and the second dominant effect is the spillover effect, FDI acting in favor of local industrial development. By extension FDI is always a positive element for good variety produced in the service as well as in the manufacturing sector.

Keywords: Foreign Direct Investment, Spillovers, Industrial Development.

JEL code: F21, F23

Introduction

The objective of this paper is to study the effects of Foreign Direct Investment (FDI) on host country economy within a general equilibrium framework. Our basic intuition is that the extent of the market (the factor market as the manufactured product market) is a key determinant for firm efficiency in the presence of internal and external returns to scale. Then, in addition to the competition effect represented by foreign firm entry in the home market through FDI, we will also consider FDI as an external capital inflow, modifying conditions for firms efficiency, through the change in host market size. We will focus our analysis on the interactions between multinational firms (MNF) and local firms. This interaction will take place through several elements. The first one is the factor market. FDI represents a capital inflow and then modify the capital endowment of the host economy. The second one is the competition effect of FDI. MNF are considered as more efficient firms competing with local producers for production factors, intermediate services and for final consumption product market.

Our analysis takes place in the framework of the general theory of FDI and international trade with imperfect competition. Despite the fact that elements such as spillovers and external economies have been largely taken into account in the international trade theory, FDI analysis has rarely included those elements until recently. In fact, the recent extensive literature on FDI and international trade with imperfect competition as has been presented by Markusen (1995), has centred the analysis on the determinants of FDI and its effects on country trade flows. Generally the study of the impact of FDI on host country economies was

limited to the framework of factor proportion theory and the analysis of the welfare effect of capital movements like, for example, in Brecher and Díaz-Alejandro (1977) and Bhagwati (1973). A significant change in the literature occurs with Ethier's (1982) work. This author proposes a more general framework which encompasses the complete modern theory of international trade in a model with external increasing returns to scale and shows how the general basic results of the factor endowment trade theory remains valid. The contribution of Ethier's analysis is twofold: first, it represents an important instrument for international trade theory allowing more familiarity with observed interactions between industries; second it is a pioneering analysis of increasing returns with specialization effects in international trade theory. The last element is basic for our study because it shows the way in which elements such as externalities and spillovers can be formalized easily, giving rise to an extensive field for the analysis of FDI impact on host country economies. The main analytical instrument used is a transformation of the peculiar utility function proposed by Dixit and Stiglitz (1977) into a production function. As mentioned by Romer (1987), this allows to «*capture a preference for variety*»¹ of intermediates inputs and, as a consequence, to take into account increasing returns due to specialization. This last element has been clearly explained by Rivera-Batiz and Rivera-Batiz (1991) to analyse FDI impact on host economies. Using a simple general equilibrium model, these authors show in a quite explicit way how foreign capital entry may induce, through the extension of the local market, more specialization in services, which in turn has a positive effect on related industries efficiency. The idea here is remarkably simple. Consider for example an economy constituted by two sectors: service and industry. Both

¹ See Romer (1987) p.56.

employ capital as a primary input and, in addition, industry uses differentiated services as inputs. Since there are increasing returns in services and competition is of monopolistic type, an external entry of foreign capital makes available capital cheaper and average costs lower in the service sector. If the number of firms in equilibrium (and the variety number of differentiated services) is determined by a zero profit condition in the service sector, then the lowering of average cost induced by foreign capital entry implies an increase in the equilibrium number of service varieties. This increase has an indirect positive impact on industry through the increase of production efficiency with external economies related to services variety. However, there are two important limitations in Rivera-Batiz and Rivera-Batiz (1991). The first one is that FDI is only considered through international movement of capital. In fact the analysis could be extended to labor mobility, obtaining similar results. The second one is that their model considers perfect competition in industry while the general theory of FDI, as exposed by Hymer (1976) and Dunning (1977) among others, has shown that FDI and, more generally, Multinational Firms are more likely to exist in imperfect market where firms own some advantages internalized through FDI against other possible strategies like export or license.

In recent works, Rodríguez-Clare (1996) and Markusen and Venables (1997) have studied the effects of FDI with imperfect competition. The results of Rodríguez-Clare imply that MNF technologies that use local intermediate goods more intensively will generate «*stronger linkages*», i.e. stronger spillovers. This is a quiet logical conclusion related to questions such as the «*local contents*» requirement of FDI generally used by host countries governments to make foreign presence more profitable to related industries. However Rodríguez-Clare

doesn't take into account the competition effect of FDI. The model considers that foreign and domestic goods are substitutes but nothing is said about the way in which competition takes place between both good types. This is not the case of Markusen and Venables' model which uses a partial equilibrium framework. Their results show that FDI may have two basic effects: the «*linkage effect*», through which the entry of new firms increases demand for intermediates and the «*product market competition effect*» because multinationals may substitute local firms. However their conclusions are somewhat extreme due to the comparative static nature of the model. Markusen and Venables suggest that «*while multinationals can certainly act as a catalyst to stimulate local industry, local industry and multinationals do not coexist*»². We show in our model that this coexistence is possible in a general equilibrium framework. Our purpose is to extend the analysis to factor endowment restrictions. The structure of this paper is as follows. Section 1 presents the basic equations of the model, Section 2 analyses the relationships between the different sectors of the economy, Section 3 discusses the effects of FDI in the host country economy and Conclusion presents the main findings of our analysis and presents possible extensions.

² See Markusen and Venables (1997), p.21.

1. The Model

We consider an economy with three sectors: agriculture, which produces an homogeneous good (y), manufacturing industry and services which produce differentiated goods named respectively x and s . All sectors use two factors, labor and capital. We make the hypothesis that labor is costless so that it is not taken into account in the analysis. Only capital (K) will be considered. This makes the analysis simpler without altering the main properties of the model. Consumers own K and purchase x and y . Services are only acquired by manufacturing firms. All consumers have identical preferences depicted by the utility function defined on y and on a sub-utility function defined on x . Hence the utility function of the representative consumer takes the form:

$$U = X^\delta Y^{1-\delta} \quad (1)$$

where $0 < \delta < 1$

and X is a sub-utility function of CES-type defined by :

$$X = \left\{ \sum_j x_j^\Gamma \right\}^{\frac{1}{\Gamma}} \quad (2)$$

where $0 < \Gamma < 1$ and $j = 1..n_x$ where n_x is the number of varieties of the manufactured good. There is monopolistic competition in industry and each variety of the manufacturing good is produced by only one producer. This hypothesis is consistent with the general monopolistic competition model since

two different producers have no incentive to produce exactly the same good because in this case their market power would be lower than in the case where each of these producers would be a monopoly of its own variety. This also supposes that differentiation is costless. There are increasing returns to scale represented by decreasing average costs and manufacturers use K as a primary production factor and services as intermediate inputs. Both inputs are used in fixed and variable quantities. Given r , the unit price of capital, q , the price index of services, and x_j , the production level of each firm taken individually, the cost function³ of each manufacturing firm is defined by:

$$C_j(x_j) = q^\mu r^{1-\mu} (\alpha + \beta x_j) \quad (3)$$

With $0 < \mu < 1$.

The terms α and β are positive parameters and average costs are decreasing with production so there are increasing returns to scale. This stands for «*internal returns to scale*». In particular, the fixed amount of inputs can be decomposed into a fixed amount of capital and services as follows:

$$\alpha = f(\alpha^k, \alpha^s) \quad (4)$$

Where α^k and α^s are the fixed quantities of capital and services required to produce the manufactured good. The price index of services is defined as following:

³ This is the cost function used by Venables (1993) and it can be easily derived from a Cobb-Douglas production function with a fixed component in term of services and capital.

$$q = \left\{ \sum_i p_i^{1-\sigma} \right\}^{\frac{1}{1-\sigma}} \quad (5)$$

where $i=1\dots n_s$ and n_s is the number of available varieties of differentiated services and σ is the constant elasticity of substitution between each pair of variety of differentiated services

with $\sigma > 1$. All the varieties of the differentiated services enter symmetrically in the production function so the expression (5) can be simplified into:

$$q = n_s^{\frac{1}{1-\sigma}} p_i \quad (5')$$

The equation (5') depicts the relationship between q and n_s . Since the expression $\frac{1}{1-\sigma}$ is negative, an increase in n_s implies a decrease in q . The direct consequence is that the cost function of manufacturing firm defined by (3) decreases with n_s for a given production level. This represents a potential external effect or « *external returns to scale* » of service sector activity on manufacturing industry because service variety, represented by n_s , plays a positive role on manufacturing firm efficiency *per se*. The model turns around this relationship between services and industry.

Given the specification of the utility function in (1) and (2), constant elasticity of substitution between each pair of differentiated manufactured products is equal to:

$$\theta = \frac{1}{1-\Gamma} > 1 \quad (6)$$

It can easily be shown that, for a sufficiently large number of firms, θ is also the price elasticity of demand. Producers determine their production level through profits maximisation. The profit function is represented by the following expression :

$$\pi_j = p_j x_j - C_j(x_j) \quad (7)$$

Given θ , individual prices are determined by the equalization of marginal income to marginal costs. So prices are set above marginal cost and using (3) and (6) we can find the expression for prices of manufactured good :

$$P_j = \frac{\theta}{\theta - 1} \beta q^\mu r^{1-\mu} \quad (8)$$

There is not strategic interactions between firms. There is free entry and exit in manufacturing industry which implies zero profits, then using (3), (7) and (8) we can find the expression for the quantity produced by each manufacturing firm as a constant term equal to :

$$x_j = \frac{\alpha (\theta - 1)}{\beta} \quad (9)$$

This expression gives us the break-even level of production or, in other words, the production level to be reached by each manufacturing firms to cover fixed costs.

Competitive conditions are quite similar in the service sector. Services are nontradable. There is monopolistic competition so prices and quantities can be derived using the same assumptions as above. Cost function is the same for each service producer and is equal to :

$$C_i(s_i) = r (\gamma + \rho s_i) \quad (10)$$

Where s_i is the production level of each service firm i and γ and ρ are positive constant terms. Average costs decrease with s_i so there are increasing returns in the service sector. Hence, firms behaviour is similar in the service and manufacturing sector. Given σ , the constant demand elasticity between each pair of services, individual prices are set above marginal costs. Services are only used by manufacturing industry and do not suppose final consumption by consumers. Supply of each variety of produced service takes place to maximise profits :

$$\pi_i = p_i s_i - C_i(s_i) \quad (11)$$

With a sufficiently large number of service varieties, σ can be taken as the price elasticity of demand, so that using equation (10), the expression for service price is equal to :

$$p_i = \frac{\sigma}{\sigma - 1} \rho r \quad (12)$$

As in manufacturing industry, there is free entry and exit in the service market so that profits are equal to zero at the equilibrium. Using equations (10), (11)

and (12) we can derive expression for the break-even level of output in services as being :

$$s_i = \frac{\gamma (\sigma - 1)}{\rho} \quad (13)$$

Equilibrium in the agricultural sector is quite simple. Since y is the production level of the agricultural good and there is perfect competition, production function for agriculture can be represented by an aggregated function as following :

$$y = K_y \quad (14)$$

where K_y is the total quantity of capital employed in agriculture. The price of agricultural good is unique and equal to marginal cost so that :

$$p_y = r \quad (15)$$

The description of the model is completed with equilibrium in the capital market. Using the Shephard lemma to derive demand for capital by manufacturing and service firms from equations (3) and (10) respectively and from equation (14) for agriculture, it is possible to depict equilibrium condition in the capital market as following :

$$n_x \frac{\partial C_i}{\partial r} + n_s \frac{\partial C_j}{\partial r} + K_y = K \quad (16)$$

K is the total capital endowment of the economy and the second partial derivative of the left hand side is defined taking p_i as given and K_y is the total factor employed in agriculture.

We can then use the model to analyse the relationships between the service sector and the manufacturing industry. To simplify the analysis, we will present first these relationships in the closed economy case. We will show afterwards how FDI may modify the results and plays an active role for the development of local firms.

2. The closed economy case

Before the analysis of the interaction between local and multinational firms, it is convenient to depict the interactions between service and manufacturing firms. Since consumers do not purchase services, the interaction here plays through two elements. The first one is the factor market and the second one is the upstream-downstream production structure of the model. To consider interactions in the factor market, one has to bear in mind that all sectors use the same factor. Following Krugman's (1979) framework, the equilibrium number of firms in services and manufacturing industry is determined by the extent of the market i.e., the total endowment in K of the economy. Hence we can use equation (16) to derive the first relationship between the equilibrium number of firms of both sectors as follows.

Since the utility function depicted in equation (1) has a Cobb-Douglas form, the expenditure in agriculture good is equal to :

$$p_y y = (1 - \delta) r.K \quad (17)$$

With full employment, the term $r.K$ is equal to available income destined to consumption of agricultural and manufactured goods, then $(1-\delta) r.K$ is the value of available income destined to consumption of the agricultural good. Then using equation (15) it is easy to show that demand for capital in agriculture is equal to :

$$K_y = (1 - \delta) K \quad (18)$$

The term $\delta.K$ represents the total quantity of capital employed in the service and manufacturing sectors.

We can then use equation (16) together with equations (3) and (10) which give the expression for cost functions, and (9), (12), and (13) which give the equilibrium values for prices and quantities, to determine the equilibrium number of manufacturing firms as a function of the parameters of the model, the number of services firms and the total capital endowment of the economy:

$$n_x = \frac{\delta K - n_s (\gamma \sigma)}{(1 - \mu) \left(\frac{\sigma}{\sigma - 1} \rho \right)^\mu (\alpha \theta) n_s^{\frac{\mu}{1 - \sigma}}} \quad (19)$$

As expected, equation (19) shows that n_x is greater, the larger is K . Here the equilibrium number of firms in the service sector n_s , acts on n_x through two opposite effects. The first one is positive and plays through the spillover effect since a larger number of varieties in the service sector implies a lower price

index for such services as described in equation (5') and increases manufacturing firms efficiency *ceteris paribus*. The second one is negative since a higher number of service firms implies also a higher demand for K and makes the relative price of capital rise, playing against manufacturing firms efficiency. The general relationship between n_x and n_s is then ambiguous. We have constructed a numerical illustration of equation (19), shown in figure 1 below to shed light on this relationship ⁴.

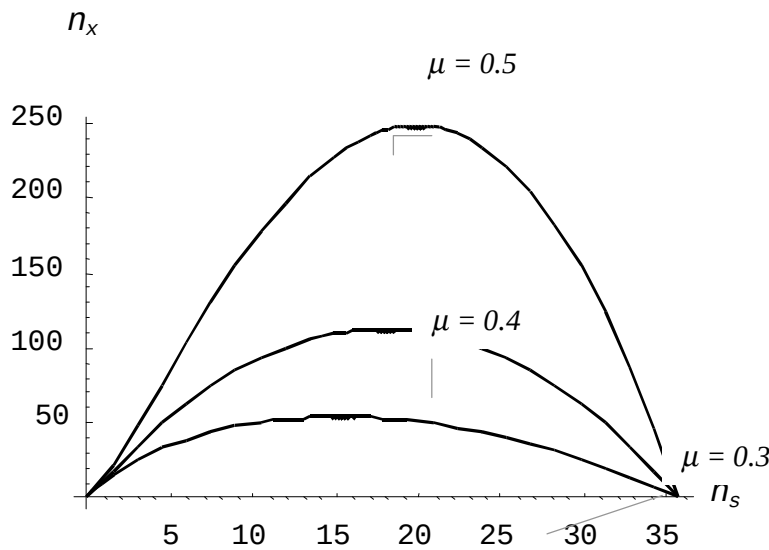


Figure 1

Figure 1 shows that there is a non-monotonous relationship between the equilibrium number of service firms, n_s , and the equilibrium number of manufacturing firms, n_x . First there is a positive relationship between both elements through the domination of the positive spillover effect and second a negative relationship due to the factor market restriction (given the finite value of K). Another important result illustrated here is that, the amplitude of the relationship between n_s and n_x (positive or negative) is more important the higher

⁴ All the numerical examples of the paper are for values given in appendix.

is μ , i.e., the higher is the proportion of manufacturing firms costs determined by the availability of services as logically one would expect given the specification of the cost function in equation (3).

It is clear that in our model, comparative statics imply that the non-monotonicity depicted in figure 1 is not determinant. To find the equilibrium number of firms n_s and n_x we just need a second equation which describes the relationship between these two endogeneous variables. Hence, the equilibrium would be illustrated as to be a point on one of the curve shown in figure 1 for a given value of μ . However, things may change if, as we will see later, we modify the equilibrium conditions of the model through an external entry of firms in manufacturing industry. Before this, it is possible to find the equilibrium number of firms in the closed economy case using the relationship between n_x and n_s given by the equality between supply and demand of differentiated services. We suppose that each service enters symmetrically in the production function of manufacturing firms. So we can use the cost function of manufacturing firms represented by equation (3) to determine the total demand for intermediates services multiplying individual demands by the equilibrium number of manufacturing firms. Then, using the Shephard lemma we can derive individual demand for each service variety. Since individual supply of services is fixed to the break-even level of production given by equation (13), demand for services is equal to supply when:

$$n_x \frac{\partial C_j}{\partial p_i} = s_i \quad (20)$$

The preceeding expression is equivalent to the following equation (20'), using the equilibrium values for prices and quantities given by equations (9), (12) and (13) :

$$n_x = \left(\gamma \frac{\sigma-1}{\rho} \right)^{\frac{1-\sigma}{\mu}} n_s^{\frac{\sigma-1}{\mu}} \left[\mu \left(\rho \frac{\sigma}{\sigma-1} \right)^{\mu-1} \alpha \theta \right]^{\frac{\sigma-1}{\mu}} \quad (20')$$

Equation (20') shows clearly the potential positive spillover effect between n_s and n_x

since $\frac{\sigma-1}{\mu} > 0$.

Then using equations (19) and (20') we can determine the equilibrium values for n_s and n_x as being equal to the following expressions (21) and (22):

$$n_s = \frac{\delta K}{\gamma \sigma} - \frac{1-\mu}{\mu} \quad (21)$$

$$n_x = \frac{\gamma \sigma}{\mu \left(\rho \frac{\sigma}{\sigma-1} \right)^{\mu} (\alpha \theta) \left(\frac{\delta K}{\gamma \sigma} - \frac{1-\mu}{\mu} \right)^{\frac{\mu}{1-\sigma}}} \quad (22)$$

Equations (21) and (22) show the positive relationship between each firm type and the total capital endowment of the economy. As expected, the total number of varieties of manufactured products and services depends on K . This is a classical result of international trade model with increasing returns to scale such as Krugman (1979). Now the question is to show how FDI in

manufacturing can modify the picture. We have seen that, generally, the study of MNF in international trade models have been made through two alternative approaches : considering FDI as an external entry of capital or as an entry of new firms in the market resulting from a choice location. We will combine these two approaches in the following section.

3. FDI, competition and spillovers.

Two important assumptions have to be made here. The first one is to suppose that there is a continuous entry of new firms in the market. We assume then that FDI is the only way to penetrate the local market described previously. FDI is realized by firms located in the Rest of the World (ROW) ignoring the production and competition conditions in their home market. We suppose that MNF have a cost function different to local firms cost function in two different aspects. First, MNF are more intensive users of intermediate services and second, fixed costs component are higher for MNF because they have a lower knowledge of consumers tastes than local firms and have to adapt to it. Hence we will modify exogenously the number of MNF, fixing their output level to zero profit. The second important hypothesis we will make is that the entry of firms in the local market will be accompanied by an exogenous entry of foreign capital. That means that part of the capital used by foreign affiliates comes from the ROW and do not suppose any payment through royalties or repatriated profits. This transfer of capital is part of the fixed amount of capital specified by equation (4) that we can rewrite for multinational firms as following:

$$\alpha_m = f_m(\alpha_m^k, \alpha_m^s) \quad (23)$$

The fixed quantity of capital α_m^k is in turn a function of the quantities acquired in the host country (h) and those acquired in ROW (w). Hence we can write α_m^k as a function of two elements:

$$\alpha_m^k = g_m(\Phi^h, \Phi^w) \quad (24)$$

The international transfer of capital is then represented by the constant term Φ^w . We consider that the unit price for the new capital is the same as the price set in the host country capital market. This transfer of capital is a *sine qua non* condition for FDI. By this way, we want to capture the positive macroeconomic effect of a larger endowment of capital in the host economy. FDI implies a fixed cost and part of this cost is covered through an international movement of capital from ROW to host country.

We consider now that there are two firms types in the manufacturing industry sector : MNF which number at equilibrium will be exogenous and named n_m ; and local firms, which number at equilibrium will be endogenous and named n_l . Given our hypothesis about costs differences between these two firms types, we have to rewrite the cost function of manufacturing firms, making the distinction between local and multinational firms. We obtain the following specifications for cost functions:

$$C_l(x_l) = q^\mu r^{1-\mu} (\alpha_l + \beta x_l) \quad (25)$$

$$C_m(x_m) = q^\lambda r^{1-\lambda} (\alpha_m + \beta x_m) \quad (26)$$

with $\alpha_m > \alpha_l$

and $\lambda > \mu$

still having $0 < \lambda < 1$ and $0 < \mu < 1$.

Prices will be identical since marginal cost (β) is the same for each firm type and will be equal to the expression of equation (8). The same occurs for the elasticity of final demand, which remains equal to θ . Nevertheless, the break even levels of output will be different. It will be higher for multinational than for local firms. Given zero profit hypothesis, output for each firm type will then be equal to :

$$x_l = \frac{\alpha_l (\theta - 1)}{\beta} \quad (27)$$

$$x_m = \frac{\alpha_m (\theta - 1)}{\beta} \quad (28)$$

So $x_m > x_l$ given our hypothesis.

Conditions remain equal in the service sector, so that all the equilibrium equations of the previous section remain unchanged. Then we can rewrite the preceding equations (16) and (20), including the existence of MNF and the modification of K to represent the magnitude of FDI. Doing this we will determine the equilibrium number of local firms in manufacturing and service

sectors. This gives us two expressions as follows : equation (29) gives us the equilibrium condition for full employment in capital market including MNF; equation (30) gives us the equality between demand and supply of individual services.

$$n_l \frac{\partial C_l}{\partial r} + n_m \frac{\partial C_m}{\partial r} + n_s \frac{\partial C_i}{\partial r} + K_y = \delta (K + \Phi^w n_m) \quad (29)$$

$$n_l \frac{\partial C_l}{\partial p_i} + n_m \frac{\partial C_m}{\partial p_i} = s_i \quad (30)$$

Both expressions can be expressed taking the equilibrium values for prices and quantities given by equations (8), (12), (13), (27) and (28). The equilibrium in the capital market is then given by:

$$(1 - \mu) n_l \alpha_l \theta n_s^{\frac{\mu}{1-\sigma}} \left(\rho \frac{\sigma}{\sigma - 1} \right)^{\mu} + (1 - \lambda) n_m \alpha_m \theta n_s^{\frac{\lambda}{1-\sigma}} \left(\rho \frac{\sigma}{\sigma - 1} \right)^{\lambda} = \delta (K + \Phi^w n_m) \quad (31)$$

The term $\Phi^w \cdot n_m$ of equations (29) and (31) represents the proportional change in the capital endowment of the host economy due to FDI. Each MNF bring itself part of the capital required to set up an affiliate. Hence, the host country capital endowment varies in proportion of the number of active MNF.

The equality between supply and demand of each variety of service is given by:

$$\mu n_l \alpha_l \theta n_s^{\frac{\mu}{1-\sigma}} \left(\rho \frac{\sigma}{\sigma-1} \right)^{\mu-1} + \lambda n_m \alpha_m \theta n_s^{\frac{\lambda}{1-\sigma}} \left(\rho \frac{\sigma}{\sigma-1} \right)^{\lambda-1} = \gamma \frac{\sigma-1}{\rho} \quad (32)$$

The motion of the model with MNF entry is the following:

$$\frac{d n_m}{d t} > 0 \quad \text{where } t \text{ is the time.}$$

The objective is then to analyse how the equilibrium number of local firms varies with n_m .

Following equations (29) and (30) the effect of MNF entry in the market acts through two elements. The first element represents the positive spillover arising from the increase of K by an amount that we have supposed to be proportional to the number of MNF. The second element is that an increase in the number of active firms in the market increases the demand for intermediates and provokes spillover effects through the relationship between the equilibrium number of manufacturing and service firms. However, the last element can also play against the equilibrium number of local firms. An entry of MNF increases competition and, *ceteris paribus*, provokes the exit of a determined number of local firms to restore zero-profit given the break-even level of output given by equation (27). Hence, there are several elements playing simultaneously with FDI making the analysis quite difficult. To make it easier to understand we have constructed a numerical example using equations (29) and (30) given the motion of the model. The result is represented in figure 2 below.

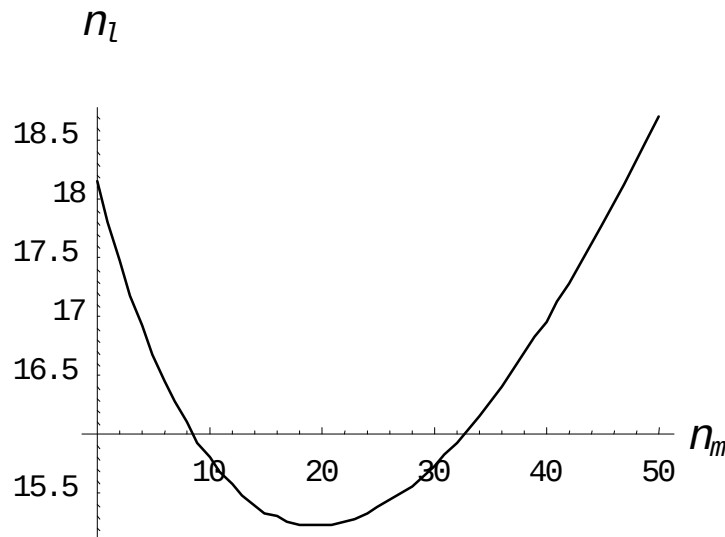


Figure 2

The « *U-curve* » represented in figure 2 depicts the potential effect of FDI on host country economy. This effect is first negative. That means that first the competition effect of FDI dominates. External entry of new firms, although they have higher fixed costs than local firms, provokes the exit of a determined number of local firms. This is in part due to our hypothesis concerning the way in which FDI occurs. In effect, we have constructed the figure 2 giving different values to n_m . Hence the endogenous variables of the model (n_s and n_l) have to adapt to it. However it is quite remarkable that, for further increases of n_m , the equilibrium number of local firms starts to increase, as a result of the domination of the positive spillover effect. Moreover, since we have considered successive changes in the capital endowment of the economy, the competition effect begin to be less important relative to the effect related to the larger market for final consumption. However it is important to mention the particularity of our hypothesis. Taking FDI as both an entry of new firms in the market as of capital inflow, FDI causes n_s to increase monotonously. Consequently, FDI is always

positive for intermediate services variety. We have to bear in mind the result represented by figure 1. We have seen that firm entry in the market may displace the equilibrium on the « $n_s - n_l$ » curve. Figure 2 shows that, with the displacement of the equilibrium provoked by FDI, we stay on the ascendant part of this curve. The important outcome of figure 2 is that it shows that the potential positive effect of FDI is more important than the negative one. When positive spillovers due to FDI dominate, the number of local firms ends up to be higher than initially, in the equilibrium without FDI.

Others numerical examples could have been considered here. For example, if local firms are relatively less efficient than MNF (i.e. for a α_m sufficiently lower than α_l), spillovers could not occur. In this case FDI would provoke the exit of all the local firms. Efficiency is then a key determinant making local firms able to capture potential spillovers arising from FDI. Moreover, in an alternative simulation we could have set $\lambda < \mu$, i.e. when MNF are less intensive users of local services than domestic firms. The spillover would have been too small to compensate the competition effect. This conclusion is related to the Rodríguez-Clare results. FDI acts as a positive element for industrial development in host countries if MNF use a sufficient amount of local intermediates. These are special cases. Our main result refers to a more general case, showing the way in which the competition effect precede the potential spillovers arising from FDI.

Conclusion

As we have shown in our analysis, FDI acts always as a positive element for product variety consumed domestically, considering that all producers, both MNF and local firms, produce different varieties. This is in part due to the way in which FDI has been modeled here, i.e. as a continuous entry of capital and foreign competitors. However, it is quite remarkable that the variety of manufactured products always increases since the competition effect is never so high as to eliminate the positive effect of FDI on product variety. Our principal result is that we have shown that the potential positive effects of FDI for local firms are larger than the negative ones. We show also that the equilibrium number of local firms can be depicted as a « *U-curve* ». The predominant effect is the competition effect which precedes the potential spillovers arising from FDI.

A more complete model would include the balance of payments equilibrium to determine the potential effect of FDI on local wages and welfare. We can make reference to the Krugman's (1979) model for example. In a model of international trade with imperfect competition represented by product differentiation and increasing returns, with two countries, the smaller the country is, the lower will be the variety of differentiated goods produced by firms located in this country. A direct consequence is that the lower will have to be home wages to verify balance of payment equilibrium since all varieties produced are consumed in both countries. However in the Krugman's model with zero transport costs, wages are equal. In our model, things would be different replacing capital by labour. Since market size acts through two elements, the

external and internal increasing returns, even with zero transport costs, the wage rate would be higher in the large country than in the small country to verify the balance of payment equilibrium condition. This is a notable result, in particular for economic integration and questions related to firms location in a world with increasing returns and externalities as described in this paper.

There are also important insights for political economy that derive from our result. This concerns questions such as incentives for resources transfer with FDI. Our model shows how FDI can be positive for local firms expansion and that positive externalities are more likely to occur the larger is the amount of capital transferred through FDI and the greater is the relative efficiency of local firms. We could add to these conditions the Rodríguez-Clare's (1996) result which shows that the larger the proportion of intermediate goods used by MNF is, the greater is the probability for spillovers to arise. In addition, our model shows that local firms need to adapt to new competitors since FDI represents a greater competition factor than imports due to the factor market size limitation. Then the competition effect can delay the spillover effect. FDI may provoke the exit of a given number of local firms while the remaining firms will be able to capture the positive spillovers effects related to FDI. This implies a transition period in which the competition effect dominates. In this case policy would have the objective of shortening this period giving priority to spillovers through the transfer of productive resources and the requirement of an appropriate local contents rule to make MNF intensive users of local intermediates goods.

Appendix

In figure 1:

$$K=50, \delta=0.5, \alpha=0.5, \beta=1, \mu=0.4, \theta=6, \rho=1, \sigma=1.4, \gamma=0.5$$

In figure 2:

$$K=50, \delta=0.5, \alpha_l=0.5, \alpha_m=4, \beta=1, \lambda=0.8, \mu=0.4, \theta=6, \rho=1, \\ \sigma=1.4, \gamma=0.5, \Phi^v=1.$$

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