

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 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 increased importance of multinational enterprises (MNEs) has raised concerns among policy-makers. There is often a fear that MNEs may be more inclined than purely local firms to downsize less efficient plants, offshore jobs, or even close down entire firms. Some of this fear could be justified as MNEs per definition have better opportunities to restructure their production to benefit from the different locational advantages around the world.

In developed countries, it is unskilled labor that is typically seen to be in danger. Multinational firms are expected to specialize in knowledge capital intensive production in developed countries, using highly educated labor, while offshoring low-skilled jobs elsewhere. Yet, empirical studies tend to find relatively small effects of globalization on labor demand. For instance, studies on Foreign Direct Investment (FDI) tend to find small effects on labor demand from acquisitions of local firms by foreign multinationals (e.g. Almeida, 2003; and Huttunen, 2007). Accordingly, Ekholm and Hakkala (2005) and Andersson and Karpaty (2007) find small effects of offshoring on relative labor demand.

One reason for lack of empirical evidence on effects from globalization on relative labor demand could be that these studies examine the demand for low or high-skilled labor, often measured in terms of educational background of the employees. However, a recent literature argues that the relationship between skill-intensity and suitability of a job being offshored is complex and that other factors than skill-intensity determine which jobs that can be located far from the main operations of the firm and which need to be kept close to them (e.g Leamer and Storper, 2001; Autor et al., 2002; Levy and Murmane, 2004; and Grossman and Rossi-Hansberg, 2006). This literature tend to stress differences between tasks in their need for personal interaction

or how easily they are codified in made in to routine tasks. Moreover, tasks that require relatively low level of personal interaction and which are of a routine nature are relatively easy to move to computers, robots, or to outside actors. As a consequence, if foreign acquisitions bring about a relocation of some operations, these may well be skill-intensive but easily offshored tasks. On the other hand, some tasks carried out by low-skilled workers may not be threatened since they require proximity to other parts of the production. Shifting the focus from the comparative advantages measured in terms of skills to the content of job tasks may allow us to discover unknown effects of increased inward FDI on domestic employment.

In this paper, we revisit the question how FDI and multinational ownership affect demand for different types of workers. There are several reasons why FDI affects the relative demand for different job tasks in the host country. An acquisition or a merger itself may be regarded as an opportunity to implement structural changes in the organization (Schleifer and Summers, 1988; and Bertrand and Mullainathan, 2003). When the acquirer is a multinational firm, the restructuring may imply an increased tendency to offshore some jobs abroad either to foreign affiliates or to foreign suppliers. The underlying assumption is simple: we would expect different abilities to engage in offshoring between multinational firms and non-multinational firms, which in turn results in different demand for workers engaged in activities that can be offshored. To analyze how inward FDI and multinational activity affects the demand for labor and specialisation, we use a conceptualization from the recent literature and define the division of labor in terms of job tasks.

Becker et al. (2007) is the only paper that to the best of our knowledge examines the effect of globalization on the demand for different job tasks. They examine the effect of foreign operations on home country job tasks in a sample of 490

German MNEs. They find that the proportion of non-routine and interactive tasks in the home country increases when employment in foreign affiliates increase.

We contribute to the literature in several respects. We start out the analysis by examining differences in the composition of job tasks between local firms and MNEs, Swedish as well as foreign owned ones, and continue by examining the effect of different types of acquisitions on relative labor demand. We distinguish between ownership changes from local to MNEs and from domestic, local or MNE, to foreign. We address the issue of causality between ownership changes and changes in the job task composition by using a propensity score matching method. After establishing the impact of ownership and ownership changes on the job task composition, we continue by trying to explain the found differences. For instance, we put special attention on the role of offshoring on the demand for different job tasks. In pursuing our empirical analysis, we use unique and comprehensive Swedish matched employer-employee data for the period of 1996 to 2005. The data covers all Swedish firms with at least 20 employees. We can separate between Swedish MNEs, Swedish non-MNEs, and foreign-owned MNEs in Sweden. Moreover, we have detailed individual information on a representative sample of roughly 50 percent of the labor force which are linked to the firms to construct measures on firm level work force composition. Detailed employee information on occupations enables us to analyze changes in division of labor according to job tasks.

Our results indicate that multinational firms, regardless of nationality, have a higher share of employees doing non-routine tasks or tasks requiring personal interactions. Moreover, acquisitions of Swedish local firms by multinationals increase the demand for non-routine and interactive tasks. Results indicate that 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, we find that acquisitions of Swedish MNEs by foreign MNEs have no important effects on the relative job task demand.

Part of the differences in relative labor demand by different types of firms is explained by firm characteristics and offshoring, but the differences remain even after controlling for such factors. Finally, we also analyze the effects of ownership and ownership changes by defining our dependent variable in terms of educational attainment, which is a standard approach in previous studies. The results suggest that the significant effects found using job task composition are not captured by a distinction of the labor force according to educational attainment.

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

Foreign acquisitions of domestic firms may affect the demand for different types of labor in several ways. Although many of the reasons are equally important for foreign and domestic MNEs, we focus here on the effect of foreign ownership on firms. First, foreign firms that enter new markets can increase the relative demand for skilled workers. Foreign MNEs need to possess some firm-specific advantages, such as superior technology or intangible knowledge capital to be able to compete with domestic incumbents.¹ Technologically more advanced foreign firms require more skilled labor to operate their operations.

¹ Foreign firms are disadvantaged in terms of inferior knowledge about local markets and tastes and also inferior contacts with local politicians and financial institutions (see e.g. Caves, 1996; Markusen, 1995; and Blonigen and Slaughter, 2001).

Second, theories of ownership change suggest that acquisitions result in reduction of administrative and managerial employment (see e.g. Scheifer and Vishny, 1988; and Lichtenberg and Siegel, 1990). A takeover is often seen as an opportunity to restructure the existing operations of the target firm (Schleifer and Summer, 1988; and Bertrand and Mullainathan, 2003) and an effective way of getting rid of managers who may be protecting employees, particularly the immediate subordinates, from dismissal. Moreover, foreign acquisitions may imply redundancy in headquarter services leading to rationalisation or relocation of management and other overhead functions to the headquarters abroad.

Third, a takeover of a local firm by a foreign or domestic multinational can trigger restructuring of the existing operations of the target firm to increase specialisation in production. Multinational firms are increasingly engaged in international production networks and may find it relatively easy to switch activities to plants in other countries. The changes in specialisation that involve cost-reducing offshoring are assumed to impact labor demand in a similar way as has previously been modeled for factor-biased technological change. Offshoring will, similar to introduction of new technologies, increase productivity by increasing the net revenue per unit of factor input. However, the effect on productivity will not necessarily be uniform across all labor inputs. For instance, when labor-intensive assembly activities are being offshored, the productivity of workers involved in headquarters activities and intermediate input production is likely to increase, whereas the productivity of domestic assembly workers is unaffected. Thus, a foreign takeover may trigger a change in the relative demand for skilled labor through increased offshoring and specialisation.

Most previous studies that have analysed the effects of foreign acquisitions on employment have focused on the total firm-level employment rather than analyzing the effects on relative labor demand (e.g. Girma och Görg, 2004; and Bandick and Karpaty, 2007). Studies that examine the effect of foreign acquisitions on relative demand for different skill groups are rather scarce and the results are ambiguous. Almeida, (2003) finds no significant effects of foreign acquisitions on the skill composition in Portuguese establishments. Lipsey and Sjöholm (2008) find that foreign takeovers of Indonesian firms increase the number of blue collar workers and have no or even a negative effect on white collar workers. Huttunen (2007) uses a matching method combined with difference-in-difference estimations to disentangle the direction of causality and to control for the possible bias due to selection on unobservables. Her results indicate that foreign acquisitions of Finnish establishments marginally decrease the share of highly educated workers.

One reason why previous studies have not found clear evidence on how foreign acquisitions affect the relative demand for labor may be that the effects are not 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) emphasize that trade increasingly entail exchanges of bits of value added in many locations rather than complete finished goods or even complete intermediate goods. For these job tasks, other characteristics than skill-intensity may be decisive whether the task is carried out at a longer distance from the headquarters and main production facilities. Tasks that are easily codifiable and do not require extensive monitoring or personal interaction can more easily be offshored and carried out in places with lower labor costs. Whereas

many of such tasks are carried out by unskilled labor, 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 computerisation 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 empirical 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 that the proportion of home country non-routine and interactive tasks increases 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.

III. Econometric Approach

Our main purpose is to estimate the impact of ownership type and ownership change on the relative demand for different job tasks. We expect that multinational firms and foreign firms offshore specific job tasks to a larger extent than domestic firms. Moreover, we expect that a change from domestic ownership to foreign ownership, or from domestic local ownership to multinational ownership, affects the relative demand for tasks as a result of restructuring, increasing offshoring and specialization.

Based on a translog cost function approach used in previous studies on relative labor demand, we estimate the following reduced-form equation to predict relative demand for job task type i at firm j at time t :

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

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 employee carrying out task i in firm j relative to the average wage of the other employees. 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 . We use real value added as a proxy for Y_{jt} and R&D expenditures to sales as a proxy for Z_{jt} .² Capital is considered to be a quasi-fixed

² See Table A1 in the appendix for construction of the variables.

factor and the value of α_1 indicates whether capital tends to substitute or complement 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).³ Our main focus is on 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 local 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.⁴ 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, according to information in the firm data, more than 50 percent of the equity is foreign-owned.⁵ We define a domestically-owned MNE as a

³ 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 relative wages between firms reflects differences in skill composition rather than exogenous wage differences (see e.g. Slaughter, 2000; Head and Ries, 2002; and Becker et al., 2007).

⁴ In these regressions we also include industry-specific effects.

⁵ Statistics Sweden uses the internationally common 50 percent cut-off in defining foreign ownership.

firm reporting positive exports to other firms within the corporation. Finally, firms reporting no such exports are classified as domestically-owned non-MNEs.⁶

In the second estimations, we analyze the effect of an ownership change. We include all firms 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 Swedish local to MNE, from Swedish local to foreign, and from Swedish MNE to foreign. The first two acquisitions allow us to distinguish between effects of foreign ownership and multinational ownership in general. The last acquisition allows us to examine if there is an effect of acquisitions on labor demand even in firms that are already multinational.

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 analyze how the job task composition evolves over time after the acquisition by including lagged *Owner* dummies. These estimations 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 that become acquired. First, it is not random which firms that become acquired. Firms that become takeover targets might exhibit characteristics that systematically differ from other non-acquired firms. Another problem is that the firm characteristics of acquired firms might be such that acquired firms in any case

We are not able to study whether the results are sensitive to this definition. However, other authors have examined the sensitivity (see e.g. Martins, 2004; and Barbosa and Louri, 2002). These studies do not find the results to be sensitive to cut-off values.

⁶Export information is available for firms with at least 50 employees or smaller firms with large sales. There might exist a few small multinationals that are classified as local firms, due to missing information on exports. The potential bias is likely to be of minor importance.

would develop differently from their non-acquired counterparts. This, in turn, means that estimating the effect of acquisitions on the relative demand for different job tasks suffers 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 that arises from differences in the characteristics between the treatment and the control group by comparing the outcomes for as similar treated and non-treated observations, based on the pre-treatment characteristics. The matching is based on a rich set of observable firm characteristics.

A potential determinant in explaining firm differences in the relative demand for job tasks has to do with the ability to engage in offshoring activities. We take this into consideration by means of adding a firm-level measure of offshoring as an additional explanatory variable. Our offshoring variable is defined as the share of imported intermediate goods in total sales.⁷ We also differentiate between offshoring activities to low and high-income countries to further analyze the impact of offshoring. Dividing offshoring by country of origin shows that offshoring to high-income countries (OECD) is roughly ten times higher than offshoring to low-income countries (non-OECD).⁸ In addition to offshoring, we will examine if differences in other firm characteristics, such as size, human capital, profits, firm age and export intensity can explain firm differences in demand for job tasks. We will also examine if differences in the distribution of local and multinational firms over sectors (services and manufacturing) explain differences in relative employment demands, and if the effect of ownership types and acquisitions differ between sectors.

Finally, we will estimate alternative specifications to further examine the robustness of our results. Most importantly, we will use two alternative dependent

⁷ This is a common way of measuring offshoring in the related literature, see e.g. Ekholm and Hakkala (2005).

⁸ See Table A1 for more information.

variables: employment shares and education cost shares. Using the latter measure allows us to compare our results to previous studies and also to conclude whether the use of job task cost shares contribute to our understanding of FDI and relative labor demand.

IV. Data and Descriptive Statistics

The analysis is based on three register-based data sets from Statistics Sweden spanning the period 1996-2005. First, 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.

Second, the Regional Labor Market Statistics (RAMS) includes data on all establishments. RAMS add establishment information on the composition of the labor force with respect to educational level and demographics.⁹

Finally, 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.

The data sets are linked together by way of 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. A description of the included variables is presented in Table A1 in the appendix.

To analyse how the composition of different job tasks is affected by an ownership change we follow Autor, Levy och Murmane (2003) and Spitz-Oener

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

(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.¹⁰ An occupation with 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 occupational. The occupational classification allows us to match the German work survey information to Swedish data to infer information on all three kinds of relevant workforce characteristics: occupation categories, the nature of performed tasks, and workers' educational attainment.

The shares of non-routine and interactive job tasks in different occupations at the 2-digit level of ISCO-88 are presented in Table 1. Non-routine tasks are highest among science based occupations and lowest in some occupations in agriculture, fishery, mining, construction, manufacturing and transport. Our measure on interactive tasks is high in the science based occupations but also in teaching based occupations. It is low in industries with little non-routine tasks but also in, for

¹⁰ For more details about the survey and the construction of measures, see Becker et al. (2007).

instance, machine operating, handicraft, and some sales oriented occupations. The general impression is that there is an overlap but not a perfect match in the degrees of non-routine tasks and tasks requiring personal interactions.

--Table 1 about here--

Figure 1 shows the development of employment in Sweden in terms of the shares of non-routine tasks and tasks requiring personal interactions. We have also included a figure on the share of the workforce with higher education, measured as the share with post-secondary education. 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 interactions. The share of workers with higher education has, however, increased substantially from about 12 percent 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 output, 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.

--Table 2 about here--

One question is whether these differences in offshoring is corresponded by a similar differences in job tasks? We include measures on the share of employees with non-routine tasks and with tasks that require personal interaction. We do also include a more traditional measure on skills: higher education which is the share of employees with post-secondary education.

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 job tasks, we would expect to see a change in the labor force 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 also 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 ownership and where there are very small and statistically insignificant changes after the 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. However, the differences are not statistically significant and there is no clear effect on job tasks composition after acquisitions of local firms by MNEs. We next continue with the econometric analysis to shed further light on the issues at hand.

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 almost four percent 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 between domestic and foreign firms: including firm characteristics in the estimation in column 2 reduces the foreign dummy variable but the difference is still 2.4 percent 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 make instead the distinction between local firms and MNEs where the latter group includes both domestic and foreign firms. It is seen again that there is a difference in the task composition between different types of firms: multinational firms have between 2.6 and 4.3 percent more non-routine tasks compared to local firms.

Estimations five to eight look at our other 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. In the estimations on interactive tasks the smaller size of the coefficients for foreign ownership and multinationality indicates smaller differences in the share of tasks requiring personal interaction.

--Table 4 about here--

We proceed to analyse whether an ownership change from domestic to foreign, or from domestic local to multinational, affect the relative demand for tasks. As discussed in section III, a change from domestic to multinational might change the

demand for tasks as a result of increasing 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 analyse acquisitions of domestic MNEs by foreign ownership. 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, but the effect is not very significant statistically. The magnitude is rather small with an increased demand for non-routine tasks by about 1 percent. There is no effect of an ownership change from local to foreign or from domestic MNE to foreign. The effects on the demand for tasks requiring personal interaction differ from the effect on non-routine tasks. The coefficients for foreign ownership or for MNE are statistically insignificant in all estimations.

--Table 5 about here--

As discussed in Section III the estimations in Table 5 potentially suffer from a selection problem. In Table 6 we report the estimation results based on a propensity score matched sample of firms. We have estimated numerous propensity scores using a variety of lagged covariates, but have only considered those satisfying the balancing

property of the propensity score.¹¹ Moreover, it is seen in Table A2 in the Appendix that the bias in the control variables is substantially reduced, although a statistical significance remains for some of the variables in some of the matching.

--Table 6 about here--

The results based on the matching method change compared with the acquisition estimations in Table 5 and we find statistically more significant effects of ownership change on the job task demand. The change in ownership from local to multinational increases demand for non-routine tasks by 1.3 percent and for interactive tasks by about 1 percent. 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 task demand. As seen in columns 7 to 9 the effects are significant but smaller for the measure of interactive job tasks.

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

¹¹ 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.

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. 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 firm-level measures on offshoring, defined as the share of imported intermediate goods in total sales, in the estimations. We also distinguish between offshoring to low- or high-income countries to examine the importance of wage-cost reducing offshoring.¹²

-- Table 7 about here--

Estimations 1 and 4 for the stock of firms in Table 7 indicate that offshoring affects the demand for tasks. It is perhaps surprising that the coefficient of the offshoring variable is negative and statistically significant indicating that higher levels of offshoring reduce the demand for non-routine tasks. The coefficients suggest that a 1 percent increase in the offshoring measure reduces the demand for non-routine tasks by about 0.4 percent. One would expect that if offshoring is driven by lower labor costs then it would increase rather than decrease demand for non-routine tasks. A closer inspection of offshoring provides us an explanation for the result. As mentioned in above, most of offshoring is from other high-income countries. We therefore

¹² High income countries are OECD countries and low income countries are non-OECD countries.

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 effect. Hence, large imports of intermediate goods from other high-income countries tend to be associated with a reduction in the demand for non-routine tasks whereas there is no effect from imports from low income countries. 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 demand for non-routine tasks than domestic firms and MNEs a higher demand 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 including offshoring in the acquisition estimations. The offshoring variable is not statistically significant but the coefficient for the ownership dummy 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 availability of the offshoring variable. We therefore estimated the reduced sample without the offshoring variable. The coefficients of ownership dummy variable 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 measures for tasks requiring personal interaction provides the same results as in Table 7 with a negative effect of offshoring and with no major impact on the coefficients for foreign and multinational ownership (not shown).

-- Table 8 about here--

Another plausible explanation for the results is that ownership is associated with firm size and that firm size has an 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 the task 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 some estimations, and in additional estimations 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.

The stock estimations do not change qualitatively: foreign firms and MNEs have a high demand for 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 coefficients of the acquisition estimations more than double when we include the size of the firm. Including other firm characteristics have a larger impact

on the dummy variables capturing ownership changes. Although coefficients are reduced they are still statistically significant and in line with our previous findings. It was also found that including size made coefficients on all acquisitions positive and statistically significant in estimations on the demand for tasks requiring personal interaction as dependent variable (not shown). The conclusion is that firm size and other firm characteristics affect the demand for tasks but that there still remains a difference between ownership groups even after controlling for these characteristics.

Additional robustness checks

An important question is whether dividing labor according to job tasks contributes anything new to our understanding about the effects of foreign ownership on labor demand. To examine this issue further, we follow much 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. In the first column, the foreign dummy variable is not significant. The MNE dummy variable is positive and significant in column 2, but the size is less than half the size of the coefficient in the estimation using the cost share of non-routine tasks in Table 4. 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

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

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, 2003; and Huttunen, 2007). Heyman et al. (2007) use same data source as this study for the period from 1996 to 2000 and find that foreign acquisitions of domestic multinationals and local firms 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 therefore it is 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 for employees conducting these tasks. Columns 8 to 10 in Table 9, show that the change in the ownership from local to multinational or local to foreign increases the share of employees with non-routine job tasks, but 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 important part of the effect seems to be explained by changes in employment composition.

--Table 9 about here--

Finally, we examine whether there are differences in manufacturing and service sectors by splitting the sample accordingly. As seen in Table 10, all our main results are valid for service sector, but in manufacturing only the stock results are confirmed. The coefficients are larger in the service sector indicating larger effects. Moreover, we find that even in the case of ownership changes of domestic MNEs to foreign MNEs the demand for non-routine job tasks increases. We would not expect to get this result if domestic MNEs are as specialized, internationalised and effective as the foreign MNEs. Obviously, foreign owners bring about some changes even in domestic MNEs in the service sector.

-- Table 10 about here--

VI. Concluding Remarks

FDI has increased at a rapid pace over the last decades. It is often assumed that this process will decrease demand for unskilled labor and increase demand for skilled employees in developed countries. However, previous empirical studies find ambiguous evidence on the effects of FDI on the 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 use 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 difference in job task composition between foreign and local Swedish firms and between multinational and local Swedish firms. We proceed to analyze the effect of ownership changes on the job task composition. We distinguish between ownership changes from local to MNEs and from domestic,

local or MNE, to foreign. We address the issue of causality between ownership change and the change in job task composition by using a propensity score matching method.

The econometric analysis indicates 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. Furthermore, the results indicate that 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, we find that acquisitions of Swedish MNEs by foreign MNEs have no important effects on the relative job task demand.

We also analyze the effects of ownership and ownership changes by defining our dependent variable in terms of educational attainment, which is a standard approach in previous studies. The results suggest that the significant effects found using job task composition are not captured by a distinction of the labor force according to educational attainment.

To sum up, our results indicate that increased FDI in a developed country such as Sweden primarily benefit employees conducting 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 the 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.

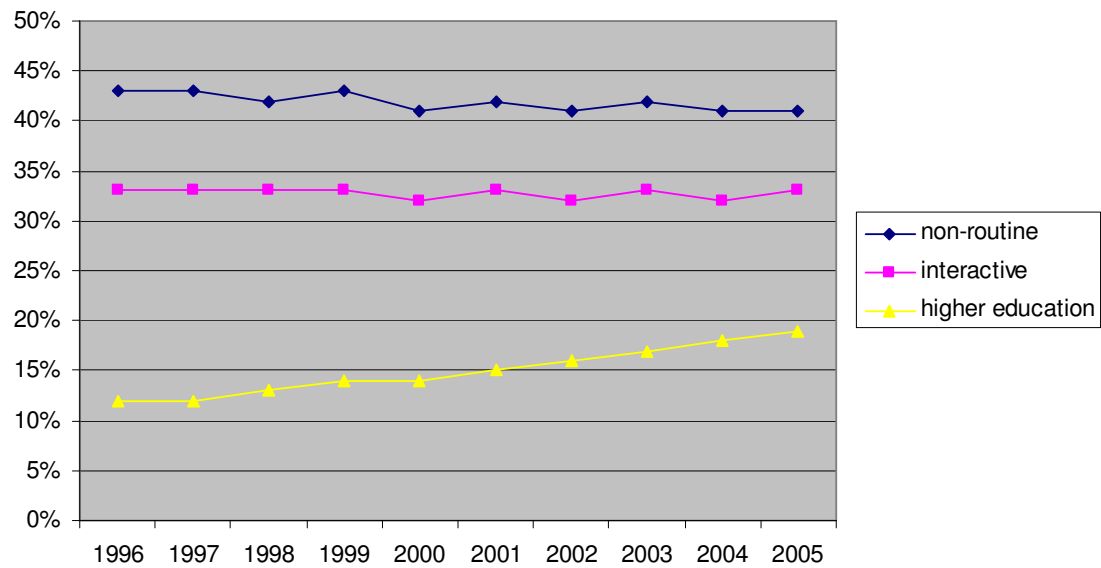


Table 2. Ownership, offshoring and job tasks (shares of total employees).

	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 MNE	From Swedish local to foreign	From Swedish MNE to foreign	From Swedish local to foreign	From Swedish local to foreign	From Swedish MNE to foreign	From Swedish local to MNE	From Swedish local to foreign	From Swedish local MNE to foreign
	Non-routine								
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 (=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	From Swedish local to MNE	From Swedish local to foreign	From Swedish MNE to foreign	Foreign firms vs. Domestic firms	MNEs vs. Swedish firms	From Swedish local to MNE	From Swedish local to foreign	From Swedish 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.

Table 10. The effect of ownership and ownership changes on the demand for non-routine job tasks. Firm-level estimates 1996-2005. Effects of industry heterogeneity

	1	2	3	4	5	6	7	8	9	10	
	Foreign firms vs. Domestic firms	MNEs vs. Swedish firms	vs. local to MNE	From Swedish local to foreign	From Swedish local to MNE to foreign	From Swedish MNE to foreign	Foreign firms vs. Domestic firms	MNEs vs. Swedish firms	vs. local to MNE	From Swedish local to foreign	From Swedish local to MNE to foreign
	Non-manufacturing					Manufacturing					
Foreign Firms	0.030 (0.006)***	--	--	--	--	0.018 (0.005)***	--	--	--	--	
Multinational	--	0.035 (0.005)***	--	--	--	--	0.018 (0.005)***	--	--	--	
Acquisition	--	--	0.018 (0.007)***	0.014 (0.007)**	0.037 (0.016)**	--	--	0.004 (0.006)	0.002 (0.006)	0.003 (0.007)	
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	0.59	0.59	0.01	0.01	0.08	0.34	0.34	0.06	0.06	0.04	
No. of obs.	16,070	16,070	2,420	1,695	360	11,676	11,676	1,358	871	1,132	

Note: 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. 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.