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

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Abstract

This study analyzes empirically the …rm's decision to invest abroad and the e¤ect of changes in labor costs and market size on a¢liate employment in di¤erent locations. Using a dataset on Swedish multinational …rms, we …nd that the probability of observing a¢liates in a host country is in‡uenced by the local labor costs and market size as well as labor costs and market size in similar locations in which the …rm has not set up any a¢liates. We do not …nd any strong evidence of either substitution or complementarity between existing a¢liates or the Swedish parents.

Keywords: labor demand, multinational …rms, vertically and horizontally integrated …rms

JEL classi…cation: F23, J23

1 Introduction

One of the main concerns with the recent increase in foreign direct investment (FDI) is the potential e¤ect on home and host countries' labor markets. In the short run, a relocation of activities from one country to another will temporarily create unemployment in the former. This is likely to result in adjustment costs.

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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.

The short-run consequences on home country employment will depend on whether an expansion of the firm abroad is associated with a contraction or expansion of the activities at home. This issue has recently been studied empirically in a number of studies by estimating labor demand functions within MNEs (Brainard & Riker 1997a, 1997b, Braconier & Ekholm 2000, Bruno & Falzoni, 1999). In these papers, cross-wage elasticities capturing the effects of wage changes in one location on employment in another location are estimated. The evidence presented so far only deals with the effects on employment in existing production units. However, the effect on the decision to establish a new affiliate and/or to shut down an existing one may be even more important.

In this paper, we shall extend the analysis in Braconier and Ekholm (2000) by explicitly considering the firm's discrete decision of whether to set up a foreign affiliate in a particular host country or not. The problem that we are interested in is how the firm's decision of whether to operate in a specific location or not is affected by cost and market conditions in that location as well as in other locations that may be important for this decision. That is, instead of looking at how changes in locational factors such as labor costs affect employment in a certain location at the margin, we examine how such changes affect the likelihood that the firm will employ any workers at all. In the analysis, the cost and market conditions in those locations that may be potential alternatives for the firm become important.

In the analysis, we shall focus on European locations. One reason for this is that we believe that our analysis is more applicable to units located within Europe than units located elsewhere. The European countries are likely to be better potential alternative locations for each other from the point of view of the firm than non-European countries, since the latter are more heterogenous with respect to geography, institutions etc.

The rest of the paper is organized as follows: In section 2, we present the theoretical framework, which is a model of a monopolist that sells goods in foreign markets and that has to decide whether to invest in a certain location or not. In section 3, we present the data that we use in the empirical analysis. Section 4 gives an account of the econometric specification of the model, whereas section 5 presents the results from the analysis. Finally, some concluding remarks are given in section 6.

2 The Model

To analyze how the MNEs choose their locations, we put forward a simple model. The firm produces a final good (Q) using inputs of labor and an intermediate

good (X). The intermediate good is also produced with labor. Production takes the form:

$$Q = \min(L; X) \quad X = L \tag{1}$$

where L denotes labor. The …rm maximizes total pro…ts ¦, which can be de…ned as net revenue summed over all its locations j:

$$¦ = \sum_j (P_j(Q_j)Q_j - w_j(Q_j + X_j) - F_j) \tag{2}$$

where $P_j(Q_j)$ is the inverse demand function, $X_j \equiv \sum_k X_{jk}$ is the produced quantity of the intermediate inputs, the …rst subscript being the index for the location in which the intermediate input is produced and the second one being the index for the location in which the intermediate input is used to produce the …nal good, w_j denotes the wage rate, and F_j is the …xed cost of setting up production in location j.

Trade costs associated with Q and X are assumed to be of the iceberg type and they are denoted with ¿: When one unit of a good is shipped across a border, only ¿ < 1 arrives at the destination. Furthermore, we assume that the …rm has already set up production facilities in country A, so that any …xed costs associated with setting up production in A are sunk. The choice faced by the …rm is assumed to be whether to set up production in country B, country C or in neither of the locations. We assume that the …rm cannot enter both B and C, either due to credit constraints or the existence of costs of implementing …rm-speci…c assets in several locations simultaneously. Final goods will be exported from the lowest cost (including trade costs) location to locations where the …rm has no activity.

Formally, the …rm will choose to locate production in country h if

$$¦^{A;h} - ¦^{A} > 0 \tag{3}$$

and

$$¦^{A;h} - ¦^{A;g} > 0 \tag{4}$$

where the superscripts refer to the plant con…guration of the …rm (i.e., $¦^{A;h}$ and $¦^{A;g}$, h 2 B; C, g 2 B; C, h 6= g, denote pro…ts when the …rm has set up an a¢liate in country h and g, respectively, while $¦^{A}$ denotes pro…ts when the …rm only produces in A). The condition in (3) states that the MNE's pro…t with an a¢liate in h has to be larger than pro…ts without entry in any of the potential host countries, while the condition in (4) states that it has to be larger than pro…ts with entry in g.

It can be shown that the left hand side of (3) is strictly increasing in local demand and decreasing in local wages and …xed costs in h. Furthermore, it can be shown that it is increasing in wages in A and trade costs.

For simplicity, we shall assume that, given that an a¢liate has been set up, it is less costly to produce the …nal good locally than to import it from another production unit. That is, we assume that the following condition holds:

$\tau_{ij} w_i < w_j < \frac{w_i}{\tau_{ij}}$, where i and j are any locations in which the …rm operates. This implies that if an a¢liate is set up in location h, we may have three di¤erent types of trade con…gurations within the …rm: (i) no trade is taking place between a¢liates, (ii) X is exported from A to h; and (iii) X is exported from h to A.

In the subsequent analysis we shall distinguish between these three con…gurations.

2.1 Case 1: Horizontal FDI

If trade costs in X are su¢ciently high, no trade in intermediates will take place and the investment in h is purely horizontal in nature. In this scenario, entry in h will not a¤ect pro…ts in market A. Thus $\pi^{A;h} - \pi^{A} = \pi_h^{A;h} - \pi_h^{A} + \pi_g^{A;h} - \pi_g^{A} - F_h$, where subscripts refer to a speci…c location (so that $\pi_h^{A;h}$ denotes operating pro…ts generated from sales in country h when the …rm has set up an a¢liate in country h). Condition (3) may then be written as:

$$\pi^{A;h} - \pi^{A} = \left(P_h(Q_{hh}) - 2w_h\right)Q_{hh} - \left[P_h(Q_{Ah}) - \frac{2w_A}{\tau_{QAh}}\right]Q_{Ah} \quad (5)$$
$$+ \pi_g^{A;h} - \pi_g^{A} - F_h > 0$$

where the …rst subscript of quantities refers to the location where the good is produced and the second subscript refers to the location where the good is sold.

Assuming that A still supplies country g with the …nal good and that the di¤erence in labor costs between locations is su¢ciently small for us to treat them as marginal, this condition will be satis…ed if:

$$2Q_h(w_A/\tau_{QAh} - w_h) > F_h \quad (6)$$

I.e., if the increase in variable pro…ts from producing locally outweighs the …xed cost associated with setting up an a¢liate (cf. Horstmann & Markusen 1992, Brainard 1993). The lower the labor cost in h compared to A, the higher the trade costs associated with the …nal good, the lower the …xed cost associated with setting up an a¢liate in h, and the larger the market for …nal goods in location h, the more likely it is that condition (5) will be satis…ed.

The …rm may however decide to supply location g from the a¢liate in h. The …rm will have incentive to do so if trade costs associated with the …nal good is lower between h and g than between A and g. If that it is the case, there will be an additional advantage from setting up an a¢liate in location h. Hence, condition (6I is su¢cient, but not necessary, for (5) to hold.

However, that overall pro…ts increase as the …rm starts production in h is not a su¢cient condition for entry with a foreign a¢liate, as entry in the other potential location may be a more pro…table alternative. Three alternative scenarios illustrate the relevant cases:

- $\tau_{XAg} w_A < w_g < w_A/\tau_{XAg}$; i.e., if entry takes place in g, no trade will take place between A and g:

ii $w_A > w_g/\tau_{XAg}$; i.e., if entry takes place in g, then X will be exported from g to A:

iii $w_g > w_A/\tau_{XAg}$; i.e., if entry takes place in g then X will be exported from A to g.

2.1.1 Production in other potential host country is also horizontal

If the wage difference between A and the other potential host country is sufficiently small, the firm will not consider trading X between these two locations. Condition (4) then reduces to:

$$\begin{aligned} & (P_h(Q_{hh}) - 2w_h)Q_{hh} - (P_g(Q_{gg}) - 2w_g)Q_{gg} + \phi_g^{A;h} - \phi_h^{A;g} \\ > \; & F_h - F_g \end{aligned} \tag{7}$$

Assuming that condition (5) holds, i.e. entry in h is profitable, and the parent firm supplies the market where there is no local production, a sufficient condition for this inequality to be satisfied is that $w_g \geq w_A/\tau_{QAg}$, i.e., that marginal costs in location g is at least as high as the trade-cost inclusive marginal cost of producing the final good in A. If the new affiliate supplies the other foreign market, a sufficient condition for the inequality to hold is that $2Q_g(w_g - w_h/\tau_{Qhg}) \geq F_h - F_g$. Hence, the higher the labor costs in location g compared to h, the lower the trade costs associated with exports of the final good to location g, and the larger the difference in fixed costs between location g and h, the more likely it is that the firm will find it profitable to set up an affiliate in h rather than in g.

2.1.2 The other potential host country exports X to A

If the configuration of wage costs satisfies the condition in (ii), then condition (4) can be stated as:

$$\begin{aligned} & \left(P_A(Q_{AA}) - 2w_A\right)Q_{AA} + \phi_h^{A;h} + \phi_g^{A;h} \\ > \; & P_A(Q^v_{AA}) - w_A - \frac{w_g}{\tau_{XAg}}\, Q^v_{AA} + \phi_g^{A;g} + \phi_h^{A;g} + F_h - F_g \end{aligned} \tag{8}$$

where the superscript v indicates that production is vertically fragmented so that the intermediate input is imported from a foreign affiliate. For simplicity, we shall assume that trade costs in the final good is sufficiently similar across locations so that if (ii) holds, then $w_A/\tau_{QAh} > w_g/\tau_{Qgh}$ holds as well. This implies that the firm will supply location h from g rather than A if it chooses to set up an affiliate in g. Assuming that $w_A/\tau_{QAh} > w_h/\tau_{Qgh}$, $\phi^{A;h} - \phi^{A;g} > 0$ if

$$\begin{aligned} & 2Q_h(w_g/\tau_{Qgh} - w_h) + 2Q_g(w_g - w_h/\tau_{Qgh}) \\ > \; & F_h - F_g + Q_A(w_A - w_g/\tau_{XAg}) \end{aligned} \tag{9}$$

Compared to case i, the only modi…cation is that local demand in A and the labor cost in A a¤ects the likelihood that the …rm will …nd it pro…table to establish production in h negatively.[1]

2.1.3 The other potential host country imports X from A

If the con…guration of wage costs satis…es condition (iii) and $w_A=¿_{QAh} < w_g=¿_{Qgh}$ and $w_A=¿_{QAg} < w_h=¿_{Qgh}$, so that market h is supplied by the parent …rm if the …rm chooses to set up an a¢liate in location g, then

$$¦^{A;h}_h + \left(P_g(Q_{Ag}) ¡ \frac{2w_A}{¿_{QAg}}\right) Q_{Ag} \qquad (10)$$
$$> \left(P_h(Q_{Ah}) ¡ \frac{2w_A}{¿_{QAh}}\right) Q_{Ah} + \left(P_g(Q^v_{gg}) ¡ w_g ¡ \frac{w_A}{¿_{XAg}}\right) Q^v_{gg} + F_h ¡ F_g$$

This condition will be satis…ed if

$$2Q_h\left(\frac{w_A}{¿_{QAh}} ¡ w_h\right) + Q_g\left(w_g + \frac{w_A}{¿_{XAg}} ¡ \frac{2w_A}{¿_{QAg}}\right) > F_h ¡ F_g \qquad (11)$$

Given that (5) holds, a su¢cient condition for this condition to hold is that $\frac{2w_A}{¿_{QAg}} \cdot w_g + \frac{w_A}{¿_{XAg}}$, i.e. the marginal cost of producing the …nal good in g with inputs imported from A is at least as high as the trade-cost inclusive marginal cost of producing the …nal good in A and supply it in g. The higher the trade costs associated with trade in intermediate goods, the more likely it is that this condition holds.

2.2 Case 2: Vertical FDI where foreign a¢liate exports intermediates

If the con…guration of trade costs and wages are such that $w_h=¿_{XAh} < w_A$, setting up production in h means that the intermediate product X will be exported from h to A. In this case, condition (3) can be written as:

$$¦^{A;h}_g + (P_h(Q_{hh}) ¡ 2w_h)Q_{hh} + \left(P_A(Q^v_{AA}) ¡ w_A ¡ \frac{w_h}{¿_{XAh}}\right) Q^v_{AA} \qquad (12)$$
$$> ¦^A_g + \left(P_h(Q_{Ah}) ¡ \frac{2w_A}{¿_{QAh}}\right) Q_{Ah} + (P_A(Q_{AA}) ¡ 2w_A)Q_{AA} + F_h$$

Compared to the case with horizontal FDI in h, there is now the additional advantage with investing in h from the reduction in marginal cost of producing …nal goods destined for the home market, A. The larger the wage di¤erence between A and h, the lower the trade costs associated with X and the larger

[1] If $w_A=¿_{QAh} < w_h=¿_{Qgh}$, the second term on the left hand side of the inequality becomes $2Q_g(w_g ¡ w_A=¿_{QAh})$.

the quantity sold in the home market, A, the more likely it is that the condition in (12) will hold.

Just as in the case with purely horizontal FDI, we have three alternative con…gurations of trade costs and wages in A and the alternative host country, g. The a¢liate in g could be horizontal in nature, or it could be either exporting or importing the intermediate product to A. The case where an a¢liate in g would not trade in intermediates with A has already been analyzed above, although with the roles of h and g reversed. Referring back to this case, we may conclude that the level of local demand and labor costs in A may a¤ect the incentives for the …rm to invest in h positively or negatively, depending on whether intermediates would be exported from h or g. However, there are two new cases to analyze: the case where an a¢liate in g would export X to A and the case where it would import X from A.

2.2.1 The other potential host country exports X to A

In the case where the other potential host county would also export the intermediate to A, condition (4) can be stated as:

$$\begin{aligned} & \Pi_h^{A;h} + \Pi_g^{A;h} + \left[P_A(Q_{AA}^v) - w_A - \frac{w_h}{\tau_{XAh}} \right] Q_{AA}^v \\ & > \Pi_g^{A;g} + \Pi_h^{A;g} + \left[P_A(Q_{AA}^v) - w_A - \frac{w_g}{\tau_{XAg}} \right] Q_{AA}^v + F_h - F_g \end{aligned} \tag{13}$$

Assuming that $w_A/\tau_{QAh} > w_g/\tau_{Qgh}$ and $w_A/\tau_{QAh} > w_h/\tau_{Qgh}$, this condition will hold if

$$\begin{aligned} & 2Q_h\left(\frac{w_g}{\tau_{Qgh}} - w_h\right) + 2Q_g\left(w_g - \frac{w_h}{\tau_{Qgh}}\right) + Q_A\left(\frac{w_g}{\tau_{XAg}} - \frac{w_h}{\tau_{XAh}}\right) \\ & > F_h - F_g \end{aligned} \tag{14}$$

Once again, the di¤erence in labor costs between location h and g is crucial for whether this condition will hold or not

2.2.2 The other potential host country imports X from A

In the case where the other potential host county would import the intermediate from A, condition (4) can be stated as

$$\begin{aligned} & \Pi_h^{A;h} + \Pi_g^{A;h} + \left[P_A(Q_{AA}^v) - w_A - \frac{w_h}{\tau_{XAh}} \right] Q_{AA}^v \\ & > \Pi_h^{A;g} + \left[P_g(Q_{gg}^v) - w_g - \frac{w_A}{\tau_{XAg}} \right] Q_{gg}^v + (P_A(Q_{AA}) - 2w_A) Q_{AA} \\ & + F_h - F_g \end{aligned} \tag{15}$$

A high labor cost in A now makes it advantageous to invest in h not only because such an investment enables the …rm to supply the intermediate good

required to supply the …nal good in market A more cheaply, but also because a high labor cost in A makes intermediate goods required to supply goods in market g expensive. However, it should be noted that a necessary condition for this outcome to be pro…table for the …rm is that labor costs in h are lower than in g (i.e., $w_h < w_h/\phi_{XAh} < w_A < w_A/\phi_{XAg} < w_g$). The inequality above will hold if:

$$2Q_h\left(\frac{w_A}{\phi_{QAh}} - w_h\right) + Q_g\left(w_g + \frac{w_A}{\phi_{XAg}} - \frac{2w_h}{\phi_{Qgh}}\right) + Q_A\left(w_A - \frac{w_h}{\phi_{XAh}}\right) \quad (16)$$
$$> \quad F_h - F_g$$

A su¢cient condition for the left hand side of this expression to be positive is that $\phi_{Qgh} > \phi_{XAg}$, i.e. that the trade cost associated with shipping the intermediate product from A to an a¢liate in g exceeds the trade cost associated with shipping the …nal product from h to g.

2.3 Case 3: Vertical FDI where foreign a¢liate imports intermediates

If wages and trade costs are such that $w_A/\phi_{XAh} < w_h$ then X will be exported from A to h in the case of entry. Condition (3) can now be written as:

$$\left[\pi_g^{A;h} + P_h(Q_{hh}^v) - w_h - \frac{w_A}{\phi_{XAh}}\right] Q_{hh}^v \quad (17)$$
$$> \left[\pi_g^{A} + P_h(Q_{Ah}) - \frac{2w_A}{\phi_{QAh}}\right] Q_{Ah} + F_h$$

It is evident from condition (17) that this outcome requires that trade costs in intermediates are lower than trade costs in …nal goods. As before, in order to analyze whether the …rm prefers to locate in h rather than in g, we need to take into account that an a¢liate in g can be horizontally or vertically integrated with respect to the parent …rm in A. The case where an a¢liate in g would not be trading with the parent …rm has already been analyzed above. Referring back to that case, we may draw the conclusion that the e¤ect of the di¤erence in trade costs between …nal and intermediate products depends on whether the potential a¢liate will be horizontally or vertically integrated with the parent …rm.

The case where an a¢liate in g would be exporting X to the parent …rm has also been analyzed above. This is the case where wages in g would have to be lower than wages in h. The level of wages in A would in this case assert a negative e¤ect on the pro…tability from investing in h, since high labor costs in A would tend to make imports of X expensive in h and the cost savings from exporting from g large. Hence, again the wage level in the home country has an ambiguous e¤ect on the pro…tability from investing in a particular location.

There is the third case where a potential a¢liate in g would be importing X from A as well.

2.3.1 The other potential host country imports X from A

In the case where $w_A/\tau_{XAg} < w_g$, entry in g would lead to imports of X from A to g. Assuming that A would serve the market without local presence, the condition in (4) can be stated as:

$$P_h(Q^v_{hh}) - w_h - \left(\frac{w_A}{\tau_{XAh}}\right) Q^v_{hh} + P_g(Q_{Ag}) - \left(\frac{2w_A}{\tau_{QAg}}\right) Q_{Ag} \quad (18)$$
$$> P_g(Q^v_{gg}) - w_g - \left(\frac{w_A}{\tau_{XAg}}\right) Q^v_{gg} + P_h(Q_{Ah}) - \left(\frac{2w_A}{\tau_{QAh}}\right) Q_{Ah} + F_h - F_g$$

This condition will be satisfied if

$$Q_h \left(\frac{2w_A}{\tau_{QAh}} - w_h - \frac{w_A}{\tau_{XAh}}\right) + Q_g \left(w_g + \frac{w_A}{\tau_{XAg}} - \frac{2w_A}{\tau_{QAg}}\right) > F_h - F_g \quad (19)$$

Sufficient conditions for the left hand side of this inequality to be positive are $\tau_{XAg} < \tau_{QAg}$ and $\tau_{QAh} < \tau_{XAh}$, i.e., that trade costs in intermediates are higher than trade costs in final goods between the parent and g and that trade costs in final goods are higher than trade costs in intermediates between the parent and h.

This analysis shows that the decision to invest in a particular location is affected by a number of variables in a way that is not always unambiguous. However, some variables affect this decision in a more clear-cut way. A high level of local labor costs makes it less likely that the firm will find it profitable to invest, whereas a high level of local demand will have the opposite effect. A high level of labor costs in alternative locations will make it more profitable to invest. The level of demand in alternative locations may have different effects depending on whether these markets are likely to be served from the affiliate under consideration or not. The level of labor costs and demand in the home country also have ambiguous effects, depending on the resulting structure of production within the firm.

This exercise yields many possible outcomes with respect to how labor costs and market size affect the firm's decision of whether to invest in a particular host country. However, one way to obtain more straightforward results is to focus on the case where trade costs in final goods are sufficiently high for marginal costs of supplying the product locally to be lower than the trade-inclusive marginal cost of supplying the market with exports (i.e., we assume that $w_j < w_k/\tau_{Qjk}, \forall j;k$). We have nine different possibilities with respect to intra-firm trade patterns when we take into account that there are alternative locations for an affiliate. Table 1 shows the expected effect of labor costs and market size in these nine different cases:

In this table, location h is the one under consideration, whereas location g is the alternative location. The first column states the different alternatives with respect to intra-firm trade patterns. H stands for horizontal FDI, i.e. the case where there is no intra-firm trade between the parent and the affiliate. V exp and V imp stand for vertical FDI where the affiliate exports and imports intermediates, respectively.

Table 1: Predictions on the assumption that $w_j < w_k / \theta_{Qjk}$, $\forall j;k$

	Q_h	w_h	Q_A	w_A	Q_g	w_g
$h \in H$ $g \in H$	+	¡		+	¡	+
$h \in H$ $g \in V^{exp}$	+	¡	¡	¡	¡	+
$h \in V^{exp}$ $g \in H$	+	¡	+	+	¡	+
$h \in H$ $g \in V^{imp}$	+	¡		+	¡	+
$h \in V^{imp}$ $g \in H$	+	¡		¡	¡	+
$h \in V^{exp}$ $g \in V^{exp}$	+	¡	+	+	¡	+
$h \in V^{exp}$ $g \in V^{imp}$	+	¡	+	+	¡	+
$h \in V^{imp}$ $g \in V^{exp}$	+	¡	¡	¡	¡	+
$h \in V^{imp}$ $g \in V^{imp}$	+	¡			¡	+

The table shows that we would always expect that the level of local labor costs and market size in alternative locations a¤ect the decision to set up an a¢liate in a particular host country in a negative direction. We would also expect that the level of local demand and labor costs in alternative locations a¤ect this decision positively. With respect to market size and labor costs in the home country, the expected e¤ect depends on the resulting intra-…rm trade pattern. If the a¢liate would be of the vertical type with exports of intermediates to the parent, we would expect both the level of labor costs and market size in the home country to assert a positive e¤ect on the likelihood that the …rm decides to invest. The same e¤ect is expected for labor costs in the case there the a¢liate would be horizontal, unless an a¢liate in an alternative location would be exporting intermediates. If the a¢liate would be of the vertical type with imports of intermediates from the parent, the e¤ect is likely to be negative instead.

Given that the …rm has decided to invest in a location, the e¤ect on employment of changes in labor costs and demand are more straightforward (see Braconier & Ekholm 2000). If an increase in labor costs in one location leads to a relocation of production to another location, there will be a substitutionary relationship in terms of labor costs. However, if there is no relocation, but only an increase in production costs, which in turn decreases the demand or supply of intermediate products, there will be a complementarity relationship instead.

3 Data

In order to analyze the determinants of the decision to establish foreign a¢liates empirically, we use …rm-level data on Swedish multinationals within the manufacturing sector. These data have been collected by the IUI since the early 1970's about every fourth year. In our sample, we have data for six years: 1970, 1974, 1978, 1986, 1990, 1994, 1998.[2]

Over the time period that we consider, the full sample of Swedish multinationals cover some 700 observation at the …rm level and some 3000 observations at the a¢liate level. Only producing a¢liates are included in the database. Moreover, we have eliminated all …rms that appear only once in the time series.[3] For each MNE, we add the number of a¢liate employees in a particular host country so that we only have one observation per …rm-country pair. This amounts to collapsing the MNE's a¢liates in each country to one single observation, so that each MNE has zero or one a¢liate in each country. Having done this, we are left with an unbalanced panel including 205 MNEs with activities in 48 host countries. Altogether, we have a sample of about 30 000 observations on …rm-country pairs, of which about 2500 contain a¢liate activity. Restricting the sample to observations related to European host countries, we have around 12 000 observations on …rm-country pairs, of which about 1700 contain a¢liate activity.

We divide the host countries into four di¤erent groups: high-income Europe, low-income Europe, high-income non-Europe and low-income non-Europe.[4] This grouping is made on the basis of two important factors from the theoretical section. Firstly, we group the Western European countries together, as trade costs between these countries are relatively low, which makes the scope for vertical integration of the …rm large. Secondly, we want to make a crude separation of countries according to relative factor endowments which are likely to a¤ect relative production costs and inter-country specialization. The size of the four di¤erent samples and the number of a¢liate observations are presented in Table 2.

Before we enter into the speci…cation of the econometric analysis, we shall present some descriptive evidence based on these data. Figure 1 shows the distribution of a¢liate employment among the four di¤erent types of locations. It shows that the relative importance of high-income Europe as a location for a¢liate activities has decreased over time, although the main part of the a¢liate employment can still be found in this region. This decreased relative importance is primarily mirrored in an increased relative importance for high-income non-Europe, which mainly consists of the US. Low-income Europe's share of a¢liate 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

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

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

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

important as locations for a¢liate activities over time. However, it should be noted that this trend hides the fact that there has been a signi…cant increased importance of Asia compared to Latin America within this group of countries. Overall, …gure 1 shows that the relative importance of high-income vs. low-wage 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 iin the group of low-income countries.

Figure 2 shows the development of labor costs in the four di¤erent types of locations in relation to the labor costs in Sweden. More precisely, the curves in …gure 2 show the ratio between average labor costs in foreign a¢liates and average labor costs in Swedish parents based on our panel sample of MNEs. According to this …gure, average labor costs have risen faster in a¢liates 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 at the time. 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 a¢liate 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 Speci…cation

There are three important points to make with respect to the theoretical analysis of determinants of the location of a¢liate activities. First, as has been shown previously (e.g. Brainard & Riker 1997b, Braconier & Ekholm 2000), for a given con…guration of the …rm in terms of foreign a¢liates, the relationship between labor costs in one location and labor demand in an other location can be either substitutionary or complementary. Moreover, the e¤ects of variables such as labor costs and demand on the entry decision may very well di¤er from the marginal e¤ects when the MNE has activities in given locations. Thus, it is important to study the determinants of the decision to invest in a particular location as well as the e¤ect of changes in labor costs on employment in the locations in which the …rm is established. Finally, the theoretical analysis suggested that when a MNE decides whether to set up an a¢liate in a particular location, its decision is not only a¤ected by conditions in the MNEs current production plants but also on local demand, wage costs and trade costs in other potential locations.

In the empirical speci…cation of the model we shall distinguish between the selection process and the e¤ect on employment within existing a¢liates. We

specify the selection model as:

$$P(A_{ijt} = 1) = f\left(w^S_{ijt}; w^l_{ijt}; w^0_{ijt}; w^{min}_{ijt}; D^0_{jt}; D^S_{ijt}; D^{max}_{ijt}; y^0_{jt}\right) \qquad (20)$$

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; and in the lowest-cost location where the firm does not have activities (w^{min}). 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}).

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.[5] 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 of locations.[6]

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 affiliate j's host country.[7] D^{max} 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. Consequently, D^{max} represents the alternative location to the host country. The variable D^S is Swedish consumption in the industry in which affiliate j operates.[8] This variable is included as a proxy for intra-firm export demand on the grounds that it may capture the demand for exports to the home country.

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).[9] 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

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

[6] 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.

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

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

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

to control for differences in overall labor productivity between locations.

We expect that the host country wage w^0 will negatively affect the probability that an MNE will produce in that location, while we expect local demand D^0 and home country demand D^S 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. 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:

$$\begin{aligned} \ln L_{ijt} = {} & \alpha + \beta_i + \gamma_t + \theta_0 \ln w^S_{ijt} + \sum_{l=1} \theta_l \ln w^l_{ijt} + \\ & \theta_5 \ln w^0_{ijt} + \theta_6 \ln D^0_{ijt} + \theta_7 \ln D^S_{ijt} + \theta_8 \ln Y^0_{ijt} + \varepsilon_{ijt} \end{aligned} \tag{21}$$

The difference regarding the independent variables compared to 20 is that w^{min} and D^{max} in other potential locations are now omitted.[10] Furthermore, all coefficients may now be interpreted as elasticities. In particular, θ_0 i θ_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 3 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 3 gives the results from estimating equation (20), while the bottom gives the

[10] We did try to include w^{min} and D^{max} in the least-square estimates as well, but in almost all regressions these variables did not have a statisitically significant effect.

results for estimating the labor demand function (21). We start by analyzing the determinants of whether MNEs carry out a¢liate production in a particular country or not. In the logit estimations, we include corporation-speci…c …xed-e¤ects, so that unobserved …xed e¤ects at the level of the MNE are controlled for. Furthermore, time dummies are included in all speci…cations.[11]

From the top of Table 3 we see that the e¤ect of the local labor cost is negative, as expected, and highly signi…cant. Thus, the level of local labor costs has a signi…cant negative e¤ect 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 signi…cant e¤ect. Consequently, a large local market increases the probability for Swedish MNEs to be active in that market, which con…rms the market size e¤ect 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 signi…cant e¤ect. This means that we …nd 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 signifant e¤ect, wheareas the estimated coe¢cient for the corresponding index for low-income Europe is positive and signi…cant 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 …rms, since only a smaller part of the Swedish MNEs have a¢liates on both high- and low-income countries.[12]

The estimated coe¢cient 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 …rm-speci…c …xed e¤ects in the empirical model. Without a …xed-e¤ect speci…cation, the estimate is positive and highly signi…cant. A positive coe¢cient implies that the existence of (relative) low-wage locations within high-income Europe where the MNE is not active decreases the probability of …nding an a¢liate in the host country. The estimated coe¢cient for D^{max} is negative and highly signi…cant in the two …rst estimations, which indicates that the existence of potential new locations with large markets in high-income Europe will decrease the likelihood of observing a¢liate production in a host country. Finally, estimated coe¢cient of the control variable for di¤erences in labor productivity, real GDP per capita, is postive and signi…cant.

Turning to the e¤ects on employment of changes in labor costs, as measured by the estimated wage elasticities in the bottom half of Table 3, we once again

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

[12] We did not …nd any signi…cant coe¢cients for wages in high-income non-Europe or low-income non-Europe. Including these variables would reduce the …rm sample even further and make it biased towards highly internationalized …rms, which is why those results are not reported.

…nd a negative coe¢cients 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 a¤ects the level of employment in foreign a¢liates. Moreoever, the estimated cross-wage elasticities with respect to wage costs in other European host countries are insigni…cant. In these estimations, the estimated coe¤ecient of the control variable for productivity is insigni…cant.[13]

Table 4 shows the results from the Heckman estimations. In general, there is a trade o¤ between the selection bias introduced in the second step OLS in Table 3 and the Heckman estimation's inability to accommodate …xed e¤ects. In the Heckman estimations presented, standard errors have been adjusted according to the assumption of clustering along …rm-identity. As in Table 3, 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 coe¢cients are signi…cant, whereas basically none of the coe¢cients of the variables of interest are signi…cant in the labor demand equation. One major di¤erence between the results of the Heckman estimations and the results from the …xed-e¤ect logit estimation is that the estimated coe¢cent of w^{min} is now positive and signi…cant. Furthermore, the wage cost and demand variable relating to Sweden now yield signi…cant estimates. The level of wage costs in Sweden is estimated to have a positive e¤ect 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 coe¢cient for Swedish industry consumption is signi…cantly 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 4, the estimated e¤ect is in any case very small.

Altogether, the results suggest that activities in existing foreign a¢liates within the group of high-income European countries are neither substitutes for nor complements to each other. Both the likelihood of observing a¢liate activity and the level of employment seem una¤ected by the level of labor costs in other locations. We …nd some weak evidence of a substitutionary relationship between employment in a¢liates in high- and low-income Europe. However, this e¤ect is not signi…cant in the Heckman estimations adjusting for selectivity bias. The three variables that consistently yield signi…cant estimates are local wage costs, local demand and the level of demand in potentional unserved locations.

In Table 5 and 6 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

[13] Neither w^{min} nor D^{max} had any signi…cant impact on employment and have therefore been excluded from the regressions shown in Table 3.

a fairly low number of degrees of freedom. An additional problem with these estimations is that the sample of countries in which we …nd a¢liate production completely changes between 1990 and 1994, since the Eastern and Central European countries do not appear as host countries before 1994.

Table 5 presents the results from the …xed e¤ect 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 …nd a signi…cant e¤ect of the level of demand in potential unserved locations. We …nd highly signi…cant e¤ects from local wage costs and local demand.

The bottom part of Table 5 presents the results from estimations of the labor demand equations. Again, we …nd signi…cant 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 …xed-e¤ect formulation of the model thus suggest that it is the local factors that matter for whether we …nd a¢liates in low-income Europe and for the level of operation in these a¢liates. However, wage costs or market size in other locations, including the home country, do not appear to have any e¤ects.

Table 6 presents the results from the Heckman estimations. In the estimations of the selection model we …nd the expected e¤ects from wage costs and market size in the alternative unserved locations. Higher wage costs in alternative locations increases the likelihood of observing a¢liate activities in a host country, whereas a larger market size reduces this likelihood. The level of wage costs in Sweden yields a positive estimate signi…cant at the 10 percent level in two of the estimations, giving some support for a substitutionary relationship between a¢liate activities in low-income Europe and parent activities in Sweden. A result in these estimations that appear somewhat peculiar, however, is a negative e¤ect on the likelihood of observing a¢liate 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 insigni…cant. 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 signi…cantly negative e¤ect, suggesting that an increase in home country demand would reduce employment in the foreign a¢liates 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 …rms that have a¢liates in not only high- and low-income Europe, but in low-income non-Europe as well, we …nd positive cross-wage elasticities with resepect to locations in both low-income Europe and low-income non-Europe.

Table 7 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 insigni…cant estimates in all

previous estimations.

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

Turning to the results for the labor demand equation, we …nd that the local market size is the only variable that yield signicant estimates of the elasticities. The estimated own-wage elasticity is negative, but insigni…cant. 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 a¤ect the MNE's decision to operate in foreign locations. Using a dataset covering Swedish multinational enterprises in the manufacturing sector 1970-1998, we …nd that the probability of observing a¢liates in a host country is in‡uenced by local wage costs and the local market size. We also …nd some evidence that labor costs and market size in similar, but unserved, locations matter. In general, we do not …nd evidence of either strong substitution or complementarity with existing a¢liates in the same group, although in some subsamples of MNEs, there seem to be substitutionary e¤ects.

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Figure 1. Swedish MNEs Share of Total Affiliate Employment in different locations.

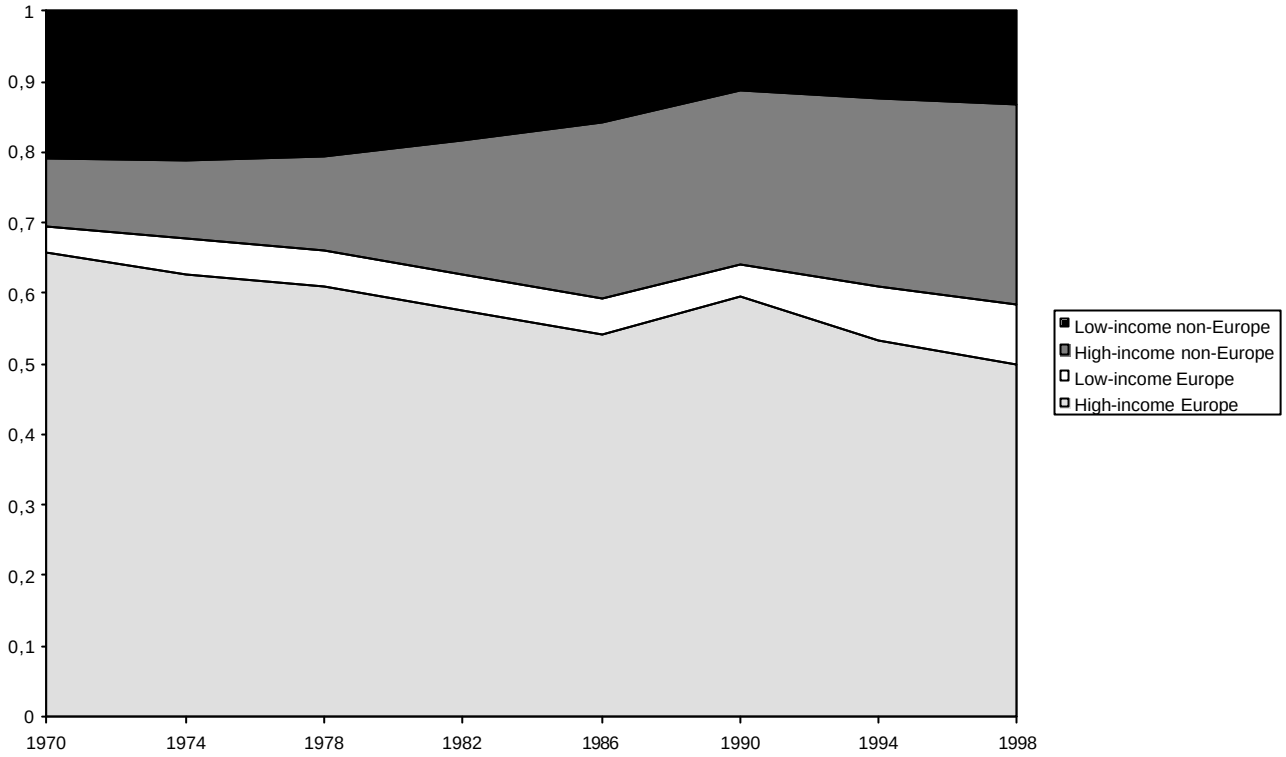

Figure 2. Relative Wages in different Locations within Swedish MNEs.

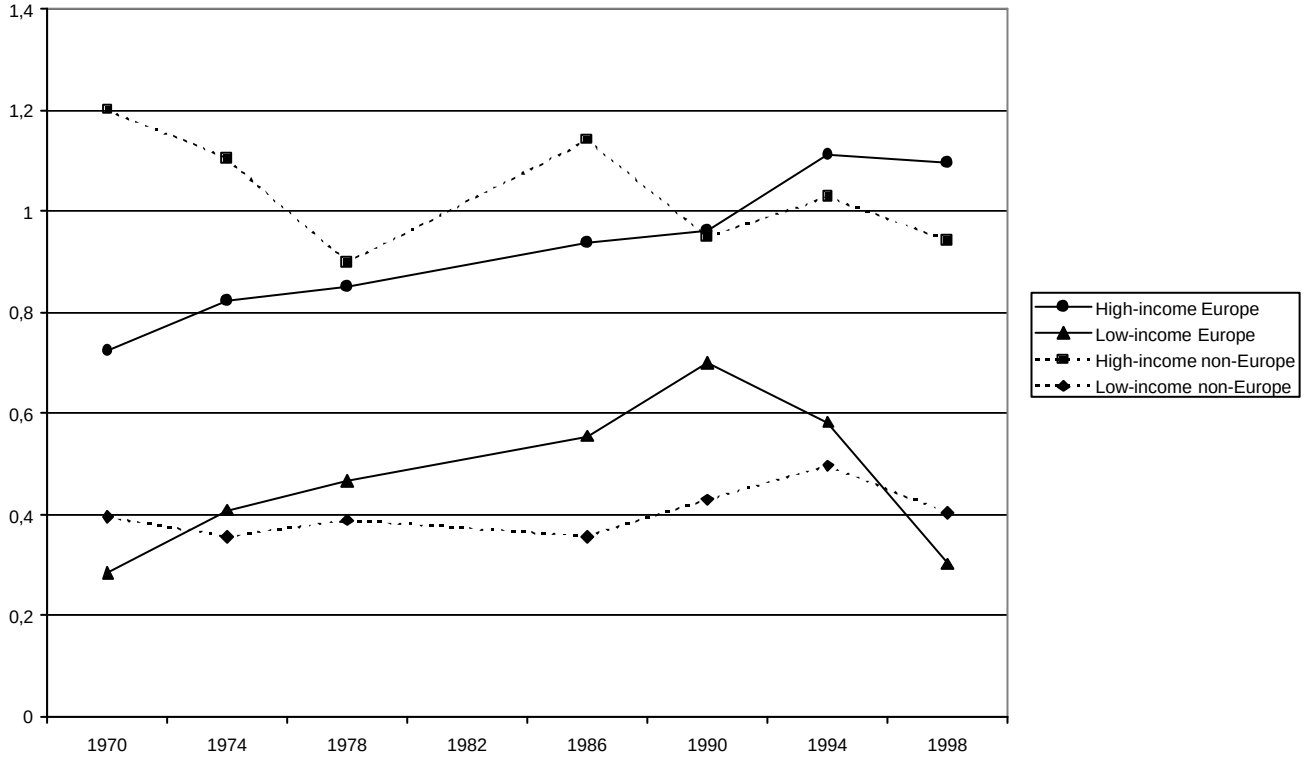

Table 2. Number of Total Observations and Affiliates across Country Groups and Years.

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 3. 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***
	(-16.7)	(-13.3)	(-7.27)
lnw^S	0.04	-0.001	-0.19
	(0.17)	(-0.003)	(-0.46)
lnD^0	0.49***	0.53***	0.63***
	(12.6)	(11.5)	(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***
	(14.6)	(10.5)	(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 4. Results for High-income Europe. Heckman estimations

Dep var: *P(A)*	**Selection model**	**Selection model**
lnw^0	-1.86***	-1.54***
	(-8.69)	(-7.65)
lnw^S	0.23*	0.46**
	(1.75)	(2.45)
lnD^0	0.25***	0.24***
	(7.33)	(6.26)
lnD^S	-0.07**	-0.06
	(-2.23)	(-1.35)
lnw^{min}	1.52***	2.33***
	(3.73)	(4.75)
lnD^{max}	-0.55***	-0.60***
	(-11.2)	(-7.22)
lny^0	1.12***	0.94***
	(7.05)	(5.61)
Dep var lnL	**Labor demand equation**	**Labor demand equation**
lnw^0	0.41	-0.09
	(1.40)	(-0.25)
lnw^S	0.23	0.05
	(0.81)	(0.12)
lnD^0	0.03	0.24***
	(0.46)	(2.70)
lnD^S	0.06	-0.10
	(0.70)	(-0.92)
lnw^{HE}	0.40	0.36
	(0.98)	(0.54)
lnw^{LE}	-	0.16
		(0.50)
lambda	-0.87***	-0.36
	(3.60)	(-1.59)
Log likelihood	-4197	-2221
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 5. 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 6. Results for Low-income Europe. Heckman estimations

Dep var: *P(A)*	**Selection model**	**Selection model**	**Selection model**
lnw^0	-0.58***	-0.07	-0.003
	(-3.26)	(-0.32)	(-0.01)
lnw^S	0.42**	0.59*	0.14
	(2.37)	(1.94)	(0.50)
lnD^0	0.10	-0.20***	-0.26***
	(1.38)	(-2.83)	(-3.30)
lnD^S	0.03	0.01*	0.02
	(0.53)	(0.08)	(0.21)
lnw^{min}	1.27***	1.59***	1.31***
	(5.15)	(4.51)	(4.33)
lnD^{max}	-0.61***	-1.03***	-1.23***
	(-3.76)	(-4.43)	(-5.22)
lny^0	0.29	0.02	-0.05
	(1.44)	(0.10)	(-0.21)
Dep var lnL	**Labor demand equation**	**Labor demand equation**	**Labor demand equation**
lnw^0	-0.22	-0.36	-0.59
	(-0.62)	(-1.06)	(-1.21)
lnw^S	-0.11	-0.69	0.73
	(-0.22)	(-1.44)	(0.53)
lnD^0	0.12	0.55***	0.63***
	(0.72)	(3.62)	(3.61)
lnD^S	-0.17	-0.22**	-0.28**
	(-1.07)	(-2.01)	(-3.00)
lnw^{HE}	-0.63	-1.16	0.08
	(-0.60)	(-0.94)	(0.06)
lnw^{LE}	-	0.36	0.63*
		(1.55)	(1.87)
lnw^{LNE}	-	-	0.40*
			(1.76)
lny^0	0.74**	0.28	0.60**
	(2.21)	(0.78)	(2.04)
lambda	-0.92***	-0.02	0.63
	(4.02)	(-0.09)	(1.48)
Log likelihood	-789	-356	-287
Observations:			
total	2125	2031	2017
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 7. 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