Competition for Multinational Activity in Europe: The Role Played by Wages and Market Size*

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Abstract

This study analyzes empirically the firm's decision to invest abroad and the effect of changes in labor costs and market size on affiliate employment in different locations. Using a dataset on Swedish multinational firms, we find that the probability of observing affiliates in a host country is influenced by local labor costs and market size as well as labor costs and market size in similar locations where the firm has not set up any affiliates. We do not find any strong evidence of either substitution or complementarity between existing affiliates or the Swedish parents.

Keywords: labor demand, multinational firms, vertically and horizontally integrated firms

JEL classification: F23, J23

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1 Introduction

One of the main concerns regarding the recent increase in foreign direct investment (FDI) is the potential effect on home and host countries' labor markets. In the short run, a relocation of activities from one country to another creates temporary unemployment in the former; increased adjustment costs being the most likely result. In the long run, the relocation of activities may have effects on the specialization patterns of the economies with potential consequences for the composition of labor demand. For instance, the relocation of activities intensive in unskilled labor from high-wage countries to low-wage countries will tend to decrease the relative demand for unskilled workers in the former countries and increase it in the latter countries.

In this paper, we use data on Swedish multinationals to examine empirically the effects of FDI on the firm's demand for labor in different locations. We model the firm's decision to locate activities abroad as a two-step process: First, the firm chooses where to set up foreign affiliates among a set of potential host countries. Second, the firm decides on the level of its activities in the set of actual host countries where it operates.

The latter decision, which has implications for whether an expansion of the firm in one location affects employment within the firm in other locations, has been analyzed previously. In a number of studies, labor demand functions for firms operating in multiple locations have been estimated using data for multinational enterprises (MNEs) (e.g., Slaughter 1995, Brainard and Riker 1997a, 1997b, Braconier and Ekholm 2000, Bruno and Falzoni, 1999). These studies estimate cross-wage elasticities that capture the effects of wage changes in one location on employment in another location. These elasticities give information about whether labor employed in different locations are price substitutes or price complements to each other from the perspective of the firm.

A drawback with these studies, however, is that they only consider changes in production costs and market conditions in those locations where the firm already has set up production, not in locations that may be perceived as potential new host countries by the firm. Since the set of countries where an MNE has foreign affiliates typically varies substantially over time, and this is likely to reflect the fact that changes in relative production costs and market conditions alter the relative profitability of producing in different countries, this drawback may indeed be an important one. Therefore, in this paper, we take this potential dimension of the firm's location decision into account by using a framework with a two-step decision procedure.

In our theoretical framework, a firm that is constrained to set up a new

plant in at most one location decides whether to set up a plant in a particular host country. In making that decision, we allow the firm to consider not only wage costs and market conditions in that location and the home country, but in other *potential* host countries as well. In this setting, different locations will be competing for MNE actitivities in the sense that the firm will choose to set up a plant in the location with the most favorable mix of production costs and market size. However, although we assume a very simple structure of the MNE – we only allow for foreign affiliates of the horizontal type – wage costs and market size in the different potential host countries and the home country also interact in a non-trivial way.

The results of our empirical analysis give fairly strong evidence of costs and market conditions in other potential host countries being important for the probability of observing affiliate activity in a particular location. Therefore, at this stage of the decision process, different locations do seem to be substitutes for each other. However, when it comes to the effect of changes in wage costs in those locations where the MNE is already active, there is much weaker evidence of different locations being substitutes for each other. The amount of labor that a firm employs in one location does not seem to be affected to any appreciable extent by changes in relative wage costs in locations where the firm has already set up plants.

The empirical analysis focus exclusively on European locations. The reason for this is that we believe our analysis to be primarily applicable to production units located within a fairly homogenous and well integrated area. European countries are more likely to be viewed as potential alternative locations for each other by the firm than non-European countries, since the latter are much more heterogenous with respect to their geography and institutions.

The rest of the paper is organized as follows: In section 2, we present the theoretical framework. In section 3, we present the data used in the empirical analysis. Section 4 gives an account of the econometric specification of the model, while section 5 presents and discusses the results from the analysis. Finally, some concluding remarks are made in section 6.

2 The Model

To analyze how a firm chooses its locations, we use a simple model of a monopolist. The firm produces a final good (Q) using inputs of labor. Production in a location j involves a fixed labor input requirement of F_j and a marginal labor input requirement of one unit. There are trade costs that

have to be incurred in order to ship goods from one location to another. They are assumed to be of the iceberg type and are denoted with τ. For one unit of a good to arrive in destination k, $\tau_{jk} \geq 1$ units have to be shipped from location j. When a good is sold in the domestic market, there are no trade costs (i.e. for $j = k$, $\tau = 1$). However, when a good is exported abroad, trade costs are strictly positive (i.e. for $j \neq k, \tau > 1$).

The firm maximizes total profits Π, which can be defined as net revenue summed over all its locations j:

$$\Pi = \sum_j \left(\sum_k p_{jk} Q_{jk} - w_j \left(\sum_k \tau_{jk} Q_{jk} + F_j \right) \right) \tag{1}$$

where p_{jk} is the price of goods produced in j and sold in k, Q_{jk} is the quantity of the final good supplied in market k, w_j denotes the wage rate, and F_j is the fixed labor input requirement of setting up production in location j.

In the analysis we shall assume that the firm has already set up production facilities in one country, denoted A, so that any fixed costs associated with setting up production in A are sunk. We then focus on a situation where the choice faced by the firm is whether to set up production in one of two potential new locations, denoted B and C. In order to focus on the potential competition between B and C as host countries, we assume that the firm cannot enter both locations. A motivation for this assumption is that the firm may face credit constraints that forces it to choose one location (if any). Another is the existence of costs of implementing firm-specific assets in several locations simultaneously.

We assume that the firm treat the markets in the different locations as segmented and that where the firm has no activity will be served by exports. Furthermore, we assume the following constant elasticity demand functions:

$$Q_{jk} = E_k p_{jk}^{-\epsilon} \tag{2}$$

where E_k is a parameter capturing the size of the market in location k and ϵ is the elasticity of demand ($\epsilon > 1$).

Given these demand functions, first order conditions for profit maximization give us the following prices:

$$p_{jk} = \frac{\epsilon w_j \tau_{jk}}{\epsilon - 1}, \tag{3}$$

which, by substituting into (2) gives us the following supplied quantities:

$$Q_{jk} = E_k(w_j\tau_{jk})^{-\epsilon}\left(\frac{\epsilon-1}{\epsilon}\right)^{\epsilon} \tag{4}$$

Formally, the firm will choose to locate production in country j if

$$\Pi^{A,j} - \Pi^{A} > 0 \tag{5}$$

and

$$\Pi^{A,j} - \Pi^{A,k} > 0 \tag{6}$$

where Π denote profits and the superscripts refer to the plant configuration of the firm (i.e., $\Pi^{A,j}$ and $\Pi^{A,k}$, $j \in B, C$, $k \in B, C$, $j \neq k$, denote profits when the firm has set up an affiliate in country j and k, respectively, while Π^{A} denotes profits when the firm only produces in A). The condition in (5) states that the MNE's profit with an affiliate in j has to be larger than profits without entry in any of the potential host countries, while the condition in (6) states that it has to be larger than profits with entry in k.

Profits for the three different location strategies are given by:

$$\Pi^{A} = \Pi_{AA} + \Pi_{AB} + \Pi_{AC} \tag{7}$$

$$\Pi^{A,B} = \Pi_{AA} + \Pi_{BB} + \max(\Pi_{AC}, \Pi_{BC}) \tag{8}$$

$$\Pi^{A,C} = \Pi_{AA} + \Pi_{CC} + \max(\Pi_{AB}, \Pi_{CB}) \tag{9}$$

where

$$\Pi_{jk} = Q_{jk}\left[p_{jk} - \tau_{jk}w_j\right] - F_j \tag{10}$$

for $j = k$ and $j, k \in B, C$. If $j = k = A$ or $j \neq k$ then

$$\Pi_{jk} = Q_{jk}\left[p_{jk} - \tau_{jk}w_k\right] \tag{11}$$

The firm's decision problem can be separated into two different problems: (i) whether to set up a foreign affiliate or not; and (ii) whether to locate a foreign affiliate in B or C.

Problem (i) can be expressed as:

If $\Pi^{A*} - \Pi^{A} > 0$ then invest abroad, where $\Pi^{A*} \equiv \max(\Pi^{A,B}, \Pi^{A,C})$

Problem (ii) can be expressed as:

If $\Pi^{A*} = \Pi^{A,B}$ then invest in B (if $\Pi^{A*} = \Pi^{A,C}$ then invest in C)

From (3) follows that markups are given by the following expression:

$$p_{jk} - w_j\tau_{jk} = \frac{w_j\tau_{jk}}{\epsilon - 1} \tag{12}$$

Substituting (4) and (12) into (7) – (9) gives us:

$$\Pi^A = \Phi \left[E_A w_A^{1-\epsilon} + E_B(\tau_{AB}w_A)^{1-\epsilon} + E_C(\tau_{AC}w_A)^{1-\epsilon}\right] \tag{13}$$

$$\Pi^{A,B} = \Phi \left[E_A w_A^{1-\epsilon} + E_B w_B^{1-\epsilon} - \frac{w_B F_B}{\Phi} + E_C \max((\tau_{AC}w_A)^{1-\epsilon}, (\tau_{BC}w_B)^{1-\epsilon})\right] \tag{14}$$

$$\Pi^{A,C} = \Phi \left[E_A w_A^{1-\epsilon} + E_C w_C^{1-\epsilon} - \frac{w_C F_C}{\Phi} + E_B \max((w_A\tau_{AB})^{1-\epsilon}, (w_C\tau_{CB})^{1-\epsilon})\right] \tag{15}$$

where $\Phi \equiv (\epsilon - 1)^{\epsilon-1}\,\epsilon^{-\epsilon}$.

Using these expressions we can define conditions for the firm to be indifferent between different location strategies. The firm will be indifferent between investing in B and C if the following condition holds: $\Pi^{A,B} - \Pi^{A,C} = 0$. Using (14) and (15) this condition will be satisfied if:

$$\begin{aligned} & E_B w_B^{1-\epsilon} - \frac{w_B F_B}{\Phi} + E_C \max((\tau_{AC}w_A)^{1-\epsilon}, (\tau_{BC}w_B)^{1-\epsilon}) \\ = \;& E_C w_C^{1-\epsilon} - \frac{w_C F_C}{\Phi} + E_B \max((w_A\tau_{AB})^{1-\epsilon}, (w_C\tau_{CB})^{1-\epsilon}) \end{aligned} \tag{16}$$

The firm will be indifferent between exporting from A and investing abroad if the following condition holds: $\max(\Pi^{A,B}, \Pi^{A,C}) - \Pi^A = 0$. Using (13) – (15) this condition will be satisfied if:

$$\begin{aligned} & \max[E_B w_B^{1-\epsilon} - \frac{w_B F_B}{\Phi} + E_C \max((\tau_{AC}w_A)^{1-\epsilon}, (\tau_{BC}w_B)^{1-\epsilon}), \\ & E_C w_C^{1-\epsilon} - \frac{w_C F_C}{\Phi} + E_B \max((w_A\tau_{AB})^{1-\epsilon}, (w_C\tau_{CB})^{1-\epsilon})] \\ = \;& E_B(\tau_{AB}w_A)^{1-\epsilon} + E_C(\tau_{AC}w_A)^{1-\epsilon} \end{aligned} \tag{17}$$

In order to solve these expression for different wage and market size differentials, we need to determine the resulting pattern of exports to the foreign market that remain without a local plant. The good will always be exported from the lowest cost (including trade costs) location. If the

conditions $\tau_{AC}w_A < \tau_{BC}w_B$ and $\tau_{AB}w_A < \tau_{CB}w_C$ hold, irrespective of whether the firm chooses B or C for its foreign affiliate, the location without an affiliate will be served by exports from the parent firm. On the other hand, if $\tau_{AC}w_A > \tau_{BC}w_B$ and $\tau_{AB}w_A > \tau_{CB}w_C$ hold, a foreign affiliate in either B or C will serve the other foreign location with exports since it is less costly than serving this market with exports from the parent firm. If $\tau_{AC}w_A < \tau_{BC}w_B$ and $\tau_{AB}w_A > \tau_{CB}w_C$ hold, a foreign affiliate in C will serve location B with exports, but a foreign affiliate in B will only sell goods in the domestic market. However, independent of which plant will supply the remaining export market, the lower the relative wage rate and larger the relative size of the market, the higher the relative profitability of producing in a particular foreign location.

Let us assume that $\tau_{AC}w_A < \tau_{BC}w_B$ and $\tau_{AB}w_A < \tau_{CB}w_C$ hold, which implies that the parent firm will supply the remaining export market. In this case $\Pi^{A,B} - \Pi^{A,C} = 0$ if the following condition holds:

$$\begin{aligned} 0 &= E_B\left(w_B^{1-\epsilon} - (w_A\tau_{AB})^{1-\epsilon}\right) + \frac{1}{\Phi}\left(w_C F_C - w_B F_B\right) \\ &\quad + E_C\left((w_A\tau_{AC})^{1-\epsilon} - w_C^{1-\epsilon}\right) \end{aligned}$$

For given values of trade costs, market sizes and wages in location A, this condition defines a positive relationship between w_B and w_C that has to hold for the firm to be indifferent between investing in B and C. This relationship is shown by the upward sloping curves in figure 1.[1] The relative market size of C and B and the per unit cost of supplying export markets from location A will affect the location of these curve. The two curves in Figure 1 have been drawn for different levels of w_A. Their slope is given by:[2]

$$\frac{dw_C}{dw_B} = \frac{F_B + \Phi E_B(\epsilon - 1)w_B^{-\epsilon}}{F_C + \Phi E_C(\epsilon - 1)w_C^{-\epsilon}} > 0,$$

which will always be positive. Below the curve, the firm will prefer producing in C to producing in B, whereas above the curve, the opposite will hold true.

[1] The curves drawn in Figure 1 is based on the following values: $F_B = F_C = E_C = 1$, $\epsilon = 2$, $\tau_{BC} = \tau_{CB} = 1.2$, $E_B = 10$, $w_A = 1$ or $w_A = 0.5$.

[2] The corresponding expression assuming that $\tau_{AC}w_A > \tau_{BC}w_B$ and $\tau_{AB}w_A > \tau_{CB}w_C$, i.e. that it is less costly to supply export markets from a foreign affiliate than the parent in A, is the following:

$$\frac{dw_C}{dw_B} = \frac{F_B + \Phi(\epsilon - 1)(E_B + E_C\tau_{BC}^{1-\epsilon})w_B^{-\epsilon}}{F_C + \Phi(\epsilon - 1)(E_C + E_B\tau_{CB}^{1-\epsilon})w_C^{-\epsilon}} > 0$$

If - as assumed in figure 1 - B is a substantially larger market than C, a decrease in wages in A will shift the curve upward, implying that the firm will prefer locating in C for a wider range of relative wages between the two potential host countries. This shift, shown by the leftmost curve, is due to the fact that the relative profitability of supplying a large market instead of a small market with exports from A increases as production costs in A decreases. Consequently, it becomes relatively more profitable to produce in C and supply B with exports from A than to produce in B and supply C with exports from A. If C were the larger market instead, a decrease in wages in A would lead to a downward shift of the curve, implying that the firm would prefer locating in B for a wider range of relative wages.

However, the level of wage costs in A also affects the firm's choice between producing abroad and staying with the existing production unit in A. The horizontal and vertical lines drawn in Figure 1 show, for a given level of w_A, the levels of w_B and w_C at which the firm is indifferent between producing abroad and exporting from A. In the figure, we have indicated the location strategy chosen by the firm for different values of w_B and w_C. For high levels of both w_B and w_C, the firm will choose not to invest abroad (**A**), for low levels of w_B it will choose to invest in B (**A,B**) and for low levels of w_C it will choose to invest in C (**A,C**). The dotted lines indicate how the lines defining indifference between producing abroad and exporting from A shift with a decrease in w_A.

So what are the predictions about locational choices based on this analysis? The theoretical analysis generates clear-cut predictions on the effect of relative wage costs in potential host countries on locational choice, where higher relative wages make the country less attractive as a host of affiliate operations. The predictions on the effect of wage costs in the home country, on the other hand, are less clear. Lower wage costs in A implies that production abroad becomes a less attractive option. This means that the firm's incentive to invest abroad rather than export from the home country becomes weaker. This effect is illustrated by point 1 in Figure 1. With high wage costs in the home country, the firm would set up affiliate production in B, but with low wage costs in the home country the firm would choose to supply both foreign markets with exports from A.

However, wage costs in A also affect the relative profitability of investing in B and C. Suppose we start from an initial situation where the firm sets up a production unit in the larger market B even though wage costs are lower in the smaller market C. Point 2 in Figure 1 illustrates such a situation. If wage costs in A decreases as shown in Figure 1, the firm would have found it profitable to set up production in C instead. The reason is that the good

can now be supplied in B at a low cost through exports from A, whereas there is still a cost advantage in supplying the good locally in the low-cost foreign location C. Consequently, even in this simple model where FDI is only of the horizontal type, cost changes in the home country can affect the locational choice between different potential host countries. This means that predictions about the effects of changes in country A's wage costs on affiliate activity in any given potential host country are ambiguous.

Another important set of determinants of the firm's location decision is the size of the market. For given values of wages and trade costs, Figure 2 shows the relationship between market size in B and C that has to hold for the firm to be indifferent between locating in these two potential foreign locations. Again, this condition defines a positive relationship. The slope of the curve shown in Figure 2 is given by:[3]

$$\frac{dE_C}{dE_B} = \frac{w_B^{1-\epsilon} - (w_A \tau_{AB})^{1-\epsilon}}{w_C^{1-\epsilon} - (w_A \tau_{AC})^{1-\epsilon}}.$$

Since $w_A \tau_{AB} > w_B$ and $w_A \tau_{AC} > w_C$ are necessary, albeit not sufficient, conditions for the firm to consider investing in B or C, this expression is positive for the relevant range of parameters. If we are outside this range of parameters, the per unit cost of supplying a good locally is higher than supplying it through exports from A. If this is the case, the sizes of the foreign markets do not matter for the firm's location decision, only the relative costs of supplying the goods to the foreign markets.

Below the curve in Figure 2, the firm will prefer producing in B to producing in C, whereas above the curve the opposite will hold true. The location of the curve is affected by the relative size of fixed costs in the two foreign locations. The dotted curve shows the effect of an increase in fixed costs in C. This will shift the curve upwards since it makes it relatively more profitable to produce in B.

The horizontal and vertical lines drawn in Figure 2 show the market sizes needed in order for the firm to be indifferent between producing abroad and exporting from A. For relatively large market sizes, the firm will prefer to produce abroad, while for relatively small markets sizes, it will prefer to serve the foreign markets with exports from its existing production unit in A. Again the level of fixed costs will affect the location of this lines. The

[3] The corresponding expression assuming that $\tau_{AC} w_A > \tau_{BC} w_B$ and $\tau_{AB} w_A > \tau_{CB} w_C$ is the following:

$$\frac{dE_C}{dE_B} = \frac{w_B^{1-\epsilon} - (w_C \tau_{CB})^{1-\epsilon}}{w_C^{1-\epsilon} - (w_B \tau_{BC})^{1-\epsilon}}$$

dotted horizontal line shows the effect of an increase in fixed costs in C. The line will shift upwards since it makes it relatively more profitable to produce in A.

Based on this analysis, we would thus predict the following. An increase in the level of wage costs in a potential host country and in the size of the market in alternative locations will have a negative effect on the relative profitability of producing in that particular location. An increase in local demand and in the wage costs in alternative locations, on the other hand, will have a positive effect on the relative profitability of producing in the potential host country. An increase in the level of wage costs in the home country will have a positive effect on the relative profitability of producing abroad and, depending on relative market sizes and trade costs, may have an effect on the relative profitability of producing in different foreign locations.

Although the model does not predict any impact of the size of the home market on the relative profitability of producing in different locations, it will be useful to discuss under what conditions the home market would be important. The reason why the size of the home market plays no role in the analysis above is that we have assumed a purely horizontal structure of the firm. If we were to allow for production of intermediate inputs that can be traded within the firm, the effect of changes in not only home country demand but also wage costs will depend on the resulting intra-firm trade pattern. For instance, if a foreign affiliate would be of the vertical type with exports of intermediates to the parent, increases in the market size (and wage costs) of the home country would have a positive effect on the profitability of investing abroad. If the foreign affiliate instead would be importing intermediate inputs from the parent, increases in the level of wage costs in the home country would have a negative effect on the profitability of investing abroad, while changes in the size of the home country market would have no effects.

It is easy to come up with cases where the relative profitability between two different locations could be affected by changes in the home country's market size if the potential affiliates would differ in their intra-firm trade with the parent. For example, one could think of two potential host countries, where one has a larger market for the final good, whereas the other is a lower-cost producer of intermediate inputs used by the parent firm. In such a scenario, an increase in the size of the home market will increase the relative profitability of investing in the low-cost country compared to the country with a large market, since the total cost savings of producing intermediates in a low-cost location then increases. This implies that the predictions on how variables relating to the size of the home market affect

the relative profitability of investing in a particular host country are not robust to alternative assumptions about the structure of the firm.

So far, we have discussed the discrete choice of where to set up a production plant. The other important dimension of the relationship between cost and market characteristics of different countries, on the one hand, and the firm's location of its activities, on the other, is how the firm's activities are allocated within an existing set of production units. This problem has been studied in a number of studies by deriving expressions for the demand for labor in one location assuming that it may be either complement or substitute to labor employed in other locations (e.g. Slaughter 1995, Brainard and Riker 1997a, 1997b, Braconier and Ekholm, 2000, Bruno and Falzoni 2000). Since this analysis has already been developed elsewhere, we shall not discuss this part of the problem in any great detail, but instead simply draw on the results obtained in previous studies. What these studies show, however, is that if an increase in wage costs in one location leads to a relocation of production to another location, labor employed in the two locations will be price substitutes for each other. However, if there is no relocation, but only an increase in production costs, which in turn decreases the demand or supply of intermediate products, they will be price complements to each other instead (see, e.g., Braconier and Ekholm, 2000).

3 Data

In order to analyze the determinants of the firm's location decision and its level of employment empirically, we use firm-level data on Swedish multinationals within the manufacturing sector. These data have been collected by the Research Institute of Industrial Economics (IUI) about every fourth year since the early 1970's. In our sample, we have data for six years: 1970, 1974, 1978, 1986, 1990, 1994, 1998.[4]

Over the time period that we consider, the full sample of Swedish multinationals cover some 700 observation at the firm level and some 3000 observations at the affiliate level. The affiliates included in the database are only those with production activities; i.e., pure sales affiliates are not included. In our sample, we have eliminated all firms that appear only once in the time series.[5] For each MNE, we add the number of affiliate employees in a particular host country so that we get observations on firm-country pair. For

[4] A description of these data can be found in Ekholm and Hesselman (2000).

[5] On account of missing information about some of the variables included in the econometric analysis, we still have several firms which appear only once in the estimations.

each such observation, affiliate employment will be either zero or a positive number. We are then left with an unbalanced panel including 205 MNEs with activities in 48 host countries. Altogether, the sample includes about 30 000 observations on firm-country pairs, of which about 2500 contain affiliate activity. Restricting the sample to observations related to European host countries, it contains around 12 000 observations on firm-country pairs, of which about 1700 contain affiliate activity.

We divide potential host countries into four different groups: high-income Europe, low-income Europe, high-income non-Europe and low-income non-Europe.[6] This grouping is made on the basis of two important aspects of the analysis. First, we want to separate out the European countries, since, as mentioned in the introduction, we want to perform the analysis for a group of countries that may conceivably be perceived as alternative locations by the firms. Moreover, compared to non-European countries, the European countries are more likely to be perceived as alternative locations for activity in the home country, Sweden. Second, we want to make a crude separation of countries according to relative factor endowments, since differences in relative factor endowments are likely to give rise to international specialization of activities within the firm. That is, we do not expect the firm to consider locating the same type of activity in a high-wage country as in a low-wage country. Therefore, from a factor proportions point of view, countries in high-income non-Europe may be more relevant alternative locations to countries in high-income Europe than countries in low-income Europe. The size of the four different samples and the number of affiliate observations are presented in Table 1.

Before we enter into the specification of the econometric analysis, we shall present some descriptive evidence based on these data. Figure 3 shows the distribution of affiliate employment among the four different types of host country locations. It shows that the relative importance of high-income Europe as a location for affiliate activities has decreased over time, although the main part of affiliate employment is still found in this region. This decreased relative importance is primarily mirrored in an increased relative importance of high-income non-Europe, which mainly consists of the US. Low-income Europe's share of affiliate employment has been fairly stable over time, although there is a small increase during the 1990's, which can be attributed to increased activities in Central and Eastern Europe. Finally, the group low-income non-Europe has become less important as locations for affiliate activities over time. However, it should be noted that this trend

[6] See Appendix for the exact grouping of countries.

hides the fact that there has been a significant increased importance of Asia compared to Latin America within this group of countries. One conclusion that can be drawn from figure 3 is that the relative importance of high-income vs. low-income countries as host countries of Swedish MNEs has not changed much over time, although there has been a shift within these two country groups; from Europe to the US within the group of high-income countries and from Latin America and Southern Europe to Asia and Central and Eastern Europe within the group of low-income countries.

Figure 4 shows the development of average labor costs in the four different types of locations in relation to average labor costs in Sweden. More precisely, the curves in figure 4 show the ratio between average labor costs in foreign affiliates and average labor costs in Swedish parents based on our sample of MNEs. According to this figure, average labor costs have risen faster in affiliates in high-income Europe than in the Swedish parents. This development seems to mirror the overall real depreciation of the Swedish krona that has occurred during the same time period. The same can be said about the curve showing relative labor costs in high-income non-Europe. The temporary increase in the mid 1980's is well explained by the real appreciation of the US dollar during this period. The curve showing the relative labor costs in low-income Europe exhibits an increase up until 1990 and a decrease during the 1990's. Behind this development lies the fact that affiliate activities in Central and Eastern Europe appear in our sample from 1994 and onwards, and labor costs in these countries are substantially lower than in the other low-income European countries.

4 Empirical Specification

There are three important points to make with respect to the theoretical analysis of determinants of the location of affiliate activities. First, as has been shown previously (e.g. Brainard & Riker 1997b, Braconier & Ekholm 2000), for a given configuration of the firm's plants in terms of their locations, the relationship between labor costs in one location and labor demand in an other location can be either positive or negative (depending on whether labor employed in different plants are substitutes or complements). Moreover, the effects of variables such as labor costs and demand on the entry decision may very well differ from the effects on the scale of operation when the MNE has activities in given locations. Thus, it is important to study the determinants of the decision to establish production in a particular location as well as the determinants of the level of employment in the locations

in which the firm is already established. Finally, the theoretical analysis suggested that when an MNE decides whether to set up an affiliate in a particular location, its decision is not only affected by conditions relevant for the MNEs existing production plants, but also on conditions relevant for other potential locations.

The way we capture the two-step procedure in the empirical analysis is by specifying a selection model as well as a labor demand function. This way, we distinguish between the process selecting host countries and the effect on the level of affiliate employment. We specify the selection model as:

$$P\left(A_{ijt}=1\right)=f\left(w_{ijt}^{S},\mathbf{w}_{ijt}^{l},w_{ijt}^{0},w_{ijt}^{\min},D_{jt}^{0},D_{ijt}^{S},D_{ijt}^{\max},y_{jt}^{0}\right) \tag{18}$$

where A_{ijt} denotes whether MNE i has an affiliate in j at time t. The w's stand for labor costs in the host country (w^0); the home country, Sweden, (w^S); in the different types of locations where the firm has activities (w^l, $l \in (1,...,4)$, where 1 represents high-income Europe, 2 represents low-income Europe, 3 represents high-income non-Europe and 4 represents low-income non-Europe. The variable denoted $w^{\min}$ is the wage in the lowest-cost location in the group that j belongs to where firm i does not have activities and intends to capture wage competition from other potential locations for the MNE, as discussed in section 2. The D's represent demand in the host country (D^0); in Sweden (D^S); and in the largest market where the MNE does not have activities ($D^{\max}$). The variable $D^{\max}$ captures the potential alternative market in the firm's choice of location. It intends to measure the maximum (local) demand in alternative locations within the same country group as the host country, where the MNE do not have activities.

In order to reduce potential problems of endogeneity, labor costs in Sweden, w^S, are measured by industry-distributed average labor costs in Swedish manufacturing.[7] Ideally, we would like to have exogenous wage cost data for all the other countries too, but finding such data is difficult. The variables $w^1 - w^4$ are therefore instead calculated in the following way: First we construct a wage rate for each location in the sample by taking the average over all affiliates of all the firms in the sample that are located in that particular host country. Then we compute a firm-specific exogenous wage rate by excluding the MNEs own affiliate wages in that particular host country. Based on this wage, we construct employment-based averages for each of the MNEs affiliates distinguishing between the four different types

[7] Wage data have been collected from *Industristatistiken* (Statistics Sweden) while information about payroll taxes have been supplied by the Swedish Employer's Confederation.

of locations.[8]

The variable D^0 is a measure of local demand and here we follow Brainard and Riker (1997b) in proxying this with aggregate consumption of the affiliate host country.[9] Similarly, $D^{\max}$ is measured as aggregate demand in the alternative location to the potential host country. The variable D^S is Swedish consumption in the industry in which affiliate j operates.[10] This variable is included as a proxy for intra-firm export demand, which according to the discussion on vertivally integrated MNEs in section 2 may affect the firms location decision.

Finally, the variable y^0 is a proxy for overall labor productivity in host country j (measured as the country's GDP per capita relative to the Swedish one).[11] This variable is included in order to avoid potential problem stemming from the fact that labor may be heterogenous rather than homogenous, as assumed in our model. If labor is heterogenous between locations (e.g. in terms of skill), labor productivity may differ across locations and wages may partially reflect productivity differences instead of pure cost differences. By including y^0, we attempt to control for differences in overall labor productivity between locations.

We expect that the host country wage $\left(w^0\right)$ will negatively affect the probability that an MNE will produce in that location, while we expect local demand $\left(D^0\right)$ and to be positive. We expect the effect of the size of demand in the largest alternative market, to be negative since it should decrease the probability of setting up production in a particular location j. The wages in locations in which the firm already has activities may affect the likelihood of operating an affiliate in j in either way, depending on whether affiliate employment in j will substitute or complement employment in the other locations. Similarly, home country demand $\left(D^S\right)$ may affect the probability of observing affiliate activities either way, given the configurations of market sizes and wage costs among potential hosts. Labor costs in alternative locations in which the MNE is not producing should affect the likelihood that the MNE will operate in location j positively, as entry in one location is likely to be a substitute for entry in another location.

Determinants of the level of employment in existing affiliates are modeled in the following way:

[8] That is, we define the variables as $w^l_{ijt} \equiv \sum_{k \in l} \frac{L_{ijkt}}{L_{ijt}} w_{ijkt}$, where $l = HE, LE, HNE$ and LNE. w_{ijkt} is measured as an average over all other Swedish affiliates in the sample that are located in country k.

[9] Data have been collected from World Development Indicator (World Bank, 1998).

[10] Data are collected from the STAN database (OECD, 1998).

[11] The data have been collected from Penn World Tables 5.6.

$$lnL_{ijt} = \alpha + \delta_i + \gamma_t + \beta_0 \ln w^S_{ijt} + \sum_{l=1}^{4} \beta_l \ln w^l_{ijt} + \beta_5 \ln w^0_{ijt} + \beta_6 \ln D^0_{ijt} + \beta_7 \ln D^S_{ijt} + \beta_8 \ln Y^0_{ijt} + \varepsilon_{ijt} \quad (19)$$

The difference regarding the independent variables compared to 18 is that $w^{\min}$ and $D^{\max}$ in other potential locations are now omitted.[12] Furthermore, all coefficients may now be interpreted as elasticities. In particular, $\beta_0 - \beta_4$ may be interpreted as cross-wage elasticities. We basically have the same expectations on the sign of coefficients for host wages, host demand and Swedish demand, whereas the coefficients for the other wage variables may or may not have the same signs as in the logit analysis. As is well known, when estimating a regression in a selection model, the estimates may be biased. In order to gauge this potential source of bias, we also use the Heckman two-stage procedure to estimate marginal effects.

5 Results

We run separate regressions for high-income and low-income Europe and use two different estimation methods: fixed effect estimation with logit estimation of the selection model and the Heckman method for taking selection bias into account. Table 2 shows the results of the fixed-effect estimations for affiliates in high-income Europe. In the first column, wage costs in Sweden is the only non-host wage included in the regressions, whereas we include wage costs in high- and low-income Europe in columns 2 and 3 respectively. The top of Table 2 gives the results from estimating equation (18), while the bottom gives the results for estimating the labor demand function (19). We start by analyzing the determinants of whether MNEs carry out affiliate production in a particular country or not. In the logit estimations, we include corporation-specific fixed-effects, so that unobserved fixed effects at the level of the MNE are controlled for. Furthermore, time dummies are included in all specifications.[13]

From the top of Table 2 we see that the effect of the local labor cost is negative, as expected, and highly significant. Thus, the level of local labor

[12] We did try to include $w^{\min}$ and $D^{\max}$ in the labor-demand function as well, but in almost all regressions these variables did not have a statisitically significant effect.

[13] We also tested for homogeneity in nominal prices and nominal demand, but found no evidence of non-homogeniety.

costs has a significant negative effect on the likelihood that a MNE will produce in the country. Labor costs in Sweden, however, do not appear to have an impact. The level of local demand, as measured by host-country GDP, has a positive and significant effect. Consequently, a large local market increases the probability for Swedish MNEs to be active in that market, which confirms the market size effect in determining FDI even in the relatively well-integrated group of high-income European countries. The level of industry consumption in Sweden, however, has no statistically significant effect. This means that we find strong evidence that local cost and demand conditions matter, but no evidence that costs or demand in the home country, Sweden, matter.

The labor cost index for locations in high-income Europe where the MNE is already established has no statistically significant effect, whereas the estimated coefficient for the corresponding index for low-income Europe is positive and significant at the 10 percent level. This would suggest that there is some evidence of substitution between the MNEs high- and low-wage locations in Europe. However, it is important to note that this result is based on only a subset of the full sample of firms, since only a smaller part of the Swedish MNEs have affiliates on both high- and low-income countries.[14]

The estimated coefficient of the variable capturing the level of labor costs in the potential new locations, $w^{\min}$ is negative in the estimations, which is contrary to our priors. Interestingly, the negative estimate depends crucially on the inclusion of firm-specific fixed effects in the empirical model. Without a fixed-effect specification, the estimate is positive and highly significant. A positive coefficient implies that the existence of (relative) low-wage locations within high-income Europe where the MNE is not active decreases the probability of finding an affiliate in the host country. The estimated coefficient for $D^{\max}$ is negative and highly significant in the two first estimations, which indicates that the existence of potential new locations with large markets in high-income Europe will decrease the likelihood of observing affiliate production in a host country. Finally, estimated coefficient of the control variable for differences in labor productivity, real GDP per capita, is postive and significant.

Turning to the effects on employment of changes in labor costs, as measured by the estimated wage elasticities in the bottom half of Table 2, we

[14] We did not find any significant coefficients for wages in high-income non-Europe or low-income non-Europe. Including these variables would reduce the firm sample even further and make it biased towards highly internationalized firms, which is why those results are not reported.

once again find a negative coefficients for local labor costs. Hence, the estimated own-wage elasticity is negative, as it should be. Again, there is no evidence that either wage costs or industry consumption in Sweden affects the level of employment in foreign affiliates. Moreoever, the estimated cross-wage elasticities with respect to wage costs in other European host countries are insignificant. In these estimations, the estimated coeffecient of the control variable for productivity is insignificant.[15]

Table 3 shows the results from the Heckman estimations. In general, there is a trade off between the selection bias introduced in the second step OLS in Table 2 and the Heckman estimation's inability to accommodate fixed effects. In the Heckman estimations presented, standard errors have been adjusted according to the assumption of clustering along firm-identity. As in Table 2, the top half presents the results from estimations of the selection model, whereas the bottom half presents results from estimations of labor demand equations.

One feature of the results from the Heckman estimations that is immediately apparent is that it is the selection model that explains most of the variation. In the selection model, most of the estimated coefficients are significant, whereas basically none of the coefficients of the variables of interest are significant in the labor demand equation. One major difference between the results of the Heckman estimations and the results from the fixed-effect logit estimation is that the estimated coefficent of $w^{\min}$ is now positive and significant. Furthermore, the wage cost and demand variable relating to Sweden now yield significant estimates. The level of wage costs in Sweden is estimated to have a positive effect on the probability that a MNE operates in a host country, which suggests a substitutionary relationship on the cost side. In one of the estimations the estimated coefficient for Swedish industry consumption is significantly negative, suggesting that a high level of home country consumption in the industry in which the MNE operates reduces the probability that the MNE produces in a host country. This could be evidence of a kind of substitutionary relationship on the demand side, but, as can be seen from Table 3, the estimated effect is in any case very small.

Altogether, the results suggest that activities in existing foreign affiliates within the group of high-income European countries are neither substitutes for nor complements to each other. Both the likelihood of observing affiliate activity and the level of employment seem unaffected by the level of labor costs in other locations. We find some weak evidence of a substitutionary re-

[15] Neither $w^{\min}$ nor $D^{\max}$ had any significant impact on employment and have therefore been excluded from the regressions shown in Table 3.

lationship between employment in affiliates in high- and low-income Europe. However, this effect is not significant in the Heckman estimations adjusting for selectivity bias. The three variables that consistently yield significant estimates are local wage costs, local demand and the level of demand in potentional unserved locations.

In Table 4 and 5 we present results for the group of low-income European countries. As this group of countries is much smaller than the former group, the number of observations is smaller. This means that in some instances we have a fairly low number of degrees of freedom. An additional problem with these estimations is that the sample of countries in which we find affiliate production completely changes between 1990 and 1994, since the Eastern and Central European countries do not appear as host countries before 1994.

Table 4 presents the results from the fixed effect logit and OLS estimations. The results from the logit estimations are similar to those found for high-income Europe, with the exception that we now do not find a significant effect of the level of demand in potential unserved locations. We find highly significant effects from local wage costs and local demand.

The bottom part of Table 4 presents the results from estimations of the labor demand equations. Again, we find significant estimates for local wage costs and local demand, with a negative own-wage elasticity and a positive elasticity with respect to host country GDP. The results based on the fixed-effect formulation of the model thus suggest that it is the local factors that matter for whether we find affiliates in low-income Europe and for the level of operation in these affiliates. However, wage costs or market size in other locations, including the home country, do not appear to have any effects.

Table 5 presents the results from the Heckman estimations. In the estimations of the selection model we find the expected effects from wage costs and market size in the alternative unserved locations. Higher wage costs in alternative locations increases the likelihood of observing affiliate activities in a host country, whereas a larger market size reduces this likelihood. The level of wage costs in Sweden yields a positive estimate significant at the 10 percent level in two of the estimations, giving some support for a substitutionary relationship between affiliate activities in low-income Europe and parent activities in Sweden. A result in these estimations that appear somewhat peculiar, however, is a negative effect on the likelihood of observing affiliate activities from host country GDP. This could be due to the change in the country sample over time.

As in the case with high-income European countries, the estimated elasticities in the labor demand equations based on the Heckman method are

mostly insignificant. The level of local demand now has a positive estimate, suggesting that the level of operations are positively related to the host country's market size. In two of the estimations, the level of industry consumption in Sweden has a significantly negative effect, suggesting that an increase in home country demand would reduce employment in the foreign affiliates located in low-income Europe. Again, this may be evidence of a subsitutionary relationship on the demand side. Finally, when estimating a labor demand function for the sample of firms that have affiliates in not only high- and low-income Europe, but in low-income non-Europe as well, we find positive cross-wage elasticities with resepect to locations in both low-income Europe and low-income non-Europe.

Table 6 presents results for high-income Europe based on unit labor cost data instead of wage cost data. Because unit labor cost data are not available for most of our low-income European countries, we only present results for the high-income European countries. Moreover, we have not included unit labor costs in Sweden, since we would have very little variation in such a variable and wage costs in Sweden have turned out to yield insignificant estimates in all previous estimations.

Starting with the results for the selection model, the estimated coefficients have the expected signs and are mostly significant. Higher local unit labor costs reduce the likelihood of observing affiliate activity, whereas higher local demand increased this likelihood. A high level of unit labor costs in alternative unserved locations increase the likelihood of observing affiliate activities, whereas a large domestic market in such locations reduce this likelhood. The estimated coefficients on unit labor costs in locations in which the MNE is already active are negative, but insignificant.

Turning to the results for the labor demand equation, we find that the local market size is the only variable that yield signicant estimates of the elasticities. The estimated own-wage elasticity is negative, but insignificant. The cross-wage elasticities are estimated to be positive, but the estimates have very low precision.

6 Concluding Remarks

In this paper, we have studied how relative labor costs and market size affect the MNE's decision to operate in foreign locations. Using a dataset covering Swedish multinational enterprises in the manufacturing sector 1970-1998, we find that the probability of observing affiliates in a host country is influenced by local wage costs and the local market size. We also find some

evidence that labor costs and market size in similar, but unserved, locations matter. In general, we do not find evidence of either strong substitution or complementarity with existing affiliates in the same group, although in some subsamples of MNEs, there seem to be substitutionary effects.

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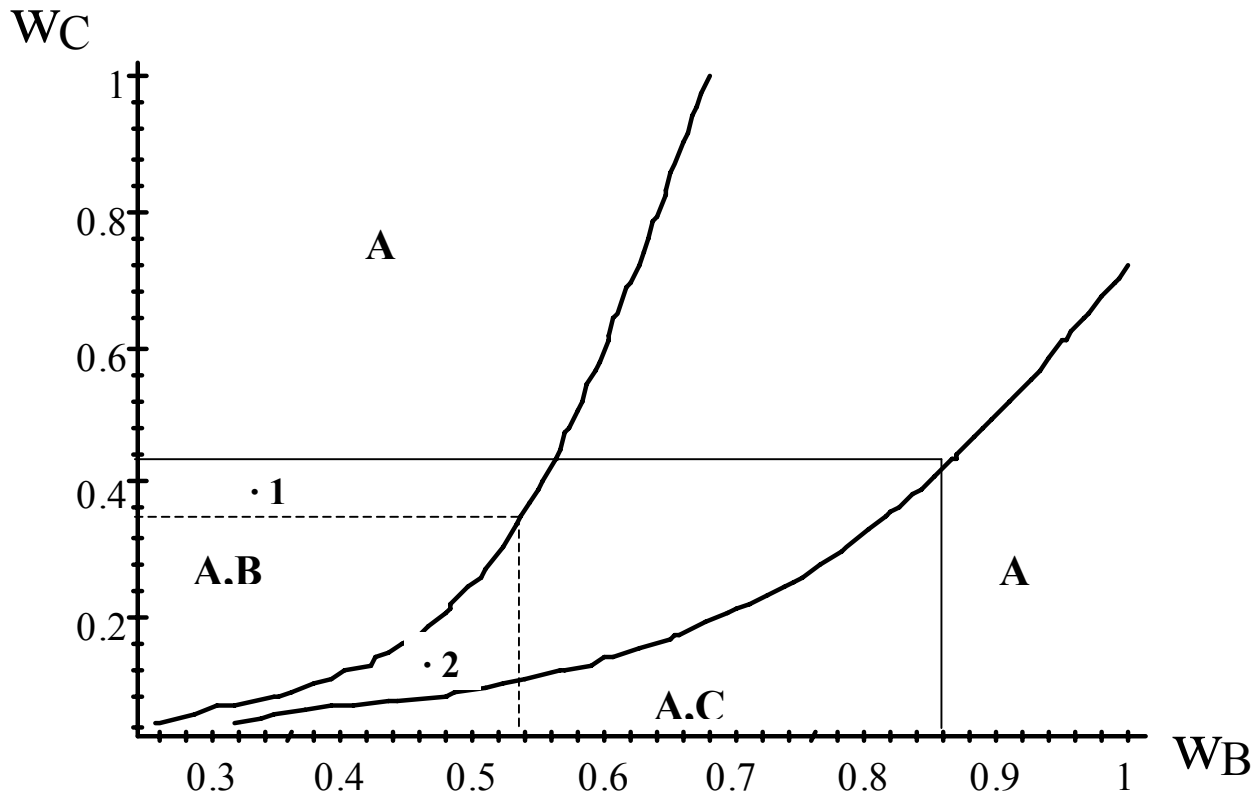

Figure 1. Location strategies for different levels of w_B and w_C

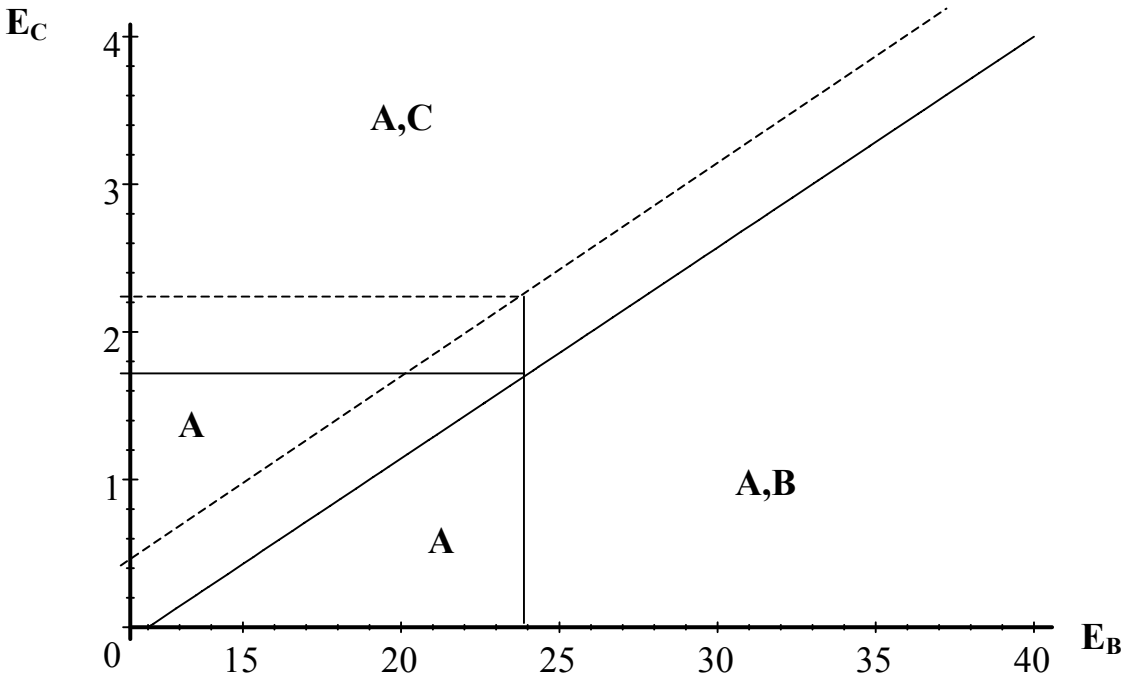

Figure 2. Location strategies for different levels of market size in B and C

Figure 3. Swedish MNEs Share of Total Affiliate Employment in different locations.

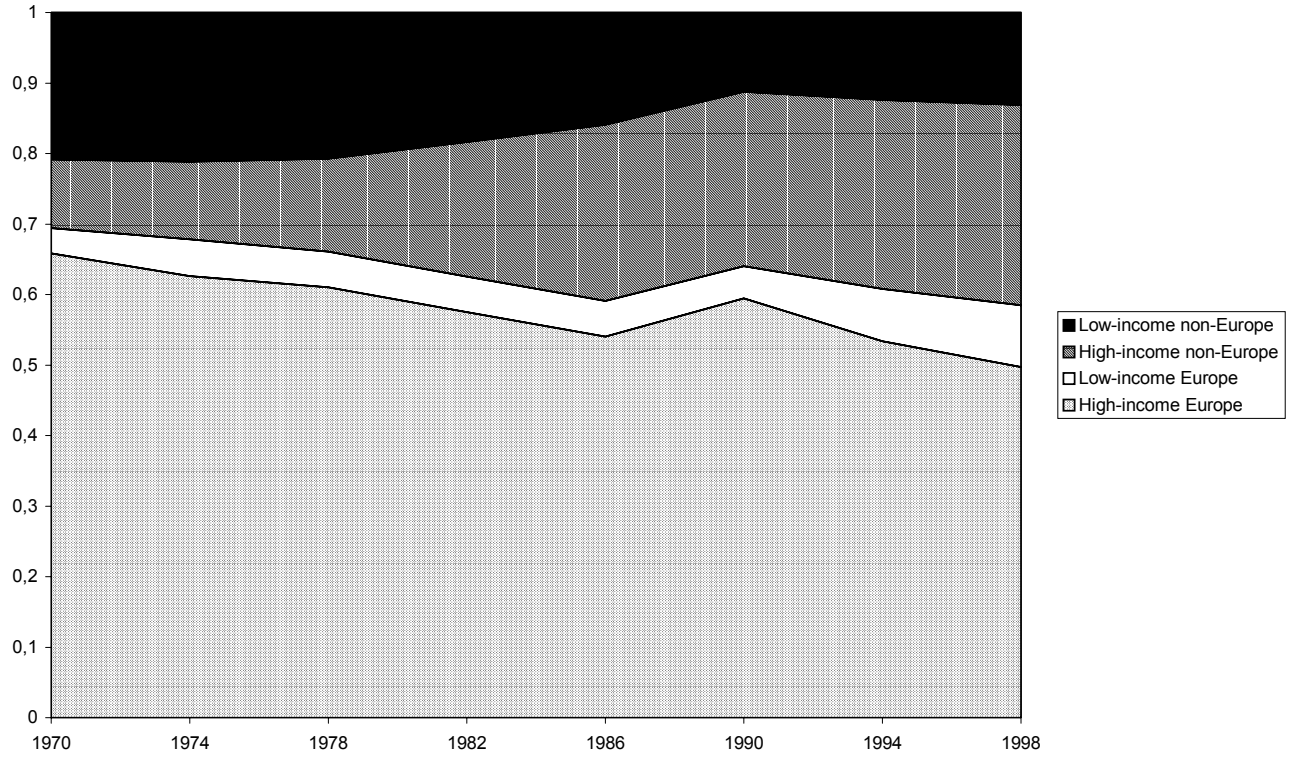

Figure 4. Relative Wages in different Locations within Swedish MNEs.

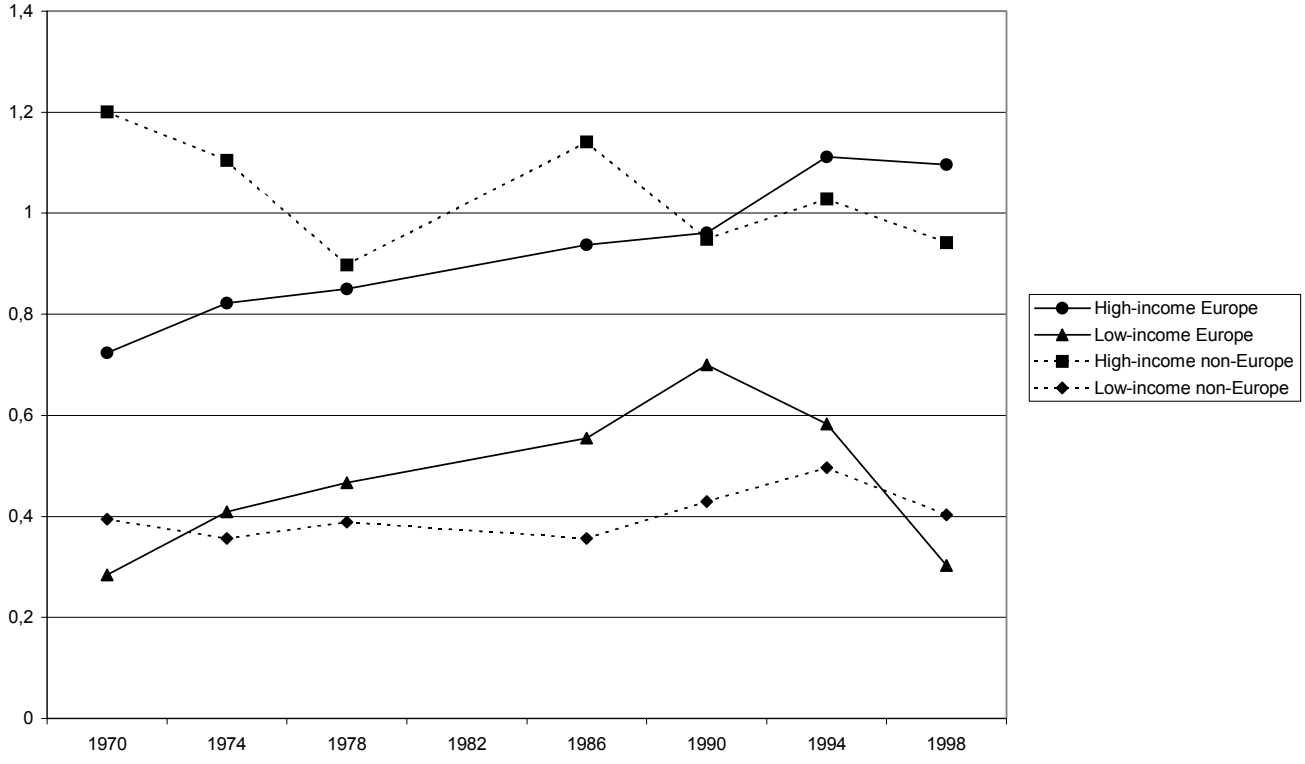

Table 1. Number of Total Observations and Affiliates across Country Groups and Years.

Year	High-income Europe			Low-income Europe			High-income non-Europe			Low-income non-Europe		
	Obs.	Aff.	Share	Obs.	Aff.	Share	Obs.	Aff.	Share	Obs.	Aff.	Share
1970	1044	194	0.19	870	21	0.02	435	30	0.07	1827	70	0.04
1974	1188	221	0.19	990	22	0.02	495	43	0.09	2079	63	0.03
1978	1092	226	0.21	910	26	0.03	455	54	0.12	1911	81	0.04
1986	1044	213	0.20	870	26	0.03	435	68	0.16	1827	71	0.04
1990	1116	234	0.21	930	28	0.03	465	69	0.15	1953	68	0.03
1994	1236	220	0.18	1030	47	0.05	515	66	0.13	2163	58	0.03
1998	792	152	0.19	660	37	0.06	330	40	0.12	1386	47	0.03

Table 2. Results for High-income Europe. Logit and fixed-effects estimations

Dep var: *P(A)*	**Logit (FE)**	**Logit (FE)**	**Logit (FE)**
lnw^0	-4.84***	-4.39***	-3.81***
	(-16.89)	(-13.29)	(-7.27)
lnw^S	0.04	-0.001	-0.19
	(0.17)	(-0.00)	(-0.46)
lnD^0	0.49***	0.53***	0.63***
	(12.59)	(11.53)	(7.74)
lnD^S	0.04	-0.01	-0.09
	(0.45)	(-0.10)	(-0.34)
lnw^{HE}	-	-0.69	-1.49
		(-1.47)	(-1.53)
lnw^{LE}	-	-	0.58*
			(1.68)
lnw^{min}	-0.79*	-0.80*	-0.27
	(1.83)	(1.64)	(-0.39)
lnD^{max}	-0.36***	-0.46***	0.02
	(-4.28)	(-4.82)	(0.91)
lny^0	3.02***	2.48***	1.34***
	(14.59)	(10.52)	(3.43)
Log likelihood	-1853	-1375	-467
Observations	5059	3408	1066
T-bar	28.4	32.5	28.1
Dep var lnL	**FE**	**FE**	**FE**
lnw^0	-0.36*	-0.44**	-0.37
	(-1.86)	(-2.02)	(-1.25)
lnw^S	0.06	0.10	-0.17
	(0.41)	(0.55)	(-0.70)
lnD^0	0.26***	0.27***	0.40***
	(9.14)	(9.07)	(9.53)
lnD^S	-0.06	-0.05	-0.27*
	(-1.06)	(-0.72)	(-1.67)
lnw^{HE}	-	-0.27	0.13
		(-0.85)	(0.22)
lnw^{LE}	-	-	0.20
			(0.94)
lny^0	-0.10	-0.13	-0.25
	(-0.76)	(-0.93)	(-1.20)
R^2 (Within)	0.10	0.10	0.16
Observations	1454	1214	639
T-bar	8.2	11.6	16.8

Note: Figures within parentheses are t-statistics and asterisks denote level of significance: * (10%), ** (5%) and *** (1%).

Table 3. Results for High-income Europe. Heckman estimations

Dep var: *P(A)*	**Selection model**	**Selection model**
lnw^0	-2.03***	-1.58***
	(-10.80)	(-8.00)
lnw^S	0.23*	0.46**
	(1.75)	(2.46)
lnD^0	0.24***	0.24***
	(7.07)	(6.23)
lnD^S	-0.07**	-0.06
	(-2.20)	(-1.35)
lnw^{min}	1.48***	2.32***
	(3.66)	(4.74)
lnD^{max}	-0.54***	-0.60***
	(-11.02)	(-7.23)
lny^0	1.29***	0.94***
	(9.58)	(5.61)
Dep var lnL	**Labor demand equation**	**Labor demand equation**
lnw^0	1.64***	0.43
	(3.94)	(1.12)
lnw^S	0.22	0.07
	(0.78)	(0.17)
lnD^0	0.08	0.27***
	(1.28)	(2.99)
lnD^S	0.05	-0.10
	(0.68)	(-0.96)
lnw^{HE}	0.19	0.23
	(0.44)	(0.34)
lnw^{LE}	-	0.16
		(0.50)
lambda	-1.00***	-0.40*
Log likelihood	-4179	-2218
Observations:		
total	5291	4716
uncensored	1192	617

Note: Figures within parentheses are t-statistics and asterisks denote level of significance: * (10%), ** (5%) and *** (1%). Standard errors have been adjusted for clustering on the firm's identity.

Table 4. Results for Low-income Europe. Logit and fixed-effects estimations

Dep var: *P(A)*	**Logit (FE)**	**Logit (FE)**	**Logit (FE)**
lnw^0	-2.58***	-2.54***	-1.33**
	(-6.91)	(-5.83)	(-2.25)
lnw^S	0.51	0.68	0.39
	(0.68)	(1.80)	(0.29)
lnD^0	1.50***	1.85***	0.77***
	(8.72)	(8.44)	(2.89)
lnD^S	0.27	0.30	0.49
	(0.84)	(0.84)	(0.70)
lnw^{HE}	-	-0.73	-6.18
		(-0.45)	(-1.55)
lnw^{LE}	-	-	-0.14
			(-0.24)
lnw^{min}	-0.54	-0.35	0.13
	(-1.21)	(-0.71)	(0.19)
lnD^{max}	-0.27	-0.09	0.53
	(0.56)	(-0.17)	(0.50)
lny^0	2.12***	2.30***	1.27**
	(5.50)	(5.03)	(2.01)
Log likelihood	-216	-156	-73
Observations	686	548	172
T-bar	10.7	11.4	11.5
Dep var lnL	**FE**	**FE**	**FE**
lnw^0	-0.68**	-0.63*	-0.39
	(-2.11)	(-1.92)	(-0.89)
lnw^S	0.27	0.32	-0.51
	(0.62)	(0.73)	(-0.64)
lnD^0	0.33**	0.49***	0.69***
	(2.52)	(3.49)	(3.52)
lnD^S	0.12	0.11	-1.86
	(0.44)	(0.38)	(-1.44)
lnw^{HE}	-	-0.59	0.56
		(-0.53)	(0.20)
lnw^{LE}	-	-	0.58
			(1.36)
lny^0	0.70*	0.46	0.38
	(1.80)	(1.14)	(0.69)
R^2 (Within)	0.10	0.15	0.27
Observations	207	167	73
T-bar	3.2	3.5	4.9

Note: Figures within parentheses are t-statistics and asterisks denote level of significance: * (10%), ** (5%) and *** (1%).

Table 5. Results for Low-income Europe. Heckman estimations

Dep var: *P(A)*	**Selection model**		**Selection model**		**Selection model**	
	Koeff.	**Elast.**	**Koeff.**	**Elast.**	**Koeff.**	**Elast.**
lnw^0	-1.35***		-0.71***		-0.69**	
	(-5.75)		(-2.74)		(-2.08)	
lnw^S	0.28		0.71**		0.11	
	(1.09)		(2.02)		(0.29)	
lnD^0	0.87***		0.46**		0.42*	
	(5.00)		(2.24)		(1.85)	
lnD^S	-0.02		-0.03		-0.02	
	(-0.42)		(-0.36)		(-0.24)	
lnw^{min}	1.33***		1.52***		1.06**	
	(4.10)		(3.58)		(2.47)	
lnD^{max}	-1.01***		-1.27***		-1.41***	
	(-7.60)		(-6.75)		(-7.01)	
lny^0	1.26***		0.78***		0.76**	
	(5.54)		(3.50)		(2.89)	
Dep var lnL	**Labor demand equation**		**Labor demand equation**		**Labor demand equation**	
lnw^0	0.09		-0.36		-0.89**	
	(0.22)		(-0.94)		(-2.49)	
lnw^S	-0.03		-0.68		0.86	
	(-0.06)		(-1.41)		(0.63)	
lnD^0	-0.35*		0.55***		0.89***	
	(-1.69)		(2.31)		(3.97)	
lnD^S	-0.14		-0.21**		-0.31***	
	(-0.88)		(-1.99)		(-3.03)	
lnw^{HE}	-0.50		-1.15		0.02	
	(-0.51)		(-0.92)		(0.01)	
lnw^{LE}	-		0.37		0.60	
			(1.37)		(1.43)	
lnw^{LNE}	-		-		0.36	
					(1.32)	
lny^0	0.28		0.28		0.96**	
	(0.78)		(0.59)		(2.31)	
lambda	-0.83***		0.00		0.46	
Log likelihood	-607		-356		-233	
Observations:						
total	1577		1483		1469	
uncensored	167		73		59	

Note: Figures within parentheses are t-statistics and asterisks denote level of significance: * (10%), ** (5%) and *** (1%). Standard errors have been adjusted for clustering around the firm's identity.

Table 6. Results for High-income Europe based on unit labor cost data. Logit and fixed-effects estimations

Dep var: *P(A)*	**Logit (FE)**	**Logit (FE)**	**Logit (FE)**
lnw^0	-1.81***	-1.71***	-1.63***
	(-12.3)	(-9.55)	(-4.79)
lnD^0	0.93***	1.00***	1.04***
	(22.6)	(19.8)	(11.1)
lnw^{HE}	-	-0.21	-0.94
		(-0.92)	(-1.32)
lnw^{LE}	-	-	-0.67
			(-1.03)
lnw^{min}	0.80**	0.71*	0.41
	(2.13)	(1.81)	(0.63)
lnD^{max}	-0.31***	-0.39***	-0.08
	(-3.42)	(-3.87)	(-0.44)
Log likelihood	-1767	-1256	-424
Observations	4972	3266	1014
T-bar	28.9	32.3	26.7
Dep var lnL	**FE**	**FE**	**FE**
lnw^0	-0.16	-0.16	-0.29
	(-1.54)	(-1.29)	(-1.61)
lnD^0	0.26***	0.28***	0.39***
	(9.41)	(9.50)	(9.23)
lnw^{HE}	-	0.06	0.06
		(0.36)	(0.14)
lnw^{LE}	-	-	0.21
			(0.63)
R^2 (Within)	0.10	0.10	0.15
Observations	1369	1132	601
T-bar	8.0	11.2	15.8

Note: Figures within parentheses are t-statistics and asterisks denote level of significance: * (10%), ** (5%) and *** (1%).

Appendix 1

Country Groups