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DISCUSSION PAPER

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Locating Foreign Affiliates in Germany: The Case of Swedish MNEs*

**Henrik Braconier
Karolina Ekholm**

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Abstract

This paper uses a dataset on the foreign activities by Swedish manufacturing firms to examine the performance of German affiliates compared with affiliates in other locations. It is found that German affiliates, on average, have higher labour productivity, R&D expenditure per employee and skill-intensity. There is also evidence suggesting that German affiliates are more oriented towards selling in the local market than affiliates in other European countries. We also analyse the effect of labour costs in the Swedish multinational enterprises' (MNEs') decision to locate in Germany. We find that the location decision is sensitive to the level of wage costs in Germany and in other potential locations in high-income Europe, but not to the level of wage costs in Sweden or low-income countries in Europe. Finally, we find that the cross-wage elasticity showing the effect of increases in labour costs in other high-income locations in Europe on employment in German affiliates of Swedish MNEs is positive, indicating substitutability between the German workers and the workers employed in other high-income countries in Europe.

Zusammenfassung

Auf der Basis eines Datensatzes über die Auslandsaktivitäten schwedischer Industriefirmen wird die Performance schwedischer Tochtergesellschaften in Deutschland im Vergleich mit denen in anderen Ländern untersucht. Es zeigt sich, dass die deutschen Töchter im Durchschnitt eine höhere Arbeitsproduktivität und höhere FuE-Aufwendungen pro Beschäftigten aufweisen und mehr qualifizierte Arbeitskräfte beschäftigen. Sie sind stärker auf den lokalen Binnenmarkt orientiert als die Töchter in den anderen europäischen Ländern. Wir untersuchen auch den Effekt der Arbeitskosten auf die Entscheidung schwedischer Multis, in Deutschland zu investieren. Dabei zeigt sich, dass die Standortentscheidung beeinflusst wird vom Niveau der Lohnkosten in Deutschland und an anderen potentiellen Standorten in europäischen Hocheinkommensländern, aber nicht von den Lohnkosten in Schweden oder in europäischen Niedriglohnländern. Schließlich finden wir Evidenz für einen positiven Zusammenhang zwischen den Arbeitskosten in anderen europäischen Hocheinkommensländern und der Beschäftigtenzahl bei den schwedischen Töchtern in Deutschland. Dies deutet auf eine Substitutionsbeziehung zwischen den Arbeitskräften in Deutschland und anderen europäischen Hochlohnländern hin.

JEL-codes: F23, J23

Keywords: labor demand, multinational firms, foreign affiliates, Germany

1 INTRODUCTION

Sweden is one of the most important home countries of multinational enterprises (MNEs). In particular, relative to its size, Sweden hosts a relatively large number of large and highly internationalised MNEs. The fact that Germany is the largest economy in Europe and lies in geographical proximity to Sweden makes it an attractive location for Swedish firms. Therefore, Germany has consistently been one of the most important host countries of Swedish MNEs.

This paper examines the foreign activities by Swedish MNEs in Germany. The data used are based on survey of Swedish manufacturing firms with producing affiliates abroad which has been carried out by the Research Institute of Industrial Economics (IUI). Based on these data we examine the performance of German producing affiliates of Swedish MNEs and compare this with producing affiliates located in other countries. Moreover, we perform an econometric analysis in order to analyse how labour costs affect the Swedish MNEs' decision to locate affiliates in Germany and to what extent changes in labour costs in different locations affect the firms' demand for workers in Germany.

The paper is organised as follows: In section 2, we compare German affiliates with respect to labour productivity, R&D expenditure per employee, skill-intensity and export propensity with affiliates located in other host countries. Section 3 discusses how the firms' decision to locate activities in a certain country is likely to be affected by labour costs in different locations. Section 4 estimates empirically how the Swedish MNEs' decision to locate in Germany is affected by labour costs in different locations and generates estimates of cross-wage elasticities which give information about whether workers employed in German affiliates are substitutes or complements to workers employed in other locations. Finally, section 5 concludes.

2 The performance of German affiliates of Swedish MNEs

The data used in this paper is based on a comprehensive survey of Swedish manufacturing firms with foreign producing affiliates that has been carried out since the early 1970s. To this date, the survey has been conducted seven times: 1970, 1974, 1978,

1986, 1990, 1994 and 1998.¹ The most interesting feature of this database is that it contains detailed information about each of the firms' foreign producing affiliates.

Tables 1 and 2 show the distribution of the Swedish MNEs' affiliate employment and production based on these data. The figures in the tables are based on information about employment and production in foreign affiliates with at least some production activities, which means that pure sales affiliates are not included, whereas affiliates with production as well as sales activities are included.

Table 1: The share of affiliate employees in selected countries, 1970-1998 (percentages)

| | 1970 | 1974 | 1978 | 1986 | 1990 | 1994 | 1998 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <i>Developed countries:</i> | | | | | | | |
| <i>Western Europe</i> | 68.5 | 66.8 | 65.7 | 57.9 | 61.5 | 56.8 | 51.8 |
| Belgium | 3.3 | 3.7 | 4.1 | 3.4 | 2.9 | 3.4 | 3.6 |
| France | 7.1 | 9.0 | 10.6 | 5.8 | 4.4 | 4.1 | 6.0 |
| Germany | 17.9 | 15.3 | 13.5 | 10.7 | 14.2 | 12.0 | 13.3 |
| Italy | 8.5 | 8.1 | 6.9 | 11.6 | 9.3 | 11.1 | 10.0 |
| Netherlands | 4.1 | 3.8 | 5.8 | 3.0 | 3.6 | 3.4 | 2.4 |
| UK | 7.6 | 7.0 | 9.6 | 6.2 | 11.5 | 8.4 | 5.3 |
| Other Western Europe | 20.0 | 19.9 | 15.2 | 17.2 | 15.6 | 14.4 | 11.2 |
| US | 5.4 | 6.0 | 9.2 | 19.1 | 21.0 | 22.4 | 22.1 |
| Other developed countries | 24.3 | 24.8 | 19.3 | 22.1 | 19.4 | 18.1 | 16.0 |
| <i>Eastern and Central Europe</i> | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.9 | 7.4 |
| <i>Developing countries:</i> | | | | | | | |
| Brazil | 11.6 | 13.0 | 10.3 | 6.9 | 5.9 | 5.7 | 4.8 |
| India | 6.7 | 5.7 | 1.5 | 1.8 | 1.4 | 1.8 | 2.2 |
| Other developing countries | 3.5 | 3.6 | 9.2 | 9.4 | 6.4 | 5.7 | 6.9 |

Source: Ekholm & Hesselman (2000)

The tables reveal two striking features of the relative importance of Germany as a host country for Swedish MNEs. First, it is evident that the relative importance of Germany has declined substantially since the early 1970's. In terms of employment, Germany's share of affiliate activities has decreased with about 4.5 percentage points (from about 18 to about 13.5 percent). In terms of production, there has been a decrease with about 8.5 percentage points (from about 21 to about 12.5 percent).

¹ A description of these data can be found in Braunerhjelm and Ekholm (1998). An account of the results from the latest survey can be found in Ekholm & Hesselman (2000).

Table 2: The percentage distribution of affiliate production in selected countries, 1970-1998

| | 1970 | 1974 | 1978 | 1986 | 1990 | 1994 | 1998 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <i>Developed countries:</i> | | | | | | | |
| Western Europe | 72.5 | 72.5 | 70.2 | 67.2 | 72.0 | 63.0 | 53.3 |
| Belgium | 7.5 | 9.2 | 8.5 | 10.7 | 10.9 | 10.7 | 13.3 |
| France | 10.9 | 11.6 | 8.9 | 7.5 | 6.6 | 6.1 | 4.0 |
| Germany | 21.1 | 20.6 | 17.0 | 14.5 | 20.6 | 14.1 | 12.4 |
| Italy | 9.2 | 7.2 | 5.0 | 12.6 | 5.7 | 10.0 | 9.1 |
| Netherlands | 6.2 | 6.7 | 9.3 | 4.7 | 5.8 | 4.8 | 2.0 |
| UK | 4.6 | 4.1 | 8.6 | 4.9 | 10.0 | 8.3 | 4.0 |
| Other Western Europe | 13.0 | 13.1 | 12.9 | 12.3 | 12.4 | 9.0 | 8.5 |
| US | 9.1 | 6.6 | 11.0 | 18.2 | 17.3 | 24.0 | 29.0 |
| Other developed countries | 17.6 | 19.5 | 17.7 | 17.4 | 16.3 | 13.0 | 15.1 |
| <i>Eastern and Central Europe</i> | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 2.4 |
| <i>Developing countries:</i> | | | | | | | |
| Brazil | 5.1 | 6.7 | 8.5 | 4.9 | 4.3 | 4.0 | 5.8 |
| India | 3.0 | 1.6 | 0.6 | 0.6 | 0.5 | 0.3 | 0.4 |
| Other developing countries | 4.6 | 6.2 | 4.9 | 4.0 | 2.0 | 4.7 | 4.9 |

Source: Ekholm & Hesselman (2000)

The tables also reveal that this decrease in relative importance as a host country is mirrored mainly in an increased relative importance of the US. It is thus not the case that Swedish MNEs have tended to favour low-wage locations over Germany. Instead, they seem to have been much more oriented towards the US in their locational strategy.

The second striking feature of the development of Germany's share of the foreign activities of Swedish MNEs is that there was a temporary increase between 1986 and 1990. In terms of employment, the share increased with 3.5 percentage points (from 10.7 to 14.2 percent), whereas, in terms of production, the increase was about 6 percentage points (from 14.5 to 20.6 percent). Part of the explanation for this development is probably that the uncertainty about Sweden's status within the European Union that prevailed in the late 1980's gave Swedish MNEs stronger incentives to locate activities in EU countries (see *Braunerhjelm* and *Ekholm*, 1999). However, it is interesting to note that there was a particularly large expansion of activities in Germany and the UK, two of the largest EU countries in terms of their markets.²

² It should be noted that although the scope of the survey of Swedish MNEs always has been to collect data from the whole population of Swedish manufacturing firms with producing affiliates abroad and the answering rate has generally been very high, there is extensive exiting and entering of firms in the database. This means that the sample of firms on which the figures presented is based has changed

It is evident that Germany's share of affiliate production has been higher than its share of affiliate employment for all years except the most recent one, 1998. One reason for differences in the two distributions is the fact that some firms have not reported the value of production for their affiliates. Hence, the distribution for employment is typically based on a larger number of observations than the distribution of production. Another explanation for this difference is that labour productivity differs between affiliates located in different host countries. In the case of Germany, the evidence suggests that labour productivity is on average higher than in other locations.³

In table 3 we present a direct measure of labour productivity: value added per employee. Here, we have defined three different groups of countries for comparison: High-income Europe, low-income Europe and high-income non-Europe. High-income Europe consists of all Western European countries except Ireland, Greece, Portugal and Spain. Low-income Europe consists of the latter three of the before mentioned countries.⁴ High-income non-Europe, finally, consists of the US, Canada, Japan, Australia and New Zealand.

Table 3: Value added per employee (thousands SEK)

| | Germany | High-income Europe | Low-income Europe | High-income non-Europe |
|------|---------|--------------------|-------------------|------------------------|
| 1970 | 37.5 | 33.6 | 24.5 | 47.9 |
| 1974 | 74.1 | 60.1 | 36.8 | 78.9 |
| 1978 | 117.3 | 93.4 | 59.5 | 103.5 |
| 1986 | 263.9 | 195.1 | 164.1 | 239.2 |
| 1990 | 343.9 | 312.1 | 269.0 | 258.0 |
| 1994 | 517.0 | 485.2 | 324.7 | 398.6 |
| 1998 | 598.8 | 541.1 | 395.6 | 442.2 |

Source: IUI database

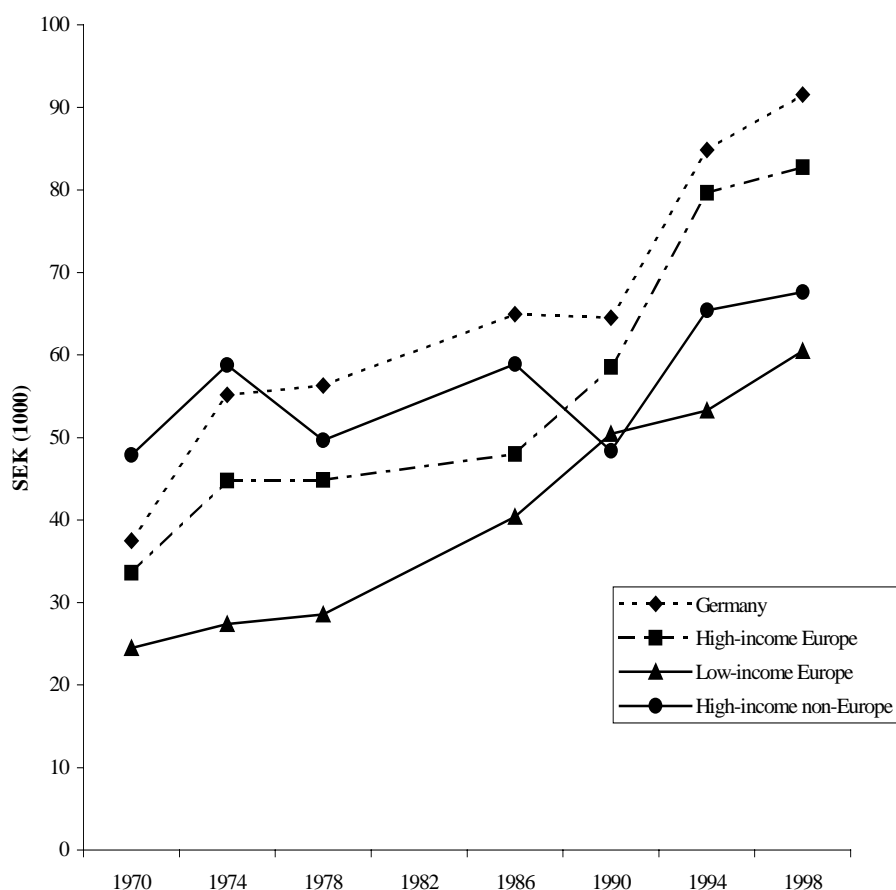
over time. An assessment of the relevance of exiting and entering firms for changes over time in the foreign share of production and in the average share of parent exports to affiliates can be found in Ekholm and Hesselman (2000). In general, the effect of exiting and entering firms seems to be fairly low, with the exception of the last survey, the one for 1998, where there are large changes compared to 1994 due to changes in the firm sample.

- 3 A third reason for differences in the two distributions is that the production figures are affected by exchange rate movements. The strong value of the US dollar in the mid 1980's is, for instance, likely to be the explanation for why the US share of foreign production is higher in 1986 than in 1990, whereas with respect to its share of foreign employment, it is the other way around.
- 4 Ireland is excluded because according to our criteria for being included in either the high-income or low-income group of European countries, Ireland should have been included in the low-income group in the beginning of the time period and the high-income group in the end of the time period.

From Table 3 it is evident that average value added per employee has consistently been higher in the German affiliates compared to affiliates located in other high-income European countries (as well as in low-income European countries). However, in the early 1970's, average value added per employee was higher in the high-income non-European countries; a country group that is dominated by affiliates located in the US.

This development is even more clear in Figure 1, which presents average value added per employee in fixed prices.⁵ It is evident that from 1978 and onwards, the affiliates in Germany show an average labour productivity that is higher than in any of the country

Figure 1: Value added per employee in fixed (1970) prices



Source: IUI database

⁵ The current prices in SEK have been deflated using the GDP deflator.

groups included for comparison. However, the gap between Germany and other high-income countries in Europe seems to have decreased during the 1990's. At the same time, we see that labour productivity in affiliates in high-income non-Europe exhibits lower growth than the European affiliates.

Another interesting issue with respect to differences in characteristics is whether affiliates located in different countries differ systematically with respect to factor intensities. Tables 4 and 5 present two measures of the skill-intensity of affiliates: average R&D expenditure per employee (Table 4) and the share of high-skilled white-collar workers.

Table 4 reveals that there is much more of variability in the figures for R&D expenditures per employee than for value added per employee. This is related to the fact that there are much more of missing values with respect to the information about affiliates R&D expenditures. It may also be noted that there is no information on R&D expenditures for 1974 and 1986. Moreover, large mergers and acquisitions can easily change the R&D figures dramatically. Still, it is evident that the affiliates located in Germany tend to have on average high R&D expenditures per employee compared to other countries. In particular, in 1990 and 1998, R&D expenditures per employee were higher in Germany than in any of the country groups included in Table 4.

Table 4: R&D expenditure per employee (thousands SEK)

| | Germany | High-income Europe | Low-income Europe | High-income non-Europe |
|------|---------|--------------------|-------------------|------------------------|
| 1970 | 0.49 | 1.21 | 0.08 | 2.51 |
| 1978 | 3.68 | 2.31 | 0.53 | 3.80 |
| 1990 | 21.4 | 14.9 | 14.3 | 14.0 |
| 1994 | 27.5 | 32.4 | 33.7 | 34.0 |
| 1998 | 28.3 | 22.1 | 8.2 | 20.1 |

Source: IUI database

Information about the skill-structure in the affiliates is only available for a few years. In 1998, the surveyed firms were asked to distribute their employees not only on blue-collar and white-collar workers, but on high-skilled and low-skilled white-collar workers as well. Table 5 shows the average share of high-skilled white-collar workers based on this information. According to this table, about 9 percent of the German

affiliates' employees were high-skilled white-collar workers, which can be compared to about 6 percent for other high-income European countries and about 7 percent for high-income non-European countries.

Table 5. Share of high-skilled white-collar workers in total labour force in 1998 (percent)

| | |
|------------------------|-----|
| Germany | 9.3 |
| High-income Europe | 6.2 |
| Low-income Europe | 2.4 |
| High-income non-Europe | 7.3 |

Source: IUI database

Because Germany is a high-wage country, we would not expect that Swedish MNEs were locating production in Germany primarily to cut production costs, but in order to get access to the large German market instead. Before the accession of Sweden in the European Union, the location of affiliates in Germany may also have been motivated by the desire to get access to the European market in general. One way to assess whether there is evidence of German affiliates to be more oriented to selling in the local German market is to examine the export propensities of affiliates. Table 6 shows affiliate exports as a share of total turnover. As expected, taking into account the large size of the domestic market, the export share is lower for the German affiliates than for affiliates in

Table 6: Exports as a share of total turnover (percent)

| | Germany | High-income Europe | Low-income Europe | High-income non-Europe |
|------|---------|--------------------|-------------------|------------------------|
| 1970 | 17.3 | 21.9 | 53.8 | 9.2 |
| 1974 | 24.6 | 32.2 | 35.1 | 15.1 |
| 1978 | 25.3 | 36.0 | 25.9 | 10.5 |
| 1986 | 29.5 | 37.9 | 45.3 | 7.9 |
| 1990 | 41.3 | 39.8 | 17.6 | 12.2 |
| 1994 | 35.2 | 47.2 | 38.1 | 12.6 |
| 1998 | 37.0 | 48.8 | 44.0 | 18.9 |

Source: IUI database

other European countries all years except 1990. As we would also expect, the export share of German affiliates is still substantially higher than the one pertaining to affiliates located in high-income non-European countries, which primarily relates to affiliates located in the US. It seems reasonable to assume that the Swedish MNEs locate affiliates in the US primarily in order to supply the US market.

The fact that the export orientation of German affiliates seems to have been particularly high in 1990 suggests that Swedish firms were investing in Germany in the late 1980's in order to get access to the larger European market.

3 The Effect of Labour Costs

In order to analyse the determinants of the decision to establish foreign affiliates empirically, we use an unbalanced panel based on the IUI database. In this panel, we have eliminated all firms that appear only once in the time series.

As has been shown previously (e.g. *Brainard & Riker 1997, Braconier & Ekholm 2000a*), for a given configuration of the firm in terms of foreign affiliates, the relationship between labour costs in one location and labour demand in another location can be either substitutionary or complementary. A relationship of substitution is said to prevail if an increase in the level of labour costs in one location leads to an increase in the demand for labour in another location. In this case, the firm increases employment in one location at the same time as it is reducing employment in the location where costs have increased. This may reflect a relocation of activities from high-cost to low-cost locations. A relationship of complementary, on the other hand, is said to prevail if an increase in the level of labour costs in one location leads to a decrease in the demand for labour in another location. In this case, the firm decreases employment not only in the location where costs have increased, but in other locations as well. This may reflect complementarities in production which make the firm react to cost increases in one location by downscaling activities in locations that now experience either a decrease in the demand for intermediate inputs or a higher cost of intermediate inputs supplied by other production units within the corporation.⁶

⁶ For a more detailed account of the possible effects on employment in one location of changes in the level of labour costs in another location, see *Braconier & Ekholm (2000a)*.

The effect of labour costs on the entry decision may, however, very well differ from the effects on labour demand when the MNE has activities in given locations. For instance, a firm that is considering setting up a new plant in a certain foreign location is likely to compare the product and factor market conditions not only in that location and locations in which the firm has existing production units, but in other potential foreign locations as well. A Swedish firm, selling in the European market, that is considering setting up an additional plant will not only compare the product and factor market conditions in Sweden and, say, Germany, but in France, the UK and other European countries as well. Thus, it is important to study the determinants of the decision to invest in a particular location as well as the effect of changes in labour costs on the level of employment in the locations in which the firm is already established (cf. *Braconier & Ekholm, 2000b*).

In our empirical specification, we therefore distinguish between the selection process and the effect on employment within existing affiliates. We specify the selection model as:

$$P(A_{it} = 1) = f(w_{it}^G, w_{it}^S, w_{it}^{HE}, w_{it}^{LE}, w_{it}^{\min}) \quad (1)$$

where A_{it} denotes whether MNE i has an affiliate in Germany at time t or not. The w 's stand for labour costs in the host country, Germany (w^G); the home country, Sweden (w^S); in locations in high-income and low-income Europe, respectively, where the firm already has activities (w^{HE} and w^{LE}); and in the lowest-cost location in high-income Europe where the firm does not have activities (w^{\min}).

In order to reduce potential problems of endogeneity, labour costs in Sweden are measured by industry-distributed average labour costs in Swedish manufacturing.⁷ The variables w^{HE} and w^{LE} are 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 MNE's 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 high- and low-income Europe.

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

We expect that the level of labour costs in Germany will negatively affect the probability that an MNE will produce in Germany. The wages in locations in which the firm already has activities may affect the likelihood of operating an affiliate in Germany in either way, depending on whether affiliate employment in Germany tends to substitute or complement employment in the other locations. Labour costs in alternative locations in which the MNE is not producing should affect the likelihood that the MNE will operate in Germany 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 modelled in the following way:

$$\ln L_{it} = \alpha + \delta_i + \beta_0 \ln w_{it}^G + \beta_1 \ln w_{jt}^S + \beta_2 \ln w_{it}^{HE} + \beta_3 \ln w_{it}^{LE} + \varepsilon_{it} \quad (2)$$

where L_{it} is the number of employees in Germany in affiliates belonging to firm i .

We now omit the variable capturing the level of labour costs in other potential locations, since there is no obvious reason for why this should affect the level of employment in existing production units. The estimates from this regression may be interpreted as wage-elasticities. Any non-observable features of the firm that influence the firm's demand for labour but that are constant over time are accounted for by the fixed-effect coefficient δ_i .

4 Results from the econometric analysis

Table 7 presents the results from an estimation of (1) using a logit approach. The estimated coefficient for the level of labour costs in Germany is negative and significant at the 10 percent level in two of the three specifications. The level of labour costs in Sweden, however, does not have a statistically significant effect in any of the specifications. The variables that seem to assert the strongest influence on the likelihood that Swedish MNEs decide to produce in Germany are the labour costs in locations in which the firms have already established themselves and in the lowest-cost location within high-income Europe that they have not already established themselves. The estimated coefficients of both these variables are positive and significant at the 5 percent level. This means that the higher the labour costs in these other locations, the

higher the likelihood that Swedish MNEs decide to produce in Germany. In particular, the coefficient of the variable capturing labour costs in potential locations in which the firm does not already have production is strongly significant; it is significant at the 1 percent level in all specifications. This suggests that although the primary motive for Swedish MNEs to invest in Germany may not be to produce at lower costs, the level of production costs do matter for their locational decision. Moreover, it suggest that the Swedish MNEs regard Germany and other high-income countries in Europe as alternative locations for similar activities, thereby creating a relationship of substitution between investments in Germany and in the other high-income European countries.

Table 7: Results for logit estimation. Dep var: $P(A)$

| | (1) | | (2) | | (3) | |
|----------------|---------|---------|---------|---------|----------|---------|
| $\ln w^G$ | -18.60 | (-1.19) | -28.80* | (-1.79) | -62.70* | (-1.74) |
| $\ln w^S$ | 0.51 | (1.38) | 0.77 | (1.57) | 0.38 | (0.36) |
| $\ln w^{HE}$ | - | | 2.84*** | (3.23) | 6.12** | (2.14) |
| $\ln w^{LE}$ | - | | - | | 0.51 | (1.00) |
| $\ln w^{min}$ | 6.79*** | (6.23) | 9.94*** | (6.87) | 11.80*** | (4.00) |
| Log likelihood | -372.3 | | -270.0 | | -53.9 | |
| Observations | 613 | | 467 | | 121 | |
| Pseudo R^2 | 0.08 | | 0.14 | | 0.30 | |

Note: Figures within parentheses are t-statistics. Asterisks denote significance levels: *** (1%), ** (5%), *(10%). The regressions also include time dummies. The estimations are based on the assumption that observations are independent across firms, but not necessarily within firms.

Table 8 presents the results from an estimation of (2). The regressions now include fewer observations since we only use the ones for which there is affiliate activities in Germany. In these regressions, the coefficient of German labour costs is estimated with very low precision. The estimates are positive, but insignificant. The estimates of the labour costs in Sweden and in locations within low-income Europe in which the firm is active are insignificant as well. In fact, the only wage-elasticity whose estimate is statistically significant is the one for locations within high-income Europe in which the firm is active. This estimated cross-wage elasticity is positive, implying that increases in labour costs in other high-income countries in Europe lead to an increased demand for German labour by the Swedish MNEs. This is additional evidence for a relationship of

substitution between German workers and workers in other high-income countries in Europe.

**Table 8: Estimated wage elasticities based on fixed-effect OLS estimation.
Dep var: $\ln L$**

| | (1) | (2) |
|----------------|----------------|---------------|
| $\ln w^G$ | 7.44 (1.08) | 5.30 (0.54) |
| $\ln w^S$ | 0.20 (0.56) | -0.27 (-0.40) |
| $\ln w^{HE}$ | 2.25*** (2.83) | 3.58* (1.98) |
| $\ln w^{LE}$ | - | 0.06 (0.16) |
| Observations | 188 | 81 |
| T-bar | 2.7 | 2.9 |
| R^2 (within) | 0.24 | 0.25 |

Note: Figures within parentheses are t-statistics. Asterisks denote significance levels: *** (1%), ** (5%), *(10%). The regressions also include time dummies.

As is well known, when estimating a regression equation in a selection model, the estimates may be biased. In order to gauge the potential source of bias, we also use the Heckman estimation procedure to estimate the wage elasticities in the labour demand equation (2). In the selection model, we include the wage costs in Germany, in other high-income countries in Europe in which the firm is active and in the lowest-cost location in high-income Europe in which the firm is not already active. In the labour demand equation we include the wage costs in Germany, in Sweden and in high-income as well as low-income countries in Europe in which the firm is already active. The labour demand equation now also includes an additional variable, λ , which is the inverse of the Mill's ratio (or the nonselection hazard) and which is calculated based on the parameter estimates of the selection model. The inclusion of this variable yields consistent estimates of the wage-elasticities in the labour demand equation on the assumption that the selection model is correctly specified and that disturbances are homoskedastic and normally distributed.

Table 9 presents the results from maximum-likelihood estimation of a Heckman selection model. The estimated coefficient of λ is highly significant, indicating

that selection bias is indeed a problem in our data. The results pertaining to the selection model are similar to the ones in Table 7, with the exception that the estimated coefficient of labour costs in other high-income European countries in which the firm is already active is insignificant. The results pertaining to the labour demand equation differs from the ones in Table 8 in that the own-wage elasticity is now negative and significant, whereas, the cross-wage elasticity for other high-income European countries is insignificant. Hence, the Heckman estimation yields weaker evidence that labour costs in other high-income European locations affect the level of activity in Germany, but stronger evidence that the labour costs in Germany do have an affect than the logit/OLS estimations. Taken together, however, the results from the estimations suggest that relative labour costs do matter for the Swedish MNEs' decisions to enter and employ workers in Germany.

Table 9: Results for Heckman estimation (maximum likelihood)

| | Selection model | Labour demand equation |
|-------------------------------|------------------|------------------------|
| $\ln w^G$ | -2.66*** (-8.43) | -23.40** (-2.28) |
| $\ln w^S$ | - | 0.82 (0.99) |
| $\ln w^{HE}$ | 0.23 (0.79) | 1.11 (0.51) |
| $\ln w^{LE}$ | - | -0.42 (-1.42) |
| $\ln w^{min}$ | 2.54*** (7.73) | - |
| lambda | | 0.83*** (5.04) |
| Log likelihood | -309.5 | |
| Observations (total/censored) | 362/81 | |

Note: Figures within parentheses are t-statistics. Asterisks denote significance levels: *** (1%), ** (5%), *(10%). The regressions also include time dummies. The estimations are based on the assumption that observations are independent across firms, but not necessarily within firms.

In many ways it would preferable to estimate the equations in (1) and (2) using unit labour cost data instead of average cost per employee as it is reported by the firms themselves. It would greatly reduce problems related to endogeneity and it would take into account the fact that differences in labour productivity between countries are likely to be reflected in average wages. One problem with using unit labour cost data in our estimations, however, is that the labour-cost variables contain very little variation and are highly correlated with each other. The results from estimations using unit labour cost data are presented in Table A1 in Appendix. As can be seen the estimates are

generally very imprecise and the goodness of fit low. None of the estimated coefficients are significant, but the sign pattern seems to be essentially consistent with the results using data on average cost per employee.

5 Concluding remarks

This paper has examined German affiliates of Swedish MNEs in the manufacturing sector. We have used data that have been collected at the level of affiliate in order to assess whether German affiliates differ systematically from affiliates located in other countries and whether labour costs play a role in the Swedish MNEs decision to locate production in Germany. We have found that the German affiliates do differ from affiliates located in other European countries as well as other high-income countries outside Europe with respect to labour productivity, R&D intensity, skill-intensity and export propensity. German affiliates are on average more R&D and skill intensive and exhibit a higher labour productivity. At the same time they seem to be more oriented towards selling their output in the local German market rather than in foreign markets.

We have also found some evidence suggesting that labour costs do play a role in the Swedish MNEs' decision to locate in Germany. According to our results, both the level of wage costs in Germany and in other potential locations in high-income Europe in which the firm has not already set up production plants affect this decision. In this respect, relative wage costs matter for whether the Swedish firms invest in Germany or in other European countries. Furthermore, we have estimated positive cross-wage elasticities with respect to other high-income countries in Europe in which the firm is already producing. This implies that from the point of view of the Swedish MNEs, German workers are substitutes for workers in other high-income countries in Europe.

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Appendix

Table A1: Results for logit and fixed-effect OLS estimation based on unit labor cost data

| Selection model | Logit | | Heckman | |
|-------------------------------|--------------|---------|----------------|---------|
| $\ln w^G$ | -0.57 | (-1.19) | -0.15 | (-0.54) |
| $\ln w^{min}$ | 0.54 | (1.13) | 0.17 | (0.58) |
| Log likelihood | -418.6 | | -718.4 | |
| Observations | 628 | | 582 | |
| Pseudo R ² | 0.001 | | - | |
| Labour demand equation | OLS | | Heckman | |
| $\ln w^G$ | 0.26 | (0.75) | -0.14 | (-0.26) |
| $\ln w^{HE}$ | 0.39 | (1.35) | 0.47 | (1.14) |
| lambda | - | | 0.49*** | (5.08) |
| Observations | 186 | | 186 | |
| T-bar | 2.8 | | - | |
| Adj R ² (within) | 0.17 | | - | |

Note: Figures within parentheses are t-statistics. Asterisks denote significance levels: *** (1%), ** (5%), * (10%). The regressions also include time dummies. The logit and Heckman estimations are based on the assumption that observations are independent across firms, but not necessarily within firms. The OLS estimations are based on a model with firm-specific fixed effects.