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Multinational Firms and Job Tasks

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Abstract

We use Swedish matched employer-employee data to analyze the impact of multinational activity and foreign acquisitions on the relative demand for different job tasks. We contribute to the literature by using a conceptualization from the recent literature in international economics and define the division of labor in terms of job tasks. Our econometric results show that multinational firms, both foreign and domestic, are associated with higher shares of non-routine tasks and tasks requiring personal interaction than local firms. Moreover, acquisitions of local firms by both foreign and domestic MNEs tend to increase the relative demand for non-routine and interactive job tasks, i.e. tasks that are not easily offshored. As a comparison, dividing labor according to educational attainment does not capture the found effects on relative labor demand.

JEL: J23, F16, F21, F23

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I. Introduction

The importance of multinational enterprises (MNEs) has raised concerns among policy-makers. MNEs are sometimes argued to be more inclined than local firms to downsize less efficient plants, offshore jobs, or even close down entire plants and firms. Some of this fear could be justified as MNEs have good opportunities to restructure their production to benefit from location advantages around the world.

Unskilled employees are typically seen to be in danger in developed countries where multinational firms locate knowledge intensive production, using highly educated labor, while offshoring low-skilled jobs elsewhere. However, studies on foreign direct investment (FDI) find small if any effects of outward investments on home country demand for white- and blue-collar workers (Slaughter, 2000; Head and Ries, 2002). Moreover, acquisitions of local firms by foreign multinationals have little impact on the relative demand for different employees (e.g. Almeida, 2003; and Huttunen, 2007). Finally, offshoring has also a small effect on relative labor demand (e.g. Ekholm and Hakkala, 2005; Andersson and Karpaty, 2007; Becker et al., 2007).

One reason for the lack of empirical support could be that most previous studies examine the demand for low- and high-skilled labor, often measured in terms of education. Recent literature emphasizes that international trade increasingly entails exchanges of bits of value, added by different job tasks in different locations, rather than complete finished goods or even complete intermediate goods. (e.g. Jones and Kierzkowski, 2001 and Grossman and Rossi-Hansberg, 2006; 2008). Other characteristics than skill-intensity may determine if tasks are located away from headquarters and main production facilities (e.g. Markusen, 2006; and Blinder, 2006).

In particular, easily codified routine tasks which do not require extensive monitoring or personal interaction can presumably relatively easily be offshored. If

MNEs relocate some operations, these may be skill-intensive but easily offshored tasks. On the other hand, some tasks carried out by low-skilled workers may not be offshored since they require proximity to other parts of the production. Shifting the focus from skills to job tasks may allow us to discover unknown effects of increased inward FDI on domestic employment.

In this paper, we revisit the question how multinational ownership affects relative labor demand. We use a conceptualization from the recent literature and define the division of labor in terms of job tasks. There are several reasons why FDI may affect demand for different job tasks. The underlying assumption is simple: we would expect multinational firms and non-multinational firms to engage differently in offshoring, with resulting differences in demand for workers engaged in activities that can be offshored.

In our empirical analysis, we use unique and comprehensive Swedish matched employer-employee data for the period 1996 to 2005. The data covers all Swedish firms with at least 20 employees and we have detailed information on occupations for a representative sample of roughly 50 percent of the labor force.

We contribute to the literature in several respects. We first examine differences in the composition of job tasks between local firms and MNEs, Swedish as well as foreign-owned ones, and continue by analyzing the effect of different types of acquisitions on relative labor demand. Our results indicate that multinational firms, regardless of nationality, have a higher share of employees doing non-routine tasks or tasks requiring personal interaction. We address the issue of causality between ownership changes and changes in the job task composition by using a propensity score matching method. In explaining the differences we pay special attention to the role of offshoring and firm characteristics. Finally, the effects found by using job task

composition are not captured by a distinction of the labor force according to educational attainment, the standard measure in previous studies.

The rest of the paper is organized as follows. In the next section, we discuss the background to this paper and related empirical literature, section III describes the empirical approach, section IV presents the data and show descriptive statistics, V presents the results and VI concludes the paper.

II. Background and Related Empirical Literature

Most previous studies on foreign acquisitions and employment have focused on the total firm or plant level employment (e.g. Girma and Görg, 2004 and Bandick and Karpaty, 2007). Studies on relative demand for different skill groups are scarce and the results are ambiguous. Lipsey and Sjöholm (2008) examine the effect foreign acquisitions of Indonesian firms on employment of white- and blue-collar workers and find that foreign takeovers increase the number of blue-collar workers and have no or even a negative effect on white-collar workers. Slaughter (2000) and Head and Ries (2002) find small if any effects of outward FDI on home country demand for blue- and white-collar workers.

Two micro based studies use education rather than blue- and white-collar workers as a measure of skill. Almeida (2007) finds no significant effects of foreign acquisitions on the educational composition in Portuguese establishments, and Huttunen (2007) finds foreign acquisitions of Finnish establishments to marginally decrease the share of highly educated workers.

One reason why previous studies find no clear evidence on how foreign acquisitions affect the relative labor demand may be that the effects are not fully captured by defining skills in terms of education. The new paradigm in trade theory stresses that the relationship between the skill content of a job task and the suitability

of the job task being offshored is complex. For instance, Jones and Kierzkowski (2001) and Grossman and Rossi-Hansberg (2006; 2008) emphasize that trade increasingly entails exchanges of bits of value added by different job tasks in different locations rather than complete finished goods or even complete intermediate goods. Several authors argue that for these job tasks, other characteristics than skill-intensity are decisive whether they can be carried out at a longer distance from the headquarters and main production facilities. Levy and Murmane (2004) characterize offshorable tasks such that they can be summarized in deductive rules; Leamer and Storper (2001) defines them by the prevalence of codifiable rather than tacit information; and Blinder (2006) emphasizes the lacking requirement of physical contact or proximity. Many of the job tasks that are easily codifiable and do not require extensive monitoring or personal interaction are carried out by unskilled labor, but it is not a prerequisite. Some examples of job tasks that require education at post-secondary level but can easily be offshored are computer programming and analysis of x-ray pictures. Many Indian radiologists and computer engineers are already carrying out these job tasks for US and European firms. On the other hand, maintenance and cleaning work are examples of job tasks that rely on unskilled labor and that cannot be carried out from a distance.

Autor et al. (2003) develop a framework for the composition of job tasks to study how increased computerization has affected demand for different types of labor in the US. They classify job tasks into five different categories: non-routine analytical, routine cognitive, non-routine interactive, routine manual and non-routine manual. Routine tasks can be expressed as rules, implying that routine tasks are easily programmable and thus suitable for execution by computers or robots. Non-routine tasks, on the other hand, are not easily codified and taken over by computers. Autor et

al. show that there has been a large increase in the shares of non-routine analytical and non-routine interactive tasks in the US from 1960 to 1998, and particularly after 1980 with the strong increase in computer usage.

Becker et al. (2007) is to the best of our knowledge the only study that analyzes the relationship between offshoring and the home country composition of production in terms of job tasks rather than skill intensity of goods. They use a balanced panel of 490 German MNEs over the period 1998-2002 to examine how foreign employment affects the home country composition of job tasks. They find the proportion of home country non-routine and interactive tasks to increase with employment in foreign affiliates, especially for enterprises in the service sector. However, the effects are relatively small. Interestingly, there is no statistically significant association between offshoring and the share of blue- and white-collar jobs in the home country wage bill.

In this study, we approach the issue of globalization and labor demand by analyzing the effects of FDI on the firm-level composition of job tasks. Foreign acquisitions of domestic firms may affect the relative labor demand in several ways. Theories of ownership change emphasize that a takeover is often seen as an opportunity to restructure the operations of the target firm (Schleifer and Summer, 1988; and Bertrand and Mullainathan, 2003) and an effective way of reducing of administrative and managerial employment (see e.g. Scheifer and Vishny, 1988 and Lichtenberg and Siegel, 1990).

If the acquiring firm is a foreign multinational, we could also expect some rationalization of headquarter services leading to relocation of management and other overhead functions to the headquarters that are located abroad. The relocated job tasks would typically require close interaction with the other headquarter activities.

It is also possible that an acquisition by a foreign firm increases the demand for skilled workers conducting non-routine and interactive job tasks. When entering new markets, the foreign MNEs generally need to possess some firm-specific advantages to overcome the disadvantages of being an outsider. The foreign acquirer may increase the demand for skilled labor required to operate a firm with superior technology or intangible knowledge capital on the production spot.

In this paper, we also analyze if takeovers of local firms by foreign or domestic multinationals can trigger a change in the relative demand for labor through increased offshoring. Multinational firms are increasingly engaged in international production networks and may find it relatively easy to switch activities to plants in other countries. Cost-reducing offshoring is assumed to impact labor demand similarly to factor-biased technological change. Offshoring increases productivity by increasing the net revenue per unit of factor input. The effect on productivity will not necessarily be uniform across different employees. For instance, when labor-intensive assembly activities are being offshored, the productivity of workers involved in headquarter activities and intermediate input production is likely to increase, whereas the productivity of domestic assembly workers is unaffected. Thus, a foreign takeover could trigger a change in the relative demand for different tasks depending on their skill intensity and how easily they are offshored.

III. Econometric Approach

Our main purpose is to estimate the impact of ownership and ownership change on the relative demand for different job tasks. Based on a translog cost function approach used in previous studies on relative labor demand, we estimate the following reduced-form equation:

$$\psi_{ijt} = \alpha_0 + \alpha_1 \log(k)_{jt} + \alpha_2 \log(Y)_{jt} + \alpha_3 Z_{jt} + \alpha_4 (\text{owne})_{jt} + \alpha_5 \log(w_i / \bar{w}_{-i})_{jt} + d_j + d_t + \varepsilon_{it} \quad (1)$$

where ψ_{ijt} is the wage cost share of employees carrying out task i in firm j at time t , k_{jt} is the capital-output ratio, Y_{jt} is output, Z_{jt} a variable capturing factor-biased technical change and $(w_i / \bar{w}_{-i})_{jt}$ is the average wage of employees carrying out task i in firm j relative to the average wage of the other employees. Our firm-level measure on the cost share for a particular type of job tasks, such as non-routine or interactive tasks, is constructed by multiplying the wages in different occupations with the share of the job tasks in that occupation and then aggregate the wage cost shares for task i to the firm level.

We use real value added as a proxy for Y_{jt} and R&D expenditures to sales as a proxy for Z_{jt} .¹ Capital is considered to be a quasi-fixed factor and the value of α_1 indicates whether capital substitute for or complement labor carrying out task i . The value of the parameter α_3 depends on whether technical change is biased towards or away from the usage of labor carrying out task i . Variables d_j , d_t , and ε_{it} are firm-specific time invariant effects, time-specific effects and an i.i.d. error term, respectively. To allow for within firm correlation over time, standard errors are adjusted for clustering at the firm level.

Equation (1) is a standard model in related literature studying the effect of offshore expansions on the onshore relative labor demand (see e.g. Slaughter, 2000; Head and Ries, 2002; Hansson, 2005 and Becker et al., 2007).² Our main focus is on

¹ See Table A1 in the appendix for construction of the variables.

² These studies include a variable capturing MNE employment in offshore locations. Note that the relative wage term in equation (1) may give rise to a potential endogeneity bias because wages and employment are jointly determined and because wages also enter the dependent wage cost share variable. We follow the praxis of the previous studies and omit this variable since the variation in

the effect of ownership and changes in ownership on the relative demand for different job tasks. We use a dummy variable *Owner*, which is equal to one if a firm is foreign-owned, and zero otherwise, or when we compare multinationals to non-multinationals firms, it is equal to one if the firm is a multinational. In the estimations examining the effect of ownership changes, *Owner* is instead an indicator variable taking the value of one in the period in which an ownership change is recorded and thereafter.

In the first estimations, we examine the relative demand for different job tasks in domestic versus multinational (foreign) firms for a sample of firms that remain the same ownership over the entire period. Firms changing ownership are excluded from these estimations.³ To distinguish between different types of firms, we divide our sample into three groups: foreign-owned MNEs, domestically-owned MNEs, and domestically-owned non-MNEs (which we also refer to as local firms). A firm is a foreign-owned MNE if more than 50 percent of the equity is foreign-owned.⁴ We define a domestically-owned MNE as a firm reporting positive exports to other firms within the corporation. Finally, firms reporting no such exports are classified as domestically-owned non-MNEs.⁵

In the second approach, we analyze the effect of an ownership change. We include all firms in the estimations except those that experience multiple ownership changes. We include firm-specific effects, and also time dummies to control for changes in the relative task demand that are common to all firms. We examine three different types of acquisitions: from a Swedish local to a MNE, from a Swedish local

relative wages between firms presumably reflects differences in skill composition rather than exogenous wage differences (see e.g. Slaughter, 2000; Head and Ries, 2002; and Becker et al., 2007).

³ In these regressions we include industry-specific effects but no firm-specific effects.

⁴ Statistics Sweden uses the internationally common 50 percent cut-off in defining foreign ownership. We are not able to study whether the results are sensitive to this definition. However, other authors have examined the sensitivity (see e.g. Huttunen, 2007; Martins, 2004; and Barbosa and Louri, 2002). These studies do not find the results to be sensitive to cut-off values.

⁵ Export information is available for firms with at least 50 employees or smaller firms with large sales. A few small multinationals might be classified as local firms, due to missing information on exports. The potential bias is likely to be of minor importance.

to a foreign MNE, and from a Swedish MNE to a foreign MNE.⁶ The first two types of acquisitions allow us to distinguish between effects of foreign ownership and multinational ownership in general. The last type of acquisitions allows us to examine if there is an effect of acquisitions on labor demand even in firms that are already multinational. The mean number of yearly acquisitions of Swedish local firms by foreign MNEs is 49 in our data. The number of Swedish local firms and Swedish MNEs acquired by foreign MNEs are 30 and 19, respectively.

In our main estimations on acquisitions, the estimated coefficient of the *Owner*-variable captures the average effect on relative demand for job tasks during the post-acquisition years. However, we will also include lagged *Owner*-dummies, which allow us to analyze if some changes occur instantly during the year of the acquisition or after one to two years after the ownership change.

An important econometric issue in estimating equation (1) concerns the selection of firms being acquired. The selection of firms that are acquired is unlikely to be random. If the targeted firms differ systematically from the non-acquired firms the estimated effect of acquisitions on the relative demand for different job tasks may suffer from a potential endogeneity problem. We use propensity score matching to take this problem into account (see e.g. Rosenbaum and Rubin, 1983). The idea is to reduce the bias from differences in firm characteristics between the treatment and the control group by comparing the outcomes for similar treated and non-treated observations, based on the pre-treatment characteristics. The matching is based on a rich set of observable firm characteristics and uses the algorithms provided by Becker and Ichino (2002) and Leuven and Sianesi (2003). We use the Nearest-Neighbor without replacement method.

⁶ The structure of the acquisition data sets is as follows: the data on Swedish local firms acquired by a MNE consist of firms that are either local during the entire period or being acquired by a MNE at some time during the period. The same structure applies to the other two forms of takeovers.

We first calculate the probability of a firm being acquired for each of our three different ownership change types. Each treated (acquired) firm is then matched with a non-treated (non-acquired) firm that is as “identical” as possible. We estimate several propensity scores using a variety of lagged covariates, but only consider those satisfying the balancing property of the propensity score.⁷

Having obtained a new control group of firms and, thus, a propensity score matched based sample, we proceed to estimate the impact of different types of acquisitions on the relative demand for job tasks. We compute the effect of takeovers by an acquisition dummy variable, basically using a difference-in-difference matching estimator that controls for the possible bias due to selection on unobservables (Heckman et al., 1997).

As discussed in Section IV, a potential determinant to relative demand for job tasks is the ability to engage in offshoring activities. We analyze the role of offshoring by adding a firm-level measure of offshoring, defined as the share of imported intermediate goods in total sales, as an additional explanatory variable.⁸ We also differentiate between offshoring activities to low- and high-income countries.. Offshoring to high-income countries (OECD countries) is roughly ten times higher than offshoring to low-income countries (non-OECD countries). In addition to offshoring, we examine if other firm characteristics, such as size, human capital, profits, firm age and export intensity can explain firm-level differences in the demand for job tasks.

⁷ The test examines treated and non-treated observations in different sub-samples (blocks) of observations. The number of blocks is determined by data and the estimated score. Within these intervals, the algorithm tests that the means of the covariates in the probit do not differ between treated and control observations. In testing the balancing property, only observations in the region of common support are included. Table A2 in the Appendix shows that the bias in the control variables is substantially reduced, although a statistical significant differences remains for some of the variables in some of the matching.

⁸ This is a common way of measuring offshoring in the related literature (see e.g. Ekholm and Hakkala, 2005). As a robustness check, we also make use of a broader measure of offshoring where we add import of consumption goods.

Finally, we will estimate alternative specifications to further examine the robustness of our results. Most importantly, we will use two alternative dependent variables: employment shares and education cost shares. Using the latter measure allows us to compare our results to previous studies and to conclude whether the use of job task cost shares contribute to our understanding of FDI and relative labor demand. A description of the included variables is presented in Table A1 in the appendix.

IV. Data and Descriptive Statistics

The analysis is based on three register-based data sets from Statistics Sweden spanning the period 1996-2005. The financial statistics (FS) contain detailed firm-level information on all Swedish firms. Variables such as value added, capital stock (book value), number of employees, wages, R&D, ownership status, sales and industry affiliation are included. The Regional Labor Market Statistics (RAMS) includes data on all establishments and adds establishment information on the labor force composition with respect to educational level and demographics.⁹ The individual wage statistics database (LS) contains detailed information from official registers on a very large representative sample of employed individuals. The LS has approximately 2 million observations per year, which is roughly 50 percent of the Swedish labor force. Examples of variables included are full-time equivalent wages, education, job types and gender.

Data for the firm-level measure of offshoring comes from the Swedish Foreign Trade Statistics, collected by Statistics Sweden and available for the period 1997-2005 by the country of origin. Data on imports from outside EU consist of all trade

⁹ The plant level data are aggregated to the firm level.

transactions and are based on compulsory registration to the Swedish Customs. The trade data with countries inside EU are available for all firms with a yearly import value of at least 1.5 million SEK. Despite this cut-off limit, 97 percent of the total trade with countries within EU is covered in the data according to figures from Statistics Sweden. However, the number of observations is smaller in the estimations where the offshoring variable is included due to this limitation.¹⁰

All our data sets are linked together with unique identification numbers. To make the sample of firms consistent throughout the time period, we restrict our analysis to firms with at least 20 employees. The total number of firm-year observations in the data on firms that do not change ownership is equal to 28,646. The corresponding figures for our three different acquisition samples are 17,832 for Swedish local firms to MNEs, 2,287 for Swedish MNEs to foreign owned and 17,086 for Swedish local firms to foreign owned.

To analyze how the composition of different job tasks is affected by an ownership change, we follow Autor et al. (2003) and Spitz-Oener (2006) and use a classification of professions according to the intensity of routine and non-routine tasks. In addition, we use a classification of professions according to the intensity of tasks that require interaction between individuals. The classification of tasks is based on information from a German work survey on workplace-tool use that has been codified by Becker et al. (2007) and which can be translated to the international standard classification of occupations (ISCO-88), available in our data on individuals.

Becker et al. (2007) discern non-routine tasks that involve non-repetitive work methods versus routine tasks, and interactive tasks that require personal interaction with co-workers or third parties versus non-interactive tasks. An occupation with

¹⁰ To take this into account, we also re-estimate our regressions on firms that are included in the trade statistics (around 60% of all firm-year observations).

many non-routine tasks typically relates to a lack of deductive rules and codifiable information, while an occupation with many interactive tasks relates to the potential importance of physical contact and geographic proximity. The measure is constructed as a share of the number of non-routine (or interactive) job tasks in the total number job tasks of an occupation.

Table 1 presents the shares of non-routine and interactive job tasks in different occupations at the 2-digit level of ISCO-88. The share of non-routine tasks is highest among science-based occupations and lowest in some occupations in agriculture, fishery, mining, construction, manufacturing and transport. The share of interactive tasks is high in science-based occupations but also in education occupations. It is low in industries with a low share of non-routine tasks but also in, for instance, machine operating, handicraft, and some sales oriented occupations. The general impression is that there is an overlap but not a perfect one in the measures of non-routine tasks and tasks requiring personal interactions.

--Table 1 about here--

Figure 1 shows the development of employment in terms of the shares of non-routine tasks and tasks requiring personal interaction in Sweden. We have also included the share of the workforce with higher education, measured as the share with post-secondary education, in the figure. The shares of non-routine and interactive tasks have been remarkable stable over the period 1996-2005. About 42 percent of job tasks are non-routine tasks and 33 percent are tasks requiring personal interaction. The share of workers with higher education has, however, increased substantially from about 12 to 19 percent. This increase in education is partly a result of retirements of

old cohorts with general low levels of education, and entrance of younger more educated cohorts of employees.

--Figure 1 about here--

Table 2 shows the job task composition in firms with different ownership. The table also shows how the level of offshoring, proxied by the share of intermediate inputs in total sales, varies with firm types. Standard deviations are relatively large which means that the variables are not significantly different between different types of firms. Bearing this in mind, the point estimates indicate that offshoring is higher in multinational firms than in local firms and also higher in foreign multinational firms as compared to Swedish multinational firms. In this paper, we are interested to examine whether these differences in offshoring are corresponded by similar differences in job tasks.

--Table 2 about here--

As expected, multinational firms, Swedish and foreign-owned, have higher shares of both non-routine tasks and tasks that require personal interaction than Swedish local firms. In terms of non-routine tasks the differences are rather large; foreign firms have about seven percentage points (0.47-0.40) higher share of non-routine tasks than domestic firms, but again, standard deviations are large and the difference is not statistically significant. Multinational firms have also a higher share of job tasks that require personal interactions and a higher share of employees with tertiary education. The difference for these two measures are, however, considerably

smaller than the difference in non-routine tasks. The difference between Swedish and foreign MNEs is very small for all different measures.

An alternative approach to studying the effect of ownership on job tasks is to examine different types of acquisitions. If multinationality has an effect on the job task composition, we would expect to see a change in the composition after an acquisition of a local firm by a multinational. Table 3 shows some descriptive statistics on different types of acquisitions and their effect on the labor force composition.

-- Table 3 about here--

Starting with acquisitions of local firms by MNEs (Swedish and foreign) it is seen by comparing Tables 2 and 3 that the targeted local firms have higher than average shares of non-routine tasks, and about average shares of tasks that require personal interactions, and workers with higher education. The targeted firms are engaged in offshoring to the same extent as non-targeted firms. There are little changes in the targeted firms after the acquisitions and none of the changes are statistically significant.

The other types of acquisitions, from Swedish local firms or Swedish MNEs to foreign ownership, show a similar pattern where the targeted firms are similar to the average firms of the same type of ownership and where there are very small and statistically insignificant changes after ownership changes. It might be interesting to note that all types of ownership changes are followed by a higher share of workers with higher education.

To sum up, our descriptive statistics show that there are some indications of a higher share of non-routine and interactive job tasks in multinational firms than in

local firms but the differences are not statistically significant. There are no clear post-acquisition changes in job tasks composition. We next proceed with an econometric analysis to shed further light on these issues.

V. Results

Examining a possible link between ownership and job tasks

We start in Table 4 by examining the composition of job tasks in foreign versus domestic firms, and in multinational versus non-multinational firms, for a sample of firms that have the same ownership over the entire period. The first estimation shows that foreign firms have on average about 3.7 percentage points more non-routine tasks than domestic firms even after controlling for industry and time effects. The high share of non-routine tasks seems to be partly explained by differences in firm characteristics: including firm characteristics in the estimation in column 2 reduces the foreign dummy variable but the difference is still 2.4 percentage points and statistically significant.

The group of comparison in estimations one and two include domestic local firms as well as domestic MNEs. Estimation three and four distinguish instead between local firms and MNEs where the latter group includes both domestic and foreign firms. There is again a difference in the task composition between different types of firms: multinational firms have between 2.6 and 4.3 percentage points more non-routine tasks compared to local firms.

The estimated coefficients on job tasks in different firms can be related to Figure 1 and Table 1 which showed that non-routine tasks constitute around 42 percent of total tasks. It seems reasonable to conclude that the 2.4 – 4.3 percentage points higher share of non-routine tasks in foreign firms and in MNEs is relatively small but not negligible.

Estimations five to eight use our second measure on job tasks, the share of tasks requiring personal interaction. The previous results do not change qualitatively: foreign firms have a higher share of job tasks requiring personal interaction than domestic firms and multinational firms have a higher share than local firms. The relatively small size of the coefficients for foreign ownership and multinationality indicates smaller differences in the share of tasks requiring personal interaction than in the non-routine tasks.

--Table 4 about here--

We proceed to analyze whether an ownership change from domestic to foreign, or from domestic local to multinational, affect the relative demand for tasks. As discussed in section II, a change from domestic to multinational might change the demand for tasks as a result of increased specialization, restructuring and offshoring. We would then expect the relative demand for tasks that are not easily offshored, non-routine tasks and tasks requiring personal interaction, to increase after the acquisition. We also analyze foreign acquisitions of domestic MNEs. We would expect to see small, if any, changes in the demand for tasks after this type of acquisition, since it is an ownership change from one type of MNE to another. It is possible, however, that an acquisition leads to some restructuring that affects the relative demand for tasks also in acquired MNEs. For instance, foreign owners may shift some headquarter services involving more advanced job tasks to the headquarters located abroad.

The results in Table 5 show that when ownership changes from Swedish local to MNE (domestic or foreign), the demand for non-routine tasks increases. The magnitude is rather small with an increased demand for non-routine tasks by about 1

percentage point (see column 1). There is no effect of an ownership change from local to foreign ownership or from domestic MNE to foreign ownership. The results for the demand for tasks requiring personal interaction differ from the results for non-routine tasks. The estimated coefficients for the three types of acquisitions are statistically insignificant in all regressions.

--Table 5 about here--

--Table 6 about here--

As discussed in Section III the estimations in Table 5 suffer from a potential selection problem. In Table 6 we report the estimations on a propensity score matched sample of firms. The results based on the matching method differ from the estimations in Table 5 and are statistically more significant. A change in ownership from local to MNE increases the demand for non-routine tasks by 1.3 percentage points, and for interactive tasks by about 1 percentage point. The change from domestic local to foreign multinational implies almost as large changes. As expected, the ownership change from domestic multinational to foreign multinational is not associated with any changes in the relative demand for tasks. As seen in columns 7 to 9 the effects are significant but smaller for the measure of interactive job tasks.

Columns 4 to 6 in Table 6 show how the effect of acquisitions on job tasks evolves over time. The results indicate that the effect of an ownership change is rather immediate, taking place mainly during the same year as the acquisition and one year after. The result suggests that possible adjustment costs involved do not prolong the change and that the acquisitions trigger MNEs to do organizational changes that do not require long time to be realized.

Trying to explain the differences

The results in Tables 4, 5 and 6 suggest that multinational firms, domestic or foreign owned, have a higher share of non-routine tasks, and acquisitions of local firms by MNEs increase the demand for non-routine tasks and tasks requiring personal interaction. There are different possible explanations for these results. As discussed in Section II, a potential important determinant to the relative demand for different job tasks is the ability to engage in offshoring activities. Table 2 provided some evidence that MNEs and local firms differ in their degree of offshoring. To examine the hypothesis further, we include measures on offshoring, defined as the share of imported intermediate goods in total sales. We also distinguish between offshoring to low- or high-income countries to examine the importance of wage-cost reducing offshoring.¹¹

-- Table 7 about here--

Columns one and four in Table 7 for the stock of firms indicate that offshoring impacts the composition of job tasks. It is perhaps surprising that the coefficient of the offshoring variable is negative, indicating that a higher level of offshoring implies a lower share for non-routine tasks. One percent increase in offshoring reduces the share for non-routine tasks by about 0.4 percent. If offshoring is driven by lower labor costs then we would expect it to increase rather than decrease the demand for non-routine tasks. A closer look at the offshoring measure provides us with an explanation for the results. As previously mentioned, most offshoring is to other high-income

¹¹ High income countries are OECD countries and low income countries are non-OECD countries.

countries. We therefore proceed with estimations where offshoring is divided between high- and low-income countries. The results in columns 2 and 5 show that offshoring to high-income countries reduces the demand for non-routine tasks in foreign and all multinational firms, whereas offshoring to low-income countries has no statistically significant effect. Hence, imports of intermediate goods from other high-income countries seem to substitute for more advanced job tasks.

However, even after controlling for offshoring, foreign firms have a higher share of non-routine tasks than domestic firms and MNEs a higher share than non-MNEs. The estimated effects are smaller than in Table 4 but only marginally smaller. This indicates that the effect of offshoring is similar across ownership groups. A further confirmation of this is seen in the statistically insignificant interaction variables between foreign or multinational ownership and offshoring (columns 3 and 6).

In columns 7 to 9 in Table 7, we investigate the impact of offshoring in the acquisition estimations. The offshoring variable is not statistically significant but the estimated coefficient for the acquisition variable changes. The ownership change from local to multinational is still associated with an increase in the demand for non-routine job tasks, but the effect is somewhat reduced. However, the ownership change from domestic to foreign is not associated with an increase in the demand for non-routine tasks in these estimations. One possible reason for these changed results could be that the sample is reduced due to the limited availability of the offshoring variable, as previously discussed. We therefore estimated the reduced sample without the offshoring variable. The coefficients of ownership variables were identical to the ones in columns 7 to 9 (not shown) suggesting that the change in the results is caused by the sample reduction rather than by the inclusion of the offshoring variable.

Using our measure of tasks requiring personal interaction as a dependent variable generates the same results as in Table 7; offshoring has a negative effect on the share of interactive tasks but no major impact on the coefficients for foreign and multinational ownership (not shown).¹²

Another plausible explanation for the results is that ownership is associated with firm size and that firm size has a separate impact on the demand for tasks. Large firms might for instance have a very different structure of production and labor force compared to small firms and thereby a different demand for tasks. There could also be other firm characteristics that affect labor demand and that are not controlled for in the previous estimations. We therefore include a variable on firm size, measured as the number of employees. In additional estimations, we include a whole set of firm characteristics, including firm size, share of employees with lower secondary education, share of employees with tertiary education, firm age, total firm sales, firm profits, share of women, share of blue-collar workers and share of exports in sales.

-- Table 8 about here--

As seen in columns 1 to 4 in Table 8, the stock estimations do not change qualitatively: foreign firms and MNEs have a higher share of non-routine tasks after controlling for firm size and other characteristics. It may be noted that large firms have less non-routine tasks, which may be explained by economies of scale in overhead functions.

The results in columns 5 to 10 in Table 8 indicate that coefficients on the dummy variables capturing ownership changes remain in line with our previous

¹² We did also try with a broader measure of offshoring, constructed as imports of both intermediate and consumption goods. The results remained largely unchanged.

findings when we include firm size, but are reduced somewhat when we include other firm characteristics. We have also included the additional firm-level variables in estimations where the costs share of tasks requiring personal interaction is the dependent variable. Including firm size made estimated coefficients on all acquisitions positive and statistically significant (not shown). The conclusion is that firm size and other firm characteristics have an affect on the task composition but that there still remains a difference between ownership types even after controlling for these characteristics.

An issue related to size is that we estimate our regressions on firms with at least 20 employees. To take into account that individuals in smaller firms are sampled, we examine the effect of ownership and tasks only in large firms. The results based on firms with at least 50 employees remained very similar to results on the total sample of firms (not shown).

Additional robustness checks

An important question is whether dividing labor according to job tasks contributes anything new to our understanding about the effects of FDI on labor demand. To examine this issue further, we follow the common praxis of the previous literature and define our dependent variable in terms of educational attainment. In columns 1 to 5 in Table 9 we show the results for the estimations using the cost share of employees with tertiary education as the dependent variable. Column 1 shows that the foreign ownership dummy variable is not significant. The MNE dummy variable is positive and significant in column 2. However, the size is less than half of the coefficient in the estimation using the cost share of non-routine tasks in Table 4. Interestingly, in columns 3 to 5, we see that none of three ownership changes affect the demand for

workers with different education. Hence, the results suggest that the significant effects of foreign or multinational ownership and ownership changes found in Tables 4 and 6 do indeed capture a labor market aspect that is not captured by a distinction of the labor force according to education.¹³

Since our dependent variables are defined as cost shares, a part of the effect of ownership may be due to effects on wages rather than employment. Previous studies have shown that the ownership change may affect wages in the acquired firm (e.g. Girma and Görg, 2007 and Huttunen, 2007). Heyman et al. (2006) use the same data source as this study for the period from 1996 to 2000 and find that acquisitions increase wage dispersion primarily by increasing wages for high-skilled employees. They also find that the positive impact on wages is concentrated to CEOs and other managers, whereas other groups are either negatively affected or not affected at all. These occupations are typically characterized by non-routine and interactive job tasks and it is therefore possible that our results are also affected by the wage effects.

In order to investigate whether our results are due to wage effects we run regressions using employment shares instead of labor cost shares as dependent variables. As seen in columns 6 to 7 in Table 9, foreign or multinational ownership is still associated with higher shares of non-routine and interactive job tasks, but the coefficients are marginally smaller than in Table 4 suggesting that a part of the difference is due to higher wages in MNEs. Columns 8 to 10 in Table 9 show that the change in ownership from local to multinational, or from local to foreign increases the share of employees with non-routine job tasks. Here as well the coefficients are smaller than in Table 6 indicating that part of the effect could be due to the fact that acquisitions impact wages unequally across employment groups. However, an

¹³ We did also try with other measures on education but with the same insignificant difference between different types of firms.

important part of the effect seems to be explained by changes in employment composition.

--Table 9 about here--

Our third alternative for dependent variable is based on a more conservative classification where fewer tasks are regarded as non-routine and interactive (Becker et al., 2007). Using this classification changed the results for personal interaction: the coefficients were not statistically significant in the estimations comparing foreign and domestic firms and multinational and local firms (not shown). The coefficients for MNE and foreign ownership in the acquisition estimations remained statistically significant but at a lower significance level. The results when we used non-routine tasks as dependent variable remained largely unchanged although there was a minor decline in the estimated coefficients. For instance, the coefficient for foreign ownership declined from 2.4 (Table 4) to 2.1, and the coefficient for MNE ownership from 2.6 to 2.3.

Finally, we have tried alternative specifications of the set of independent variables. For instance, unlike our study most previous studies do not include a variable for technology. Dropping our variable on R&D intensity did not have any major impact on the results. Moreover, we have followed previous studies and excluded the relative wage from the estimations because of the obvious risk of an endogeneity problem. Including the relative wage increase the coefficients on the ownership variables slightly but have no qualitative effect on the results (not shown). The relative wage variable is negative as expected.

VI. Concluding Remarks

FDI has increased rapidly over the last decades. It is often assumed that this development will decrease demand for unskilled employees and increase demand for skilled employees in developed countries. However, previous empirical studies find small effects of FDI on relative labor demand. One possible reason could be that the distinction of high- and low-skilled employees is not the most relevant distinction in the context of FDI and labor markets.

In this paper, we have used a conceptualization from the recent literature and define the division of labor in terms of job tasks, to examine the effect of inward FDI on the demand for labor. We first examine the differences in job task compositions between foreign and local Swedish firms and between multinational and local Swedish firms. We proceed with the effect ownership changes from local to MNEs and from domestic, local or MNE, to foreign.

Multinational firms, both foreign and domestic, have higher shares of non-routine tasks and tasks requiring personal interaction than local firms. For instance, the share of non-routine tasks is between 2.6 and 4.3 percentage points higher in MNEs than in local Swedish firms, which can be compared to the aggregate share of non-routine tasks at around 42 percent in Swedish industry. Acquisitions of local firms by both foreign and domestic MNEs tend to increase the relative demand for non-routine and interactive job tasks, and the effect of an acquisition is rather immediate, with the largest impact taking place within two years after the acquisition. As expected by the theory on multinational firms, acquisitions of Swedish MNEs by foreign MNEs have no effect labor demand.

We also define our dependent variable in terms of educational attainment, which is a standard approach in previous studies. The results suggest that the effects

found by using job task composition are not captured by a distinction of the labor force according to educational attainment.

To sum up, FDI in a developed country such as Sweden increase relative demand for non-routine and interactive job tasks, that is, job tasks that are assumed to require proximity to other production activities and that are not easily offshored. By shifting focus from the comparative advantages measured in terms of skills to the content of job tasks we contribute with new knowledge on effects of increased inward FDI on domestic employment.

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Table 1. The shares of non-routine and interactive tasks in different occupations (%).

	Non-routine	Interactive
Physical, mathematical and engineering science professionals	100.0	65.9
Life science and health professionals	90.4	57.9
Physical and engineering science associate professionals	79.7	48.0
Corporate managers	78.4	61.0
Other professionals	63.0	49.3
Teaching professionals	61.2	65.7
Life science and health associate professionals	56.3	32.3
Legislators and senior officials	54.4	38.4
Other associate professionals	52.7	33.4
Office clerks	52.1	26.4
General managers	46.6	46.5
Stationary-plant and related operators	43.6	39.7
Metal, machinery and related trades workers	41.6	44.3
Precision, handicraft, printing and related trades workers	39.8	14.7
Teaching associate professionals	36.1	61.6
Personal and protective services workers	32.0	26.5
Customer services clerks	27.1	15.8
Extraction and building trades workers	21.4	34.6
Machine operators and assemblers	18.8	10.8
Other craft and related trades workers	17.7	14.7
Market-oriented skilled agricultural and fishery workers	10.8	23.8
Models, salespersons and demonstrators	8.1	15.1
Drivers and mobile-plant operators	6.3	30.3
Laborers in mining, construction, manufacturing and transport	2.5	12.4
Agricultural, fishery and related laborers	0.9	10.1

Figure 1. The shares of non-routine tasks, interactive tasks, and workers with higher education.

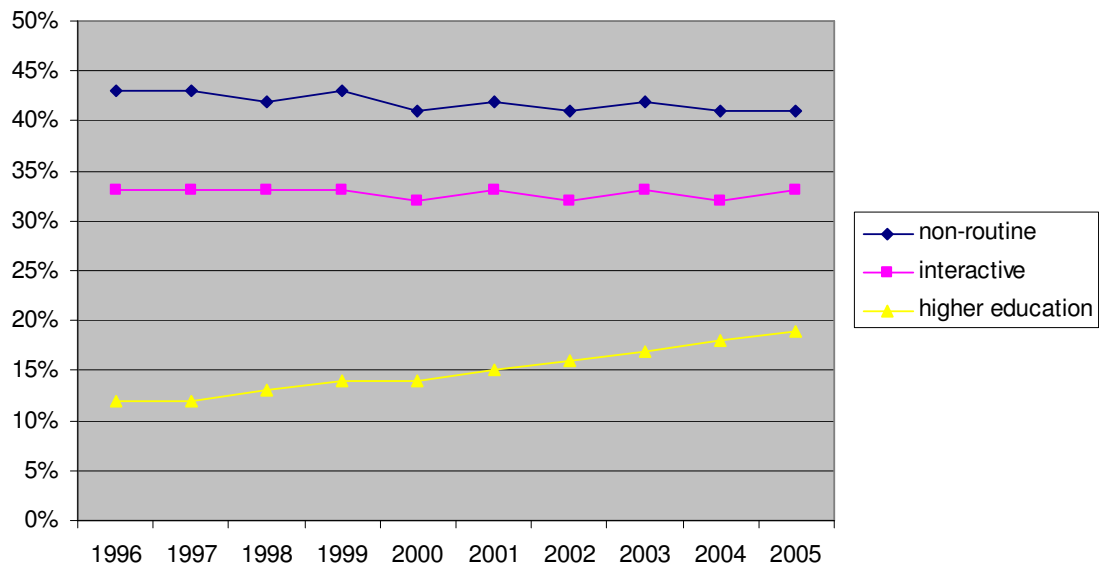


Table 2. Ownership, offshoring and job tasks (shares of total employees).

	Share of number of firms	Off- shoring	Non- routine	Personal interaction	Higher education
All firms		0.06 (0.12)	0.42 (0.20)	0.33 (0.12)	0.15 (0.18)
Swedish local firms	0.66	0.04 (0.10)	0.40 (0.20)	0.32 (0.12)	0.15 (0.19)
Swedish multinational firms	0.12	0.07 (0.11)	0.46 (0.19)	0.33 (0.12)	0.16 (0.17)
Foreign firms	0.22	0.10 (0.16)	0.47 (0.18)	0.34 (0.11)	0.16 (0.16)

Note: Offshoring is imported intermediate goods as a share of sales. Higher education is the share of employees with post-secondary education. Offshoring, Non-routine tasks, and Personal interaction are all defined as shares of total employees. Standard deviations are shown within brackets.

Table 3. Acquisitions, offshoring and job tasks.

	Off- shoring		Non- routine		Personal interaction		Higher education	
	Before	After	Before	After	Before	After	Before	After
Swedish local firms to MNE	0.04 (0.09)	0.04 (0.09)	0.43 (0.20)	0.44 (0.21)	0.32 (0.12)	0.33 (0.12)	0.14 (0.16)	0.16 (0.17)
Swedish local firms to foreign	0.04 (0.10)	0.05 (0.11)	0.43 (0.19)	0.42 (0.19)	0.32 (0.12)	0.32 (0.12)	0.13 (0.15)	0.15 (0.15)
Swedish MNE to foreign	0.09 (0.13)	0.08 (0.12)	0.43 (0.17)	0.45 (0.16)	0.32 (0.11)	0.33 (0.10)	0.12 (0.14)	0.15 (0.16)

Note: Offshoring is imported intermediate goods as a share of sales. Higher education is the share of employees with post-secondary education. Offshoring, Non-routine tasks, and Personal interaction are all defined as shares of total employees. Standard deviations are shown within brackets

Table 4. The effect of ownership on the demand for non-routine and interactive job tasks. Firm-level estimates 1996-2005.

	1	2	3	4	5	6	7	8
	Non-routine				Interactive			
Foreign Firm	0.037 (0.004)***	0.024 (0.004)***	--	--	0.014 (0.003)***	0.009 (0.003)***	--	--
Multinational	--	--	0.043 (0.003)***	0.026 (0.004)***	--	--	0.017 (0.002)***	0.008 (0.002)***
Capital/sales	--	-0.009 (0.001)***	--	-0.009 (0.001)***	--	-0.003 (0.001)***	--	-0.003 (0.001)***
Value added	--	0.016 (0.001)***	--	0.015 (0.001)***	--	0.008 (0.001)***	--	0.008 (0.001)***
R&D/sales	--	0.111 (0.034)***	--	0.108 (0.033)***	--	0.070 (0.018)***	--	0.069 (0.018)***
Year dummies	Included	Included	Included	Included	Included	Included	Included	Included
Industry dummies	Included	Included	Included	Included	Included	Included	Included	Included
R2 adj.	0.52	0.54	0.52	0.54	0.45	0.46	0.45	0.46
No. of observations	28,567	27,746	28,567	27,746	28,567	27,746	28,567	27,746

Notes: The dependent variable in columns 1-4 is the wage cost share for employees with non-routine tasks. The dependent variable in columns 5-8 is the wage cost share for employees with interactive tasks. Robust standard errors, adjusted for clustering at the firm level within parentheses. *** indicate significance at the 1 %-level, ** significance at the 5 %-level and * significance at the 10 %-level.

Table 5. The effect of ownership changes on the demand for non-routine and interactive job asks. Firm-level estimates 1996-2005.

	1	2	3	4	5	6
	From local to MNE	Swedish local to foreign	From MNE to foreign	From local to MNE	Swedish local to foreign	From MNE to foreign
	Non-routine			Interactive		
Acquisition	0.008 (0.004)*	0.008 (0.005)	0.008 (0.007)	0.004 (0.003)	0.005 (0.004)	0.006 (0.005)
Capital/sales	-0.002 (0.002)	-0.002 (0.002)	0.008 (0.007)	-0.002 (0.001)	-0.002 (0.001)	-0.003 (0.003)
Value added	-0.011 (0.003)***	-0.012 (0.003)***	0.016 (0.006)	-0.007 (0.002)***	-0.007 (0.002)***	-0.007 (0.005)
R&D/sales	-0.003 (0.020)	0.002 (0.020)	0.031 (0.030)	-0.001 (0.012)	-0.000 (0.012)	0.017 (0.020)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
R2 (within)	0.01	0.01	0.03	0.01	0.01	0.02
No. of observations	17,268	16,534	2,232	17,268	16,567	2,232

Notes: The dependent variable in columns 1-3 is the wage cost share for employees with non-routine tasks. The dependent variable in columns 4-6 is the wage cost share for employees with interactive tasks. Acquisition takes the value of one in the acquisition period and thereafter, zero before. Robust standard errors, adjusted for clustering at the firm level within parentheses. *** indicate significance at the 1 %-level, ** significance at the 5 %-level and * significance at the 10 %-level.

Table 6. The effect of ownership changes on the demand for non-routine and interactive job tasks. Firm-level estimates 1996-2005 on a propensity score matched sample of firms.

	1	2	3	4	5	6	7	8	9
	From Swedish local to MNE	From Swedish local to foreign	From Swedish foreign to MNE	From Swedish local to MNE	From Swedish local to foreign	From Swedish MNE to foreign	From Swedish local to MNE	From Swedish local to foreign	From Swedish MNE to foreign
	Non-routine						Interactive		
Acquisition	0.013 (0.005)***	0.010 (0.005)**	0.007 (0.007)	--	--	--	0.007 (0.003)*	0.006 (0.004)*	0.005 (0.005)
Acquisition (t=0)	--	--	--	0.009 (0.004)**	0.006 (0.004)	0.008 (0.006)	--	--	--
Acquisition (t+1)	--	--	--	0.012 (0.005)**	0.006 (0.005)*	0.005 (0.007)	--	--	--
Acquisition (t+2)	--	--	--	0.008 (0.006)	0.002 (0.003)	0.008 (0.007)	--	--	--
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2 (within)	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.02
No. of observations	3,778	2,566	1,492	3,778	2,566	1,492	3,778	2,566	1,492

Notes: The dependent variable in columns 1-3 is the wage cost share for employees with non-routine tasks. The dependent variable in columns 4-6 is the wage cost share for employees with interactive tasks. Acquisition takes the value of one in the acquisition period and thereafter, zero before. Acquisition t=0 takes the value one in the acquisition period acquisition and zero otherwise. The other Acquisition ((t+1) and (t+2)) variables are defined accordingly. Firm controls are the same as in Tables 3 and 4, i.e log capital intensity, log value added and R&D intensity. Robust standard errors, adjusted for clustering at the firm level within parentheses. *** indicate significance at the 1 %-level, ** significance at the 5 %-level and * significance at the 10 %-level.

Table 7. The effect of ownership and ownership changes on the demand for non-routine job tasks. Firm-level estimates 1997-2005. Effects of offshoring.

	1	2	3	4	5	6	7	8	9
	Foreign firms vs. Domestic firms			MNEs vs. Swedish local firms			From Swedish local MNE to	From Swedish local to foreign	From Swedish MNE to foreign
Foreign Firm	0.019 (0.004)***	0.019 (0.004)***	0.017 (0.046)	--	--	--	--	--	--
Multinational	--	--	--	0.023 (0.004)***	0.023 (0.004)***	0.023 (0.004)***	--	--	--
Acquisition	--	--	--	--	--	--	0.011 (0.005)**	0.007 (0.005)	0.007 (0.007)
Offshoring	-0.041 (0.015)***	--	-0.054 (0.020)***	-0.043 (0.015)***	--	-0.048 (0.023)**	0.023 (0.041)	-0.027 (0.057)	-0.032 (0.048)
Offshoring high income countries	--	-0.043 (0.016)***	--	--	-0.044 (0.016)***	--	--	--	--
Offshoring low income countries	--	-0.009 (0.058)	--	--	-0.018 (0.057)	--	--	--	--
Offshoring Foreign firms	* --	--	0.025 (0.026)	--	--	--	--	--	--
Offshoring Multinational	* --	--	--	--	--	0.007 (0.026)	--	--	--
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Firm fixed-effects	No	No	No	No	No	No	Yes	Yes	Yes
R2	0.55	0.55	0.5	0.55	0.55	0.55	0.02	0.02	0.03
No. of observations	16,997	16,997	16,997	16,997	16,997	16,997	2,454	1,722	1,352

Notes: The dependent variable is the wage cost share for employees with non-routine tasks. Acquisition takes the value of one in the acquisition period and thereafter, zero before. Offshoring is a firm-level variable defined as the share of imported intermediate goods in total sales. High income countries are OECD countries. Low income countries are non-OECD countries. Firm controls are log capital intensity, log value added and R&D intensity. The acquisition estimations in columns 7-9 are based on the propensity score matched sample. Robust standard errors, adjusted for clustering at the firm level within parentheses. *** indicate significance at the 1 %-level, ** significance at the 5 %-level and * significance at the 10 %-level.

Table 8. The effect of ownership and ownership changes on the demand for non-routine job tasks. Firm-level estimates 1996-2005. Effects of additional firm characteristics.

	1	2	3	4	5	6	7	8	9	10
	Foreign Domestic firms	firms	vs. MNEs vs. Swedish local firms	Swedish local firms	From MNE	Swedish local to	From foreign	Swedish local to	From foreign	Swedish MNE to
Foreign Firm	0.025 (0.004)***	0.008 (0.002)***	--	--	--	--				
Multinational	--	--	0.027 (0.003)***	0.008 (0.002)***						
Acquisition	--	--	--	--	0.014 (0.005)***	0.010 (0.004)**	0.010 (0.005)**	0.008 (0.004)*	0.008 (0.007)	0.004 (0.006)
Log Firm size	-0.064 (0.004)***	--	-0.064 (0.004)***	--	-0.027 (0.009)***	--	-0.022 (0.011)**	--	-0.039 (0.017)**	--
Additional firm characteristics	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Firm fixed effects	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.56	0.79	0.556	0.79	0.02	0.29	0.02	0.17	0.04	0.38
No. of observations	27,746	27,160	27,746	27,160	3,778	3,769	2,566	2,564	1,492	1,490

Notes: The dependent variable is the wage cost share for employees with non-routine tasks. Acquisition takes the value of one in the acquisition period and thereafter, zero before. Firm controls are log capital intensity, log value added and R&D intensity. Additional firm characteristics include log firm size, share of high-skilled employees, share of low-skilled employees, firm age, sales per employee, profits per employee, share of women, share of blue-collar workers and export per sales. The acquisition estimations in columns 5-10 are based on the propensity score matched sample. Robust standard errors, adjusted for clustering at the firm level within parentheses. *** indicate significance at the 1 %-level, ** significance at the 5 %-level and * significance at the 10 %-level.

Table 9. The effect of ownership and ownership changes on the demand for non-routine job tasks. Firm-level estimates 1996-2005. Effects of alternative dependent variables.

	1	2	3	4	5	6	7	8	9	10
	Foreign firms vs. Domestic firms	MNEs vs. Swedish firms	local vs. Swedish to MNE	local vs. Swedish to foreign	MNE to foreign	Foreign firms vs. Domestic firms	MNEs vs. Swedish firms	local vs. Swedish to MNE	local vs. Swedish to foreign	MNE to foreign
	Education cost shares					Non-routine employment shares				
Foreign Firms	0.004 (0.004)	--	--			0.021 (0.004)***	--	--		
Multinational	--	0.011 (0.004)***	--	--	--	--	0.021 (0.004)***	--	--	--
Acquisition	--	--	0.003 (0.003)	0.000 (0.004)	-0.000 (0.006)	--	--	0.005 (0.005)	0.005 (0.005)*	0.007 (0.006)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	No	No	No	Yes	Yes	No	No	No
Firm fixed effects	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
R2	0.51	0.51	0.18	0.18	0.21	0.56	0.556	0.01	0.01	0.01
No. of obs.	25,008	25,008	3,502	2,352	1,474	27,746	27,746	3,778	2,566	1,492

Notes: The dependent variable in columns 1-5 is the wage cost share for employees with tertiary education. The dependent variable in columns 6-10 is the share of employees with non-routine job tasks. Acquisition takes the value of one in the acquisition period and thereafter, zero before. The acquisition estimations in columns 3-5 and 8-10 are based on the propensity score matched sample. Robust standard errors, adjusted for clustering at the firm level within parentheses. *** indicate significance at the 1 %-level, ** significance at the 5 %-level and * significance at the 10 %-level.

Appendix

Table A1. Variable definitions and descriptive statistics (means and standard deviations). Firms with at least 20 employees, 1996-2005.

Firm variables		All firms	Swedish local firms	MNEs	Foreign firms
Wage cost share, non-routine tasks	Wage cost share, employees with non-routine tasks.	0.44 (0.20)	0.41 (0.20)	0.49 (0.18)	0.49 (0.18)
Wage cost share, personal interaction	Wage cost share, employees with personal interaction tasks.	0.34 (0.12)	0.34 (0.12)	0.35 (0.11)	0.36 (0.11)
Wage cost share, tertiary education	Wage cost share, employees with tertiary education.	0.20 (0.20)	0.20 (0.21)	0.20 (0.18)	0.20 (0.17)
Capital/sales	(Net property, plant and equipment)/ sales.	0.00042 (.0023)	0.0005 (0.0028)	.0002 (0.001)	0.0002 (.001)
Value added	Sales-operational expenses excluding wages.	216,580 (978,706)	121,722 (618,312)	399,507 (1,420,256)	299,990 (997,740)
R&D/sales	R&D expenses / sales. Available 1996-2002. For the years 2003-2005, the median R&D/sales for the period 1996-2002 is used.	0.013 (0.102)	0.009 (0.112)	0.019 (0.079)	0.015 (0.060)
Offshoring	Share of imported intermediate goods in total sales	0.064 (0.123)	0.041 (0.112)	0.089 (0.142)	0.097 (0.156)
Offshoring, high income countries	Share of imported intermediate goods in total sales to OECD countries	0.059 (0.116)	0.037 (0.090)	0.082 (0.134)	0.092 (0.149)
Offshoring, low income countries	Share of imported intermediate goods in total sales to non-OECD countries	0.005 (0.027)	0.004 (0.025)	0.006 (0.028)	0.006 (0.027)

Note: All monetary variables are in 1995 SEK.

Table A2. Control variables in matched and unmatched samples of firms.

Variable		Sample	Mean		% bias	% reduction in bias	t-statistics
			Treated	Control			
From Swedish local to MNE	Capital/sales	Unmatched	-9.414	-8.915	-29.6		5.43***
		Matched	-9.414	-9.194	-13.1	55.9	1.92*
	Value added	Unmatched	11.168	10.525	49.5		9.73***
		Matched	11.168	10.589	44.6	9.9	6.06***
	R&D sales	Unmatched	0.005	0.010	-4.8		0.69
		Matched	0.005	0.005	0.5	89.9	0.18
From Swedish local to foreign	Capital/sales	Unmatched	-9.462	-8.920	-31.6		4.63***
		Matched	-9.462	-9.234	-13.3	58.0	1.54
	Value added	Unmatched	11.244	10.518	54.7		8.65***
		Matched	11.244	10.763	36.2	33.8	3.51***
	R&D sales	Unmatched	0.005	0.009	-5.2		0.58
		Matched	0.005	0.004	1.6	69.5	0.62
From Swedish MNE to foreign	Capital/sales	Unmatched	-9.146	-9.009	-10.1		1.22
		Matched	-9.154	-9.161	0.5	94.6	0.04
	Value added	Unmatched	11.744	12.412	-47.3		5.26***
		Matched	11.744	12.297	-39.2	17.2	3.27***
	R&D sales	Unmatched	0.036	0.028	7.1		1.03
		Matched	0.028	0.027	0.9	86.7	0.09

Note: *** indicate significance at the 1 %-level, ** significance at the 5 %-level and * significance at the 10 %-level.