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Vertical Multinationals, Industry Characteristics, And Endogenous Technology Spillover

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Abstract

In this paper, we build a model of vertical multinational firms with endogenous spillover that explains recent empirical questions; why developing countries have little technology transfer from foreign direct investment (FDI) and why only low-tech sectors benefit from technology spillover. To explain these ques-

1 Introduction

For developing countries, superior knowledge of production is an especially important source of economic development. Since the 1960s, the contents of technological change or spillover has been left as an unexplained residual, although many economists recognized the importance of technological diffusion for economic development.[1] During the same period in which theoretical contributions to technology spillover have been developed, some empirical studies were conducted within the framework of international trade.[2]

In the 1990s the study of technology spillover split along two newly emerging paths. One is a series of micro empirical studies, usually using firm level data, while the other path is interested in empirical tests of the endogenous growth model in Macroeconomics. A series of endogenous growth models, such as Barro and Sala-i-Martin (1995) and Grossman and Helpman (1991), enable us to discuss differences in economic growth rates. Barro and Sala-i-Martin (1995) highlighted human capital as a source of the technology differences across countries. Grossman and Helpman's (1991) model clarified the role of dynamic scale economies and the learning mechanism in the catching-up process.

These two paths provide both macro and micro incentives for empirical studies on technological diffusion across countries or across industries. Empirical studies on international technology spillover can roughly be classified into two groups: t1(ps)sinto6cir2(eso-445(tno

(FDI) channel. Studies on FDI channel may be further divided into two groups: those that use cross-country estimation and those that employ firm-level estimation.[4] Recent called "Barro equation," which refers to regressing the growth rate on variables such as initial income level, education level (both primary and secondary), the number of

Firm level Evidence

Firm level evidences may roughly be divided into two categories. The first group consists of developed country samples which finds that multinational enterprize (MNE) subsidiaries [5] have positive impacts on the host economy's productivity. This group includes Haskel, et al., (2002) and Veugelers and Cassiman (2003).[6] The second group consists of developing country's samples which has mixed results. This includes Kokko (1994), Haddad and Harrison (1993), Aitken and Harrison (1999), Blomström and Sjöholm (1999), and Blomström et al. (2000).

While the studies with developed country data find the positive spillover effects of FDI, most of the studies analyzing developing countries have failed to find the evidence of positive spillovers. Haddad and Harrison (1993) employ firm-level data of Moroccan manufacturing sector, but they reject the hypothesis that FDI accelerated productivity growth in domestic firms during the second half of the 1980s. However they find that spillover effects are significant for relatively simple technology using sectors and there are no significant transfers of modern technologies. Analyzing Mexican manufacturing industry data Kokko (1994) concludes that the industries where large productivity gaps and large foreign shares occur may explain why spillovers do not exist. Kokko also argues that when foreign affiliates and local firms are in more direct competition with each other, spillover effects are more likely to occur. Aitken and Harrison (1999) find with Venezuelan plant level data that increases in foreign equity participation are correlated with increases in productivity for small plants. However they fail to find the positive spillover effects to other domestic plants. They emphasize the possibility that spillover effects vary across industries. Blomström and Sjöholm (1999) show

[5] Focussing on the argument of vertical multinationals and technology spillover via subsidiaries, we exclude licensing as one of possible supply modes in this paper. Thus, we use the word "multinational firm" and "FDI" interchangeable.

[6] Haskel et al.(2002) analyze UK and Veugelers and Cassiman (2003) use Belgium firm level data, respectively.

For horizontal multinational firms, the trade-off between exporting and producing in the host economy usually arises. On the other hand, vertical multinationals involve trade-off between cost of producing whole process in source country and cost of breaking up the vertical production structure.

The effects of horizontal and vertical multinational firms can be different in many aspects. First, horizontal multinationals are likely to be substituted for international trade while vertical multinationals are complement to trade. Second, horizontal multinationals are likely to occur between countries of similar development levels while vertical multinationals are more likely between countries with different levels of development. Third, horizontal multinationals generally have more job creation effects on host economy than vertical multinationals.

Figure 1 shows some aspects of differences between horizontal and vertical multinationals which is modified version of Figure 3 in Carr et al. (2003). Volume of subsidiary sales or the number of multinational firms for vertical MNE is declining as countries factor endowment structures or levels of development become similar. On the other hand, the number of horizontal multinationals are an increasing function of similarity between countries. Figure 1 gives simple insights when we consider the effects of MNE on host economy, i.e., we need to distinguish two types of multinationals to identify their effects on the host economy. It means that when we consider the effects of multinationals on host developing economies, we should emphasize vertical multinationals rather than horizontal ones. Although horizontal multinational firms are more important in world capital flows, vertical multinationals are still very important for only low-tech sectors, and how MNE behaviors or spillover effects are different across industries. Regarding the last question, it is rather surprising that little theoretical attention has been paid to the industry characteristic of FDI. To explain these questions, we endogenize spillover effects and incorporate industry characteristics into the model.

The rest of this paper is organized as follows. Section 2 presents the model of vertical multinational firm and derive the main implications of the model. Section 3 extends the model to endogenous technology spillover model which is the central aim of this paper. Section 4 refers to implications for economic development of host economy. Section 5 concludes the paper.

2 A Model of Vertical Multinationals

Although the importance of technology spillovers from developed to developing countries have been recognized empirically, few theories try to uncover the mechanism of spillovers.[10]

Recent theoretical contributions focus on the equilibrium conditions in which technology spilloves occur. Markusen and Ethier (1996) analyze multinational firms and technology spillover in a product cycle setting. Their main concern is to investigate the decision making of supply modes (exports, licensing contracts, or multinationals), and endogenous determination of wage rate and the number of multinational firms. They assume that licensing contract and multinational subsidiaries are main routes of technology transfer via labor turnover but exporting is not.

Fosfuri et al.(2001) and Glass and Saggi (2002) focus on narrower point of spillover mechanism. Fosfuri et al.(2001) identify the conditions under which technology spillovers

[10] See Wang and Blomstöm (1992) for survey on the earlier works on this issue. Many of earlier models focus on capital inflow and learning by doing process in dynamic setting

occur using two stage multinational firm's decision game, based on the idea that technology spillovers occur through workers mobility. Trained workers in the multinational's subsidiaries establish local rivals firms. Their other concern is to identify why multinationals provide workers higher wages than local firms do and conditions under which this is true. Glass and Saggi (2002) construct two-country one-shot Cournot game but they concentrate on more host government's policy concern.

The model of this paper is different from both the earlier and recent models in many aspects. Since our model is constructed to explain the empirical findings mentioned in the previous section, we do not focus much on the conditions in which technology spillovers occur. Instead we focus more on the idea that the effects of multinational firms vary across industries and the endogenous determination of technology spillover effcts. The framework of our model is more similar to Markusen and Venables (2000) which construct the horizontal multinational firm model with the varieties of final goods in two country general equilibrium, and Zhang and Markusen (1999) where they make the vertical multinational model under the oligopoly in two country general equilibrium. However, these models study neither industry characteristics nor technology spillovers.

Model

The (host) economy is assumed to be a developing and small open economy with two final goods sectors, X and Y, and two factor inputs of productions, skilled and unskilled labor. While Y-sector is characterized as a perfect competition, X-sector is monopolistic competitive market. While Y-sector produces final good Y using both skilled and unskilled labor X-sector produces final good X with two types of machines; one is low-tech and the other is high-tech machines. Since the host country is less developed, we assume this country is relatively abundant in unskilled labor. We further assume that low-tech machines are produced by only unskilled labor and the high-tech machines are produced by only skilled labor. Under this assumption, the host country has a comparative advantage in the production of low-tech machines. Hence multinational firms have incentives to split the production process of good X in which multinational firms produce and bring high-tech machines to the host country and assemble them with low-tech machines produced in the host country. Factors are perfectly mobile within each country but are immobile between countries. However, high-tech machines are tradable with some transfer and adjustment costs.

The distinct feature of our analysis is to allow the model to focus on the effects of the multinational firms on the host economy under the various industry characteristics as well as country characteristics. While the ratio of fixed endowments of skilled to total labor force stands for the country characteristics, the intensiveness of high-tech machines used in the sector determines the industry characteristics.

Preference

There are two final goods, X and Y, and the preference takes the following Cob-Douglas utility form.

$$u = X^{\gamma} Y^{1-\gamma}, \quad X = \left[n X_d^{\frac{\sigma-1}{\sigma}} + m X_m^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}, \quad \sigma > 1,$$

where γ is the expenditure share to the good X $(0 < \gamma < 1)$, X_d (X_m) is the differentiated good by local (multinational) firms. σ is the elasticity of substitution between X_d and X_m. n (m) is the numbers of domestic (multinational) firms. Economy endows fixed amount of skilled and unskilled labor.[11]

Final Goods Sector

There are two final goods sectors; Y is produced using skilled and unskilled labor showing constant returns to scale technology, and Y is assumed numeraire. Good X is produced by two types of producers; domestic producers and multinational firms.

[11] To save the notations, X and Y denote both demand and supply of final goods.

X_d represents each variety produced by domestic producers and X_m is each variety produced by multinationals. Final good Y represents the rest of the economy and is tradable at the fixed world market price. We further assume the trade in good Y is costless. Demands for each final good is as follows;

$$X = \frac{\gamma E}{Q_X}, \quad Y = (1-\gamma)E. \tag{1}$$

where E is total expenditure of the economy which will be defined shortly and Q_X is a composite price index of X which consists of prices of X_d and X_m[12]

$$Q_X = \left[n p_d^{1-\sigma} + m p_m^{1-\sigma} \right]^{\frac{1}{1-\sigma}}, \tag{2}$$

where p_d and p_m represent the prices of domestic and foreign goods respectively.

Given X, domestic firms and multinationals generate the demand for each variety, X_d and X_m

$$X_d = p_d^{-\sigma} Q_X X, \tag{3}$$

$$X_m = p_m^{-\sigma} Q_X X, \tag{4}$$

Each variety X_d and X_m is produced under monopolistically competitive markets with the following production techniques;

$$X_d = \Psi \min \left[\frac{Z_L^d}{1-\mu}, \frac{Z_H^d}{\mu} \right],$$
$$X_m = \min \left[\frac{Z_L^m}{1-\mu}, \frac{Z_H^m}{\mu} \right],$$

where Z_i^j, $i = L, H$ and $j = d, m$ is quantity of intermediate goods (machines) used in each final good production. Final good X_d and X_m are produced with two kinds of machines, low tech- and high-tech machines. Machines are assumed to be tradable.

[12] The derivations of Q_X and demand functions for X_d and X_m are already well-stylized. See Markusen (2002), chapter 6, for details.

We further assume that multinationals bring (import) Z_H^m from their home country to this host economy and assemble the final goods X_m using low-tech machines which are produced in the host country. μ indicates the fixed productivity parameter and also indicates the type of industry assumed to lie between 0 and unity. Ψ is productivity parameter and captures spillover effects from multinational firms in which the activity of multinationals has an externality to local firm production. This productivity parameter contains the quantity of skilled labor who obtain knowledge of new technology and absorptive capability of host economy that will be discussed in next section. In this section Ψ is assumed to be unity, that is, there are no spillover effects.

Technology of Y-sector is assumed Cob-Douglas and produced with skilled and unskilled labor;

$$Y = AL_Y^{\beta} H_Y^{1-\beta},$$

where A is productivity parameter, L_Y and H_Y denote unskilled and skilled labor employed in Y-sector.

Cost Functions and prices

Since final good Y is numeraire and produced under perfectly competitive market, we have following unit cost function of Y-sector;

which is greater than 1. φ is an adjustment cost that is necessary to install the new machines into the host economy's production. F_d and F_m are fixed costs for each type of firm and we assume that $F_m < F_d$

We assume that to adjust a high-tech machine brought by the multinational firm to the low-tech machine which is produced by the local firm, the subsidiary needs a help of local skilled labor. In other words, adjustment cost φ is a function of skilled labor's wage rate. Using the transformation of wage rates above, unit cost functions become

$$c_d(w) = \Psi^{-1}\left[(1-\mu)w^{\beta-1} + \mu\, w^{\beta}\right], \tag{10}$$

$$c_m(w) = (1-\mu)w^{\beta-1} + \mu\,(t_z w^{\beta} + \alpha w^{\beta}), \tag{11}$$

where w is the wage ratio of skilled to unskilled labor in multinational's home country and α is units of skilled labor required to adjust new machine to host country's low-tech machine assuming $0 < \alpha < 1$.[14]

Since we assume full employment and fixed labor supply, the total factor income, E, of this economy is $w_L L + w_H H$. Using the previous transformation of

Unskilled and skilled labor in X-sector consist of local and multinational firms' employees,

$$L_X = n(1-\mu)(X_d + F_d) + m(1-\mu)(X_m + F_m), \tag{14}$$

$$H_X = n\mu(X_d + F_d) + \alpha m\mu(X_m + F_m). \tag{15}$$

The first term of right hand ides of equations (14) and (15) represent unskilled and skilled labor employed by local firms. The second term of right hand sides of equations (14) and (15) represent unskilled and skilled labor employed by multinational firms.

Finally zero profit condition for each firm is directly derived from each profit function setting equal zero,

$$X_d = (\quad -1)F_d \tag{16}$$

$$X_m = (\quad -1)F_m \tag{17}$$

Combining these zero profit conditions together with factor market equilibrium conditions, w can be described as a function of n and m that has the following properties;

$$\frac{\partial w(n,m:\mu)}{\partial L} > 0, \quad \frac{\partial w(n,m:\mu)}{\partial H} < 0$$

$$\frac{\partial w(n,m:\mu)}{\partial n} \ \square\ 0 \quad \Leftrightarrow \quad \mu \ \square\ \frac{H-H_X}{L-L_X+H-H_X},$$
$$\frac{\partial w(n,m:\mu)}{\partial m} \ \square\ 0 \quad \Leftrightarrow \quad \mu \ \square\ \frac{H-H_X}{\alpha(L-L_X)+H-H_X}.$$

These properties say that an increase in (absolute term of) $L(H)$ raises (lowers) the relative wage of skilled to unskilled labor w. In other words, the $L(H)$ abundant country tends to have higher (lower) wage ratio w. This captures the country characteristic. On the other hand, parameter μ denotes the industry characteristic.

The system of equations consists of 15 equations, such as (1)(two equations), (2), (3), (4), (8), (9), (10), (11), (12), (13), (14), (15), (16), and (17). These 15 equations solve 15 unknown variables, such as $\{X, Y, X_d, X_m, p_d, p_m, c_d, c_m, Q_X, w, E, L_X, H_X, n, m\}$. (see Appendix 3 for more detail.).

Intuitive Arguments

To identify the impact of multinationals, let us first consider the situation when there were no multinationals. Therefore equilibrium conditions are described by equations (3) and (13). Figure 2 shows the relationship between w and μ. Derivations of curves are explained in Appendix A. The equilibrium conditions for w and n are divided into two cases depending on the relative size between μ and the share of skilled labor in total labor force, $h = H/(L + H)$. As Figure 2 shows that the determination process of equilibrium w and n are different across sectors. The upper panel of Figure 2 which is the case for $\mu < h$ have relatively larger number of domestic firms and lower wage rate than the lower panel of Figure 2 which is the case for $\mu > h$. In the upper panel, both equations, (3) and (13) have maximum attainable numbers of domestic firms which are expressed by the limiting values of $H/(F_d\mu)$, and $\gamma H/(F_d\mu)$, respectively. In the lower panel while equation (13) has the same maximum number of domestic firms, equation (3) has the minimum limit number of domestic firms which is expressed by $\gamma H/(F_d\mu)$.

It is clear that the wage ratio in low-tech sector (upper panel) is lower than that of high-tech sector (lower panel). Figure 2 also shows that the number of local firms in low-tech sector is greater than that in high-tech sector. Absolute number of local firms, on the other hand, depends on coutry characteristics, h.

Entry of multinationals affects equilibrium in both panels though changes in limiting values. An increase in the number of multinational firms shifts the limit lines leftward because the number of multinational firms enters in the denominator of the limiting values. As a result, curves of equations (3) and (13) also shift leftward. It is obvious that the entry of multinational firms reduces the number of local firms. It is, however, not obvious whether it reduces or raises the wage ratio.

To see whether the wage ratio increases or decreases, we should solve the general equilibrium model that consists of three equations, (3), (4) and (13) simultaneously. Since it is very diﬃcult to solve the whole system analytically, we solve it numerically instead in the next subsection.

General Equilibrium

To show the characteristics of industry as well as country characterisics, we draw the graphs over μ for various skilled labor endowment ratios. Figure 3 shows the numbers of domestic and multinational firms without spillovers, i.e., $\Psi = 1$ over μ for three diﬀerent cases of h

with μ. Local and multinational firms compete in only relatively high-tech sectors.

Country characteristics which is indicated by h bring the following insights: the number of multinational firms is declining and the range of sectors shifts toward high-tech sectors as h increases, while the range of local firms expands as h increases. These observations on the country characteristics match the empirical findings about vertical multinational firms that we have discussed in introduction section.

In the next section, introducing technology spillover into these general equilibrium insights of industry and country characteristics, we explain the main question in this paper, i.e., why technology spillovers hardly occur in less developed countries, and only low-tech sectors benefit from FDI.

3 Endogenous Technology Spillover

Technology spillovers pass two stages. The first stage is where subsidiaries of multinational firms bring superior technology and knowledge of production into the host country. At the second stage mainly local skilled workers employed by subsidiaries learn new technology and then new technology disperses to local firms via labor turnover.[16] In addition to these factors, the degree of technology spillover also depends on the absorption capability of the host industry as many empirical studies indicate.

Thus the degree of technology spillover depends on the number of skilled labor employed by the multinationals, the frequency of labor turnover, and absorption capability of the industry. To make the story simple, we assume that the absorption capability of each industry is the share of number of local firms in the total number of firms in the industry. Blomström and Kokko (1998) state that spillovers from competition are not determined by foreign presence alone, but rather by the simultaneous

[16] See, for example, Hall and Khan (2003) for the importance of skilled workes on the technology spillovers. See also Fosfuri et al.(2001). Other than labor turnover, spillovers may arise through demonstration effects and backward and forward production linkage effects.

interaction between foreign and local firms. They also point out that large foreign presence may even be a sign of a weak local industry, where local firms have not been able to absorb any productivity spillovers, while a high level of local competence contributes to raise the absorptive capacity of the host country. Blomström et al. (2000) also state that spillovers appear in industries with moderate technology gaps between local and multinational firms, but not in industries with large technology gaps. We assume that labor turnover potentially occurs for every skilled worker employed by multinational firms. In this sense, we may refer to our measure as *potential* degree of spillover.

Hence the (potential) degree of technology spillover is defined as follows;

Share of Skilled Labor for MNE to Total Labor × Industry's Absorption Capability.

In our notation,

$$\frac{H^{MNE}}{\quad}$$

less than the country with $h = 0$.

4 Implications for Economic Development

Our spillover model addresses the importance of skilled labor and a competitive environment between local and multinational firms for technology spillover. This implication suggests a developing host country should educate their workforce. This education reduces the skilled labor scarcity which allows local firms to compete with multinationals. This competition, in turn, enables the spillover effect. In this section we consider the question how the host economy can develop or how it can increase the share of skilled workers which eventually leads to increase the competitiveness of local firms.

By introducing the industry characteristics, our endogenous technology spillover model of a small open economy with vertical multinationals has identified (1) in a severely skilled labor scarce country, local firms are active only in low-tech sectors while multinational firms emerge in relatively high-tech sectors. In this setting, multinational firms occupy the whole of the high-tech industry market. (2) in a moderately skilled labor scarce developing country, local firms are active in all sectors but tend to be more active in lower technology sectors. Multinational firms enter relatively high-tech industries. In these high-tech sectors, multinational firms get the larger share of the market than local firms but local firms are able to compete with multinational firms for a portion of market share. (3) In a country with relatively large amount of skilled labor, local firms are active in all sectors while multinationals are active only in high-tech industries. Market shares are dominated by local firms for all sectors.

Applying these features of our model to empirical findings, we have the following main result. Combining the industry characteristics of vertical multinationals together with the absorption capability of technology spillovers we explained that in less developed countries foreign multinationals drive out local firms in many high-tech sectors because of the wide gap in technology. This in turn implies that spillover effects from multinationals to local firms are very small. In this case, local firms are too weak to compete with multinational firms in many high-tech sectors. Only in low-tech sectors, can local firms compete with multinationals and thus spillover effects occur only in low-tech sectors. In relatively skilled abundant economies, such as the Asian newly industrializing countries, local firms can survive after investment liberalization and compete with multinationals in all industries. In this case, knowledge of technology is smoothly transferred to local firms.

On designing investment liberalization policy, the clear message of this paper is that different responses in industries, such as the share of local firms, absorption capability,

Appendix

A Derivation of Figure 2

To draw the Figure 1, we assume that there are no multinational firms ($m = 0$) in the host economy. Plugging equations (1), (2), (8), (10), and zero profit condition for x_d into equation (3) and rearranging, we have the following function of relative wage w;

$$w = \frac{\gamma L - n\ F_d(1 - \mu)}{nF_d\mu - \gamma H}, \tag{18}$$

which describe the relationship between relative wage w and the number of local firm n.

Differentiating equation (18) with respect to n yields the following sign condition:

$$\frac{dw}{dn} \square 0 \quad \Leftrightarrow \quad \mu \square \frac{H}{H + L}.$$

On the other hand, labor market equilibrium condition (equation (13)) with equations (14) and (15), keeping $m = 0$, yield the following function of w;

$$w = \frac{1 - \beta}{\beta} \frac{L - n(1 - \mu)\ F_d}{H - n\mu\ F_d}, \tag{19}$$

which also describe the relationship between wage ratio w and the number of local firms n.

Differentiating equation (19) with respect to n gives the following sign condition;

$$\frac{dw}{dn} \square 0 \quad \Leftrightarrow \quad \mu \square \frac{H}{H + L}.$$

y-intercepts are derived from setting n

α	β	γ		F_d	F_m	w	t_z
0.5	0.5	0.5	3.0	1.0	0.7	1.2	1.2

Each industry characteristic $h = H/(H + L)$ is used from the following numerical values:

h	0.18	0.20	0.25	0.30
H	18	20	25	30
L	82	80	75	70
$H + L$	100	100	100	100

C General Equilibrium Structure

In Section 2 we assume that there are no spillovers ($\Psi = 1$). The system of general equilibrium consists of following 15 equations:

Demand Block: (1),(3),(4)

$$
\begin{aligned}
X &= \frac{\gamma E}{Q_X}, \\
Y &= (1-\gamma)E, \\
X_d &= p_d^{-} Q_X X, \\
X_m &= p_m^{-} Q_X X.
\end{aligned}
$$

Prices: (2),(8),(9),(13)

$$
\begin{aligned}
Q_X &= \left[n p_d^{1-} + m p_m^{1-} \right]^{\frac{1}{1-}}, \\
p_d &= \frac{}{-1} c_d, \\
p_m &= \frac{}{-1} c_m, \\
w &= \frac{1-\beta}{\beta} \frac{L - L_X}{H - H_X}.
\end{aligned}
$$

Supply Block: (10),(11)

$$
\begin{aligned}
c_d(w) &= \Psi^{-1} \left[(1-\mu) w^{\beta-1} + \mu\, w^{\beta} \right], \\
c_m(w) &= (1-\mu) w^{\beta-1} + \mu\, (t_z w^{\beta} + \alpha w^{\beta}).
\end{aligned}
$$

Factor Income: (12)

$$E(w) = w^{\beta-1}L + w^{\beta}H.$$

Labor Market Equilibrium Conditions: (14),(15)

$$\begin{aligned} L_X &= n(1-\mu)(X_d + F_d) + m(1-\mu)(X_m + F_m), \\ H_X &= n\mu(X_d + F_d) + \alpha m\mu(X_m + F_m). \end{aligned}$$

Zero Profit (Free Entry) Conditions: (16),(17)

$$\begin{aligned} X_d &= (\quad - 1)F_d \\ X_m &= (\quad - 1)F_m. \end{aligned}$$

These 15 equations solve 15 unknowns, such as X, Y, X_d, X_m, p_d, p_m, c_d, c_m, Q_X, w, E, L_X, H_X, n, and m.

To solve the system, with the function of $w(n, m : \mu)$, we can rewrite c_d and c_m (equations (10), (11)) as functions of n and m. Plugging $c_d(w(n, m : \mu))$ and $c_m(w(n, m : \mu))$ into equations (2), (8) and (9), we have Q_X, p_d and p_m as functions of $w(n, m : \mu)$. Combining these results together with equation (12), we obtain the equation of X, i.e., (1), as a function of $w(n, m : \mu$

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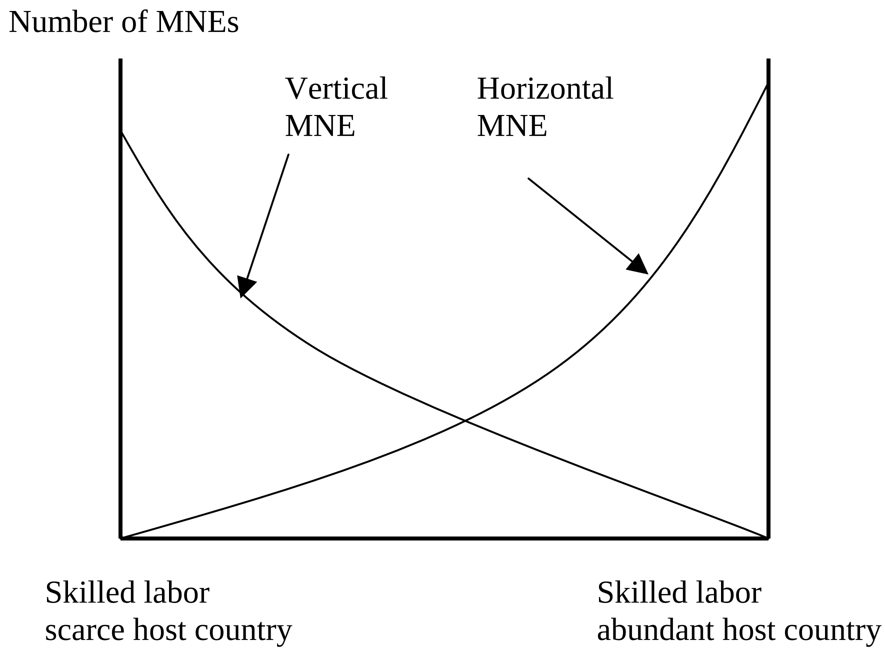


Figure 1
Number of Horizontal and Vertical Multinational Firms
Source: Carr, Markusen, and Maskus (2003), Figure 3.

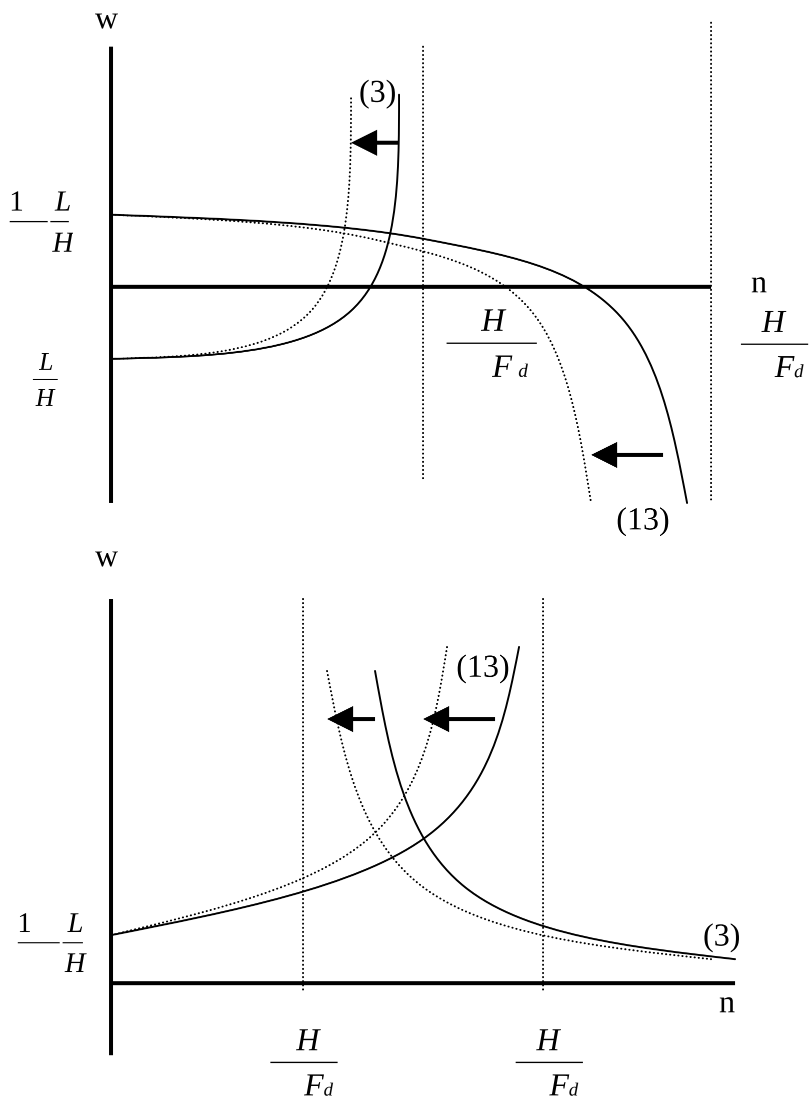
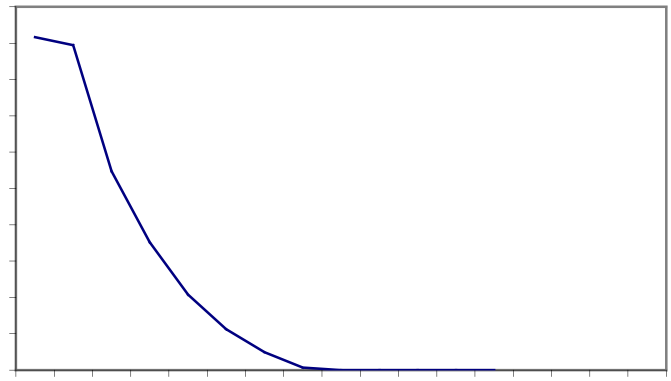
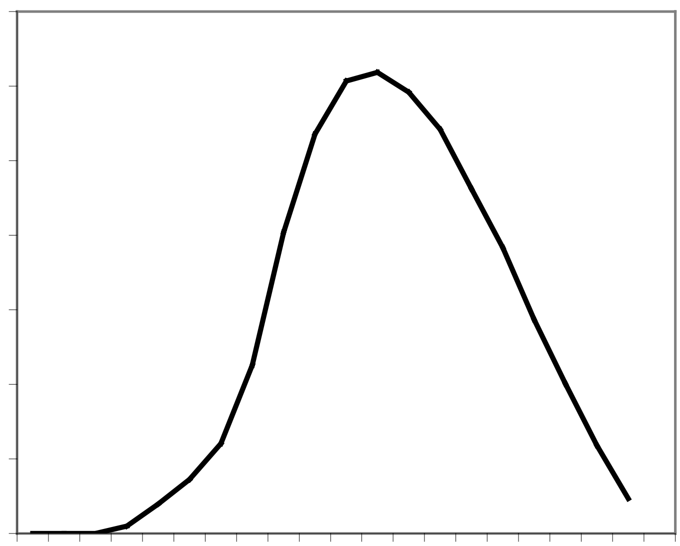


Figure 2
Impact of Multinational Firms
Upper Panel: <h
Lower Panel: >h
h= H/(H+L)

h=0.20



h=0.20



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