

MULTINATIONAL FIRMS AND JOB TASKS

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Abstract

We use Swedish matched employer-employee data to analyze the impact of multinational and foreign ownership on the relative labor demand. We use a recent conceptualization and define the division of labor in terms of job tasks. Multinational firms, both foreign and domestic, are associated with high shares of non-routine tasks and tasks requiring personal interaction. Moreover, multinational acquisitions of local firms increase the relative demand for non-routine and interactive job tasks, i.e. not easily offshored job tasks. Dividing labor according to educational attainment does not capture the same effects on relative labor demand.

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I. Introduction

The influence of multinational enterprises (MNEs) has unsettled policymakers worldwide. Some argue that MNEs are more inclined than local firms to offshore jobs and downsize inefficient plants – or even shut them down entirely. Indeed, these fears are not baseless; MNEs enjoy opportunities to restructure production to capitalize on location advantages throughout the world.

In developed countries - where multinational firms locate knowledge intensive production while offshoring low-skilled jobs elsewhere – unskilled workers are generally believed to be threatened. Yet 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, 2007; Head and Ries, 2002). On a related issue, acquisitions of local firms by foreign multinationals have little impact on the relative demand for different employees (e.g. Almeida, 2003; and Huttunen, 2007) and also offshoring has a small effect on relative labor demand (e.g. Ekholm and Hakkala, 2005; Andersson and Karpaty, 2007).

The lack of empirical support may stem from previous studies' focus on the demand for low- and high-skilled labor, often defined 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 finished or even intermediate goods (e.g. Jones and Kierzkowski, 2001; Grossman and Rossi-Hansberg, 2006 and 2008). Several authors put forward that whether job tasks are located away from headquarters and main production facilities depends on characteristics other than skill intensity (e.g. Markusen, 2006; Blinder, 2006).

In particular, routine tasks and tasks that do not require personal interaction can more easily be offshored. MNEs may thus relocate skill-intensive tasks if they fall

within this category. On the other hand, some tasks carried out by low-skilled workers require proximity to other parts of the production and are not easily offshored. Shifting the focus from skills to job tasks may allow us to discover unknown effects of increased inward FDI on domestic employment.

We revisit the question how inward FDI and multinational ownership affect relative labor demand. In line with recent literature, we define the division of labor in terms of job tasks. The underlying assumption is simple: we expect multinational and non-multinational firms to engage differently in offshoring. The resulting differences would occur in the demand for workers engaged in activities that can be offshored.

We use comprehensive Swedish matched employer-employee data for the period 1996 to 2005. The data include 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. First, we show that MNEs - both Swedish and foreign-owned - have a higher share of employees doing non-routine tasks or tasks requiring personal interaction than local firms. We proceed to analyzing the effect of different types of acquisitions on relative demand for job tasks. We address causality issues by using a propensity score matching method. Our results show that acquisitions of local firms by multinational firms, regardless of nationality, increase the share of employees doing non-routine tasks or tasks requiring personal interaction. In explaining the differences, we pay special attention to the role of offshoring and firm characteristics. Using a distinction of the labor force according to educational attainment – the standard measure in previous studies – does not indicate any effects of acquisitions on skill composition of firms. This suggests that task measures do indeed capture a new labor market aspect.

II. Background and Related Empirical Literature

The multinational firm is believed to be a key actor in international division of job tasks (Grossman and Rossi-Hansberg, 2008). Multinational firms are able to form increasingly sophisticated global production networks because of falling transport costs, improvements in information and communication technologies, and liberalized FDI regimes. Jones and Kierzkowski (2001) and Grossman and Rossi-Hansberg (2006; 2008) note that trade increasingly entails exchanges of small parts of products and processes that involve different job tasks in different locations, rather than complete finished goods or even complete intermediate goods. As a result, a very high share of international trade today takes place within MNEs. For instance, Grossman and Rossi-Hansberg (2007, p.67) refer to the Bureau of Economic Analysis data according to which about 47 percent of US imports are conducted within multinational firms in 2005.

It seems reasonable that MNEs with international production networks and experience of running operations in different countries are relatively apt to react and adjust their operations to differences in production costs across countries. We therefore expect multinational firms to have more specialized production and job tasks as compared to local firms. The type of job tasks that are kept close to the headquarters and main operations of MNEs are determined by cost considerations but also by the possibility to offshore them.

Several authors argue that other characteristics than skill intensity (level of education) explain if job tasks can be offshored, i.e. located away from the headquarters and main production facilities. It is, for instance, argued that offshorable tasks can be summarized in deductive rules (Levy and Murmane, 2004); that they are

defined by codifiable rather than tacit information (Leamer and Storper, 2001); and that physical contact or proximity are not required (Blinder, 2006).

Easily codifiable job tasks that do not require extensive monitoring or personal interaction are often carried out by unskilled labor, but it is not a prerequisite. Computer programming and analysis of x-ray pictures are well-known examples of job tasks that require education at post-secondary level but can easily be offshored, as witnessed by the many Indian radiologists and computer engineers carrying out 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 of job tasks to study how computers have affected relative labor demand. 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, making them easy to program and thus suitable for execution by computers or robots. Non-routine tasks, on the other hand, are not easily codified and carried out 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. As discussed above, job tasks that are of a non-routine character and which require personal interaction are less likely to be offshored and we therefore expect these to be of relatively large importance in multinational firms.

This paper puts special focus on the effect of acquisitions on relative demand for different tasks. 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). When the acquirer is a multinational firm the takeover may also trigger restructuring that involves offshoring parts of production to take an advantage of the international production networks and to reduce costs.

Studies on foreign acquisitions and 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 other 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 composition of workers according to education in Portuguese establishments, and Huttunen (2007) finds foreign acquisitions of Finnish establishments to marginally decrease the share of highly educated workers. These results suggest that effects of acquisitions on relative labor demand are either small or insignificant when defining skills by education.

Becker et al. (2008) is the only study that defines the composition of labor force in terms of job tasks. They use a balanced panel of 490 German MNEs over the period 1998-2002 to examine how foreign employment affects demand for job tasks in the home country. The proportion of home country non-routine and interactive tasks increases with employment in foreign affiliates, especially in the service sector. They find that there is no statistically significant association between offshoring and

the share of blue- and white-collar jobs in the home country wage bill. This indicates that defining employment in terms of job tasks may uncover effects that are not found by using traditional definitions of relative skills and occupations.

III. Econometric Approach

Our aim is to estimate the impact of ownership and ownership changes on the relative demand for different job tasks. In line with previous studies on relative labor demand, we estimate the following reduced-form translog cost function:

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

where ψ_{ijt} is the wage cost share of 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 other employees.

Our measure on the cost share for a particular type of job 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 start by analyzing first the effects by using the traditional measure of skills defined as costs shares based on the educational attainment of the employees. This measure allows us to compare our results to previous studies and to conclude whether the use of job tasks contribute to our understanding of FDI and relative labor demand.

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

We use real value added as a proxy for Y_{jt} . Z_{jt} is a sector level measure on ICT capital defined as capital compensation for computing and communications equipment as a share in total capital compensation. α_1 shows whether capital substitute for or complement labor carrying out task i , and the value of α_3 depends on whether technical change is biased towards or away from the usage of labor carrying out task i . 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.²

Owner equals one if a firm is foreign-owned, and zero otherwise, or when we compare multinationals to non-multinationals firms, it equals one if the firm is a multinational. When we examine ownership changes, *Owner* is instead one when an ownership change is recorded and thereafter.

In the first estimations, we examine the relative demand for job tasks in domestic versus multinational (foreign) firms in a sample of firms that remain the same ownership over the entire period. Firms changing ownership are excluded.³ 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 classified as 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

² This is a standard model in related literature (see e.g. Slaughter, 2000; Head and Ries, 2002; Hansson, 2005; and Becker et al., 2007). 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 previous studies and omit this variable since the variation in relative wages between firms presumably reflects differences in skill composition rather than exogenous wage differences.

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 but other studies on FDI do typically not find cut off values to matter for the results (see e.g. Huttunen, 2007; Martins, 2004; and Barbosa and Louri, 2002).

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 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. Three different types of acquisitions are examined: from a Swedish local to a MNE, from a Swedish local to a foreign MNE, and from a Swedish MNE to a foreign MNE.⁶ The first two allow us to distinguish between effects of foreign ownership and multinational ownership in general. The last allows us to examine if there is an effect on labor demand even in acquired firms that are already multinational. Foreign firms acquire an average of 49 firms annually: 30 MNEs and 19 local firms.

The selection of firms being acquired is unlikely to be random. The estimated effect of acquisitions may suffer from a potential endogeneity problem if the target firm differs systematically from non-acquired firms. We use propensity score matching to control for this endogeneity (see e.g. Rosenbaum and Rubin, 1983). This approach reduces the bias from differences in firm characteristics by comparing the outcomes for similar treated and non-treated observations, based on the pre-treatment characteristics. The matching is based on 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.

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. We therefore re-run our estimations below on firms with above 50 employees which does not affect the results.

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.

More specifically, we first calculate the probability that a firm is acquired for each of our three different changes in ownership. Each treated (acquired) firm is then matched with a non-treated (non-acquired) firm that is as similar as possible. The matching satisfies the balancing property of the propensity score.⁷ We proceed to estimate the impact of different types of acquisitions on the relative demand for job tasks on the matched sample of firms.

As discussed in Section II, a potential determinant to relative demand for job tasks is the ability to engage in offshoring. 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.⁸ We 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.

Finally, we also estimate alternative specifications to further examine the robustness of our results. Most importantly, we will use alternative definitions of job tasks and alternative dependent variables. A description of the included variables is presented in Table A1 in the appendix.

IV. Data and Descriptive Statistics

We use register-based data sets from Statistics Sweden covering the period 1996-2005. To make the sample of firms consistent over time, we restrict our analysis

⁷ Table A2 in the Appendix shows that the bias in the control variables is substantially reduced, although a statistical significant difference remains for some of the variables.

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.

to firms with at least 20 employees. The financial statistics 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 are included. The Regional Labor Market Statistics adds information on the labor force composition with respect to education and demographics.⁹ The individual wage statistics database contains, for instance, full-time equivalent wages, education, job types and gender on approximately 2 million individuals per year, which is roughly 50 percent of the Swedish labor force.

Data on offshoring comes from the Swedish Foreign Trade Statistics, collected by Statistics Sweden and available at the firm level and by country of origin for the period 1997-2005. Data on imports from outside EU consist of all trade transactions and are based on compulsory registration to the Swedish Customs. The trade data with countries inside the EU are available for all firms with a yearly import value of at least 1.5 million SEK. According to figures from Statistics Sweden 97 percent of the total trade with countries within the EU is covered in the data but the number of observations is smaller in estimations where the offshoring variable is included.¹⁰

All data sets are linked together with unique identification numbers. The total number of observations on firms that do not change ownership equals 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.

We follow Autor et al. (2003) and Spitz-Oener (2006) and use a classification of occupations according to the intensity of routine and non-routine tasks. In addition, we use a classification of occupations according to the intensity of tasks that require

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

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).

interaction between individuals. The classification of occupations is based on information from a German work survey 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.¹¹

Becker et al. (2007) distinguish non-routine tasks that involve non-repetitive work methods versus routine tasks, from interactive tasks that require personal interaction with co-workers or third parties versus non-interactive tasks.¹² 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 occupation and normalized to an index that takes values between 0 and 100.¹³

Table 1 presents the shares of non-routine and interactive job tasks in different occupations at the 2-digit level of ISCO-88. There is an overlap but not a perfect one in the measures of non-routine tasks and tasks requiring personal interaction. The share of non-routine tasks is highest in science-based occupations and lowest in some occupations in simple services, agriculture, mining, construction, manufacturing and transport. High shares of interactive tasks is seen in, again, science-based occupations but also in education. It is low for occupations with a low share of non-routine tasks

¹¹ The measures are based on the Qualification and Career Survey for 1998/99 conducted by the German Federal Institute for Vocational Training (Bundesinstitut für Berufsbindung BIBB) and the research institute of the German Federal Labor Agency (Institut für Arbeitsmarkt- und Berufsforschung IAB). For other studies using the same work survey see, for instance, Acemoglu and Pischke (1998) and Spitz-Oener (2006).

¹² For more details about the survey and the construction of measures, see Becker et al. (2007).

¹³ The task measures are normalised by the following formula: $x_norm_i = [x_i - \min(x_i)] / [\max(x_i) - \min(x_i)] * 100$ where x_i is the original task index for occupation i .

but also in, for instance, machine operating, handicraft, and some sales oriented occupations.

--Table 1 about here--

Figure 1 shows the development of employment in Sweden in terms of the shares of non-routine tasks; tasks requiring personal interaction; and 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 remarkably stable over the period 1996-2005: about 42 percent of job tasks are non-routine, 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, in part as a result of retirements of old cohorts with generally low levels of education, and entrance of younger more educated cohorts of employees.

It should be noted that we measure cross-occupation employment changes that Autor et al. (2003) refer to as "extensive" margin shifts, as opposed to changes in the task content within occupations. Autor et al. (2003) analyze both cross- and within occupational employment changes and show that shifts in job content away from routine and toward nonroutine cognitive tasks are pervasive and concentrated industries and occupations that adopted computer technology most rapidly.

--Figure 1 about here--

--Table 2 about here--

Table 2 shows the composition of job tasks and the level of offshoring in firms with different ownership.¹⁴ Standard deviations are large which means that the variables are not significantly different between different firms. Bearing this in mind, 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 - about seven percentage points (0.48-0.41) - but again, standard deviations are large and the difference is not statistically significant. The differences for the share of interactive tasks and for the share with higher education are considerably smaller than the difference in non-routine tasks. Finally, the difference between Swedish and foreign MNEs is very small for all different measures, suggesting that the relevant distinction is between multinational and non-multinational firms rather than between domestic and foreign firms.

One possible explanation to differences in job tasks between firms is, as discussed above, a different degree of offshoring, which gets some support in Table 2: offshoring is higher in multinational firms than in local firms and also higher in foreign multinational firms than in Swedish multinational firms.

If multinationality affects job tasks, we would expect a change in the composition after an acquisition of a local firm by a multinational firm. Table 3 presents some descriptive statistics on different types of acquisitions and their effects on job tasks.

-- Table 3 about here--

¹⁴ Job tasks and education are expressed as wage cost shares to make figures consistent with the econometric analysis. Using employment shares yields very similar differences but the levels are typically about 2 percentage points lower.

Starting with acquisitions of local firms by MNEs (Swedish and foreign), a comparison of Tables 2 and 3 shows 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. Targeted firms are engaged in offshoring to the same extent as non-targeted firms. There are only small changes taking place after the acquisitions and none of the changes are statistically significant.

Foreign acquisitions of Swedish local firms or Swedish MNEs show a similar pattern: targeted firms are similar to non-targeted firms and there are small and statistically insignificant changes after ownership changes.

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 statistically insignificant. Moreover, there are no clear post-acquisition changes in the 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 education and job tasks in foreign versus domestic firms, and in multinational versus non-multinational firms, for a sample of firms that remain 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: the inclusion of firm characteristics in column two reduces the foreign dummy variable but the difference is still 2.4 percentage points and statistically significant.

The group of comparison in columns one to six includes domestic local firms as well as domestic MNEs. Estimations in columns seven to twelve 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 firms: multinational firms have between 2.6 and 4.3 percentage points more non-routine tasks compared to local firms.

Figure 1 and Table 1 showed that non-routine tasks constitute about 44 percent of total tasks. It seems reasonable to conclude that 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 in columns three, four, nine and ten use our second measure on job tasks, the share of tasks requiring personal interaction. The prior 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. Firm differences in the share of tasks requiring personal interaction are smaller than for the non-routine tasks.

--Table 4 about here--

Finally, we compare our results for job tasks with a measure of educational skills as a dependent variable. As seen in columns five, six, eleven and twelve, foreign and multinational firms have a higher share of employees with tertiary education. Hence, there is a correlation between higher education and more advanced job tasks, but it seems from the size of the coefficients that measure of nonroutine tasks picks up larger differences between firms than the traditional educational measure.

Examining the effect of ownership changes on job tasks

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.

The results in Table 5 show that when ownership changes from local Swedish 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 of about 1 percentage point (see column one). There is no effect of an ownership change from local to foreign ownership or from domestic MNE to foreign ownership. The results for the tasks requiring personal interaction and education are all statistically insignificant with respect to ownership changes.

--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 differ from the estimations in Table 5. 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 has almost as large effect. As expected, the ownership change from domestic multinational to foreign multinational does not change the relative demand for tasks. As seen in columns four to six the effects are significant but smaller for the measure of interactive job tasks. None of the ownership changes has a significant effect on the demand for education as seen in columns seven to nine. Again, the results suggest that the significant effects for ownership changes do indeed capture a labor market aspect that is not captured by a distinction of the labor force according to education.¹⁵

Trying to explain the differences in job tasks

The results above suggest that multinational firms have higher shares of non-routine tasks, and acquisitions of local firms by MNEs increase the demand for non-routine tasks and tasks requiring personal interaction. As discussed in Section II, a potential important explanation to the relative demand for different job tasks is the ability to engage in 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.¹⁶

-- Table 7 about here--

¹⁵ Other measures on education also showed insignificant difference between different firms.

¹⁶ High income countries are OECD countries and low income countries are non-OECD countries.

Table 7 includes the stock of firms and shows in columns one and six that the level of offshoring is related to 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. A one percent increase in offshoring reduces the share for non-routine tasks by about 0.4 percent. We would expect offshoring to increase rather than decrease the demand for non-routine tasks if offshoring is driven by lower labor costs then. A closer look at the offshoring measure provides us with an explanation to the results: most offshoring is to other high-income countries. We therefore proceed with estimations where offshoring is divided between high- and low-income countries. The results in columns two and seven show that offshoring to high-income countries reduce the demand for non-routine tasks, whereas offshoring to low-income countries has no statistically significant effect. Hence, imports of intermediate goods from other high-income countries appear to substitute for more advanced job tasks.

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 indicated by Table 4, but only marginally so. This indicates that the effect of offshoring is similar across ownership groups, which is confirmed by the statistically insignificant interaction variables between foreign or multinational ownership and offshoring (columns three and eight).

In columns one, five and eight in Table 8, we include 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 still increase the demand for non-routine job tasks, but at a reduced rate. The ownership change from domestic to foreign does not increase the

demand for non-routine tasks when offshoring is included. A closer look at the results shows that the change is caused by a different (reduced) sample of firms rather than by the inclusion of offshoring: when we repeat the estimations for the reduced sample without the offshoring variable, the coefficients of ownership variables are identical to the ones in columns one, five and eight (not shown). Our conclusion is that differences in offshoring between different firms can not explain differences in job tasks.

Using our measure of tasks requiring personal interaction as a dependent variable generates the same results as in Tables 7 and 8: 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).

-- Table 8 about here--

Another plausible explanation for the results is that ownership is associated with firm size and that firm size impacts the demand for tasks. Large firms might, for instance, have a different structure of production and labor force, 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 conventional variable of 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.

As seen in Table 7, results do not change qualitatively: foreign firms and MNEs have a higher share of non-routine tasks after controlling for firm size and other characteristics. Note that large firms have less non-routine tasks, which may be explained by economies of scale in overhead functions.

The results for acquisitions in Table 8 are in line with our previous findings when we include firm size, but the effect is slightly reduced 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. Coefficients on all acquisitions were positive and statistically significant when firm size was included (not shown). We conclude 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).¹⁷

Finally, we show in columns four, eight and twelve in Table 8 how the effect of acquisitions on job tasks evolves over time. The effect of an ownership change from Swedish local firm to multinational is rather immediate, taking place mainly during the same year as the acquisition or within the next year. The result suggests that possible adjustment costs involved do not prolong the change in job tasks, and

¹⁷ Including only large firms does also control for a possible bias from missing export figures on small firms (see footnote 5).

that the acquisitions trigger MNEs to institute organizational changes that can be quickly realized.

Additional robustness checks

An important question is whether our results are valid also for alternative measures of job tasks? To examine this issue further, we first used a dependent variable with a more conservative classification where fewer tasks are regarded as non-routine and interactive (Becker et al., 2007). The results for personal interaction changed: 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.

Second, we use definitions of job tasks based on the definitions of Spitz-Oener (2006) in a study about technological change, job tasks and rising educational demand. Spitz-Oener's definition is based on the same German survey we use for our main tasks measures but with a different classification of job tasks.¹⁸ In columns 1 to 5 in Table 9 we present results for estimations using a measure of non-routine tasks based on Spitz-Oener's definition. Foreign and multinational firms have more non-routine job tasks, but shares are lower than for our main measure of non-routine job tasks. Similarly, ownership changes from domestic to foreign or to multinational firms

¹⁸ We thank Alexandra Spitz-Oener for sharing her definitions with us.

have a positive but relatively small effect on non-routine job tasks as seen in columns three and four. As expected, ownership changes from domestic MNEs to foreign ones have no effect on demand for non-routine tasks. To sum up, our main results seem to be robust to alternative definitions of job tasks but the size of the ownership effect differs slightly.

The effect of ownership on job tasks may be caused by effects on wages rather than employment since our dependent variables are defined as cost shares. 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 CEOs and other managers.¹⁹ 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.

We therefore run regressions using employment shares instead of labor cost shares as dependent variables in Table 9. As seen in columns 6 to 7, foreign and multinational firms still have higher shares of non-routine and interactive job tasks. The coefficients are marginally smaller than in Table 4, suggesting that higher wages in MNEs explain a part of the difference. Columns 8 to 10 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 are the coefficients smaller than in Table 6. One possible explanation for the smaller and less significant coefficients is that wage costs shares partly capture within occupational task upgrading which is reflected in higher wages.

--Table 9 about here--

¹⁹ See also Girma and Görg (2007) and Huttunen (2007) for other studies on acquisitions and wages.

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. Our variable on ICT is a sector level variable and, hence, implicitly assumes that technologies is similar across firms within sectors. Dropping our variable on ICT intensity did not have any major impact on the results. Moreover, we have also used firm-level R&D expenditures as an alternative technology variable, but, again, it had no major impact on the results.²⁰ We have followed previous studies and excluded the relative wage from the main estimations because of the obvious risk of an endogeneity problem. Including the relative wage increases the coefficients on the ownership variables slightly but has 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. Many assume that this development will decrease demand for unskilled employees and increase demand for skilled employees in developed countries. However, empirical studies find small effects of FDI on relative labor demand. One reason could be that the distinction between high- and low-skilled employees is not the most relevant.

We examine the effect of inward FDI on the demand for labor and define the division of labor in terms of job tasks according to the concepts of the recent literature on offshoring and international trade. We first examine the differences in job task compositions between foreign and local Swedish firms and between multinational and

²⁰ R&D is not available for firms with below 50 employees which is one reason why it is not included in the default specification.

local Swedish firms. We proceed with the effect of 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 of about 44 percent in the 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. The effect of an acquisition is rather immediate: the largest change occurs within two years after the acquisition. As expected by the theory on multinational firms, acquisitions of Swedish MNEs by foreign MNEs have no effect on labor demand.

The difference in job tasks declines when we control for various firm characteristics such as offshoring, but it does not disappear. Hence, an obvious area for future research is to further try to explain the difference in demand for tasks.

In line with previous studies, we also define our dependent variable in terms of educational attainment. We find that a classification of the labor force according to educational skills does not capture the effects found by using job tasks measures.

To sum up, FDI in a developed country such as Sweden increases relative demand for non-routine and interactive job tasks - job tasks that require proximity to other production activities and that can not be 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 of the 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
Sales and services elementary occupations	0.0	0.0

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

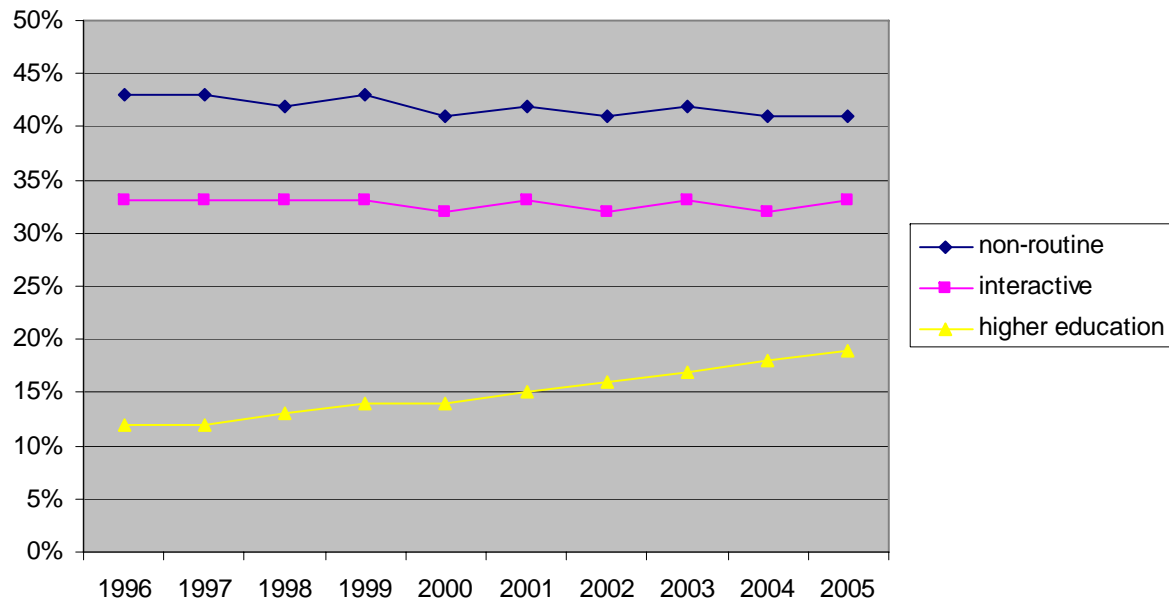


Table 2. Ownership, offshoring and job tasks.

	Share of number of firms	Off- shoring	Non- routine	Personal interaction	Higher education
All firms		0.06 (0.12)	0.44 (0.20)	0.34 (0.12)	0.20 (0.20)
Swedish local firms	0.66	0.04 (0.10)	0.41 (0.20)	0.34 (0.12)	0.20 (0.21)
Swedish multinational firms	0.12	0.07 (0.11)	0.48 (0.18)	0.35 (0.12)	0.20 (0.19)
Foreign firms	0.22	0.10 (0.16)	0.49 (0.18)	0.36 (0.11)	0.20 (0.17)

Note: Offshoring is imported intermediate goods as a share of sales. Higher education is employees with tertiary education. Non-routine tasks, personal interaction, and higher education are all defined as cost (wage) shares. 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)	0.45 (0.19)	0.46 (0.20)	0.34 (0.12)	0.35 (0.12)	0.17 (0.17)	0.20 (0.18)
Swedish local firms to foreign	0.04 (0.10)	0.05 (0.11)	0.45 (0.19)	0.45 (0.19)	0.34 (0.12)	0.34 (0.12)	0.17 (0.17)	0.18 (0.16)
Swedish MNE to foreign	0.09 (0.13)	0.08 (0.12)	0.45 (0.17)	0.48 (0.16)	0.34 (0.11)	0.35 (0.10)	0.16 (0.16)	0.19 (0.18)

Note: Offshoring is imported intermediate goods as a share of sales. Higher education is employees with tertiary education. Non-routine tasks, personal interaction, and higher education are all defined as cost (wage) shares. Standard deviations are shown within brackets.

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

	1	2	3	4	5	6	7	8	9	10	11	12
	Foreign Firms						Multinational Firms					
	Nonroutine Tasks		Interactive Tasks		Educational Skills		Nonroutine Tasks		Interactive Tasks		Educational Skills	
Ownership dummy	0.037 (0.004)***	0.024 (0.004)***	0.014 (0.003)***	0.008 (0.003)***	0.013 (0.004)***	0.003 (0.004)	0.043 (0.003)***	0.026 (0.004)***	0.017 (0.002)***	0.008 (0.002)***	0.026 (0.004)***	0.011 (0.004)***
Capital	--	-0.009 (0.001)***	--	-0.003 (0.001)***	--	-0.009 (0.001)***	--	-0.009 (0.001)***	--	-0.003 (0.001)***	--	-0.008 (0.001)***
Value added	--	0.017 (0.001)***	--	0.008 (0.001)***	--	0.017 (0.002)***	--	0.015 (0.001)***	--	0.008 (0.001)***	--	0.015 (0.002)***
ICT	--	0.019 (0.007)***	--	0.008 (0.005)	--	0.005 (0.007)	--	0.019 (0.007)***	--	0.008 (0.005)	--	0.005 (0.007)
Year dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
R2 adj.	0.52	0.54	0.45	0.46	0.49	0.50	0.52	0.54	0.45	0.46	0.49	0.51
No. of observations	28,567	27,746	28,567	27,746	25,788	25,008	28,567	27,746	28,567	27,746	25,788	25,008

Notes: The dependent variable is the wage cost share of the educational skill, non-routine tasks or interactive tasks of employees. 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	7	8	9
	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	From Swedish local to MNE	From Swedish local to foreign	From Swedish MNE to foreign
	Non-routine			Interactive			Educational skills		
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)	0.003 (0.003)	0.008 (0.005)	0.001 (0.005)
Capital	-0.002 (0.002)	-0.002 (0.002)	0.006 (0.005)	-0.001 (0.001)	-0.002 (0.001)	-0.003 (0.003)	-0.002 (0.002)	-0.002 (0.002)	-0.003 (0.004)
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)	-0.008 (0.003)***	-0.012 (0.003)***	-0.010 (0.005)**
ICT	-0.008 (0.009)	0.008 (0.010)	0.000 (0.016)	-0.005 (0.007)	-0.006 (0.008)	0.001 (0.010)	-0.001 (0.010)	0.008 (0.010)	0.023 (0.010)**
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)	0.01	0.01	0.03	0.01	0.01	0.02	0.13	0.01	0.22
No. of observations	17,268	16,534	2,232	17,268	16,534	2,232	14,747	16,534	2,210

Notes: The dependent variable in columns 1-3 is the wage cost share for employees with non-routine tasks, in columns 4-6 the wage cost share for employees with interactive tasks and in columns 7-9 is the wage cost share for employees with tertiary education. 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 asks. 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 MNE to foreign	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			Educational Skills		
Acquisition	0.007 (0.003)**	0.006 (0.004)*	0.005 (0.005)	0.013 (0.004)***	0.010 (0.005)**	0.007 (0.007)	0.003 (0.003)	0.000 (0.004)	0.000 (0.006)
Capital	-0.004 (0.002)	-0.000 (0.002)	-0.003 (0.004)	-0.005 (0.004)	-0.002 (0.003)	-0.003 (0.007)	-0.006 (0.003)*	-0.001 (0.002)	0.001 (0.006)
Value added	-0.005 (0.003)*	-0.003 (0.003)	-0.009 (0.005)*	-0.008 (0.005)	-0.005 (0.005)	-0.018 (0.007)**	-0.004 (0.004)	-0.001 (0.004)	-0.008 (0.005)
ICT	0.011 (0.012)	0.015 (0.014)	-0.002 (0.009)	0.021 (0.012)*	0.019 (0.018)	0.007 (0.014)	-0.009 (0.011)	0.011 (0.014)	0.022 (0.011)
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	0.02	0.02	0.01	0.03	0.18	0.18	0.20
No. of observations	3,778	2,566	1,492	3,778	2,566	1,492	3,502	2,352	1,474

Notes: The dependent variable in columns 1-3 is the wage cost share for employees with non-routine tasks, in columns 4-6 the wage cost share for employees with interactive tasks and in columns 7-9 is the wage cost share for employees with tertiary education. 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 7. The effect of ownership on the demand for non-routine job tasks controlling for additional firm characteristics 1996-2005.

	1	2	3	4	5	6	7	8	9	10
	Foreign Firms					Multinational Firms				
Ownership dummy	0.019 (0.004)***	0.019 (0.004)***	0.017 (0.005)***	0.025 (0.004)***	0.008 (0.002)***	0.023 (0.004)***	0.023 (0.004)***	0.023 (0.004)***	0.027 (0.003)***	0.008 (0.002)***
Offshoring	-0.043 (0.015)***	--	-0.058 (0.020)***	--	--	-0.046 (0.015)***	--	-0.052 (0.023)**	--	--
Offshoring high-income countries	--	-0.045 (0.016)***	--	--	--	--	-0.047 (0.016)***	--	--	--
Offshoring low-income countries	--	-0.012 (0.058)	--	--	--	--	-0.021 (0.057)	--	--	--
Offshoring * Foreign firms	--	--	0.027 (0.026)	--	--	--	--	0.008 (0.026)	--	--
Offshoring * Multinational	--	--	--	--	--	--	--	--	--	--
Log Firm size	--	--	--	-0.064 (0.004)***	--	--	--	--	-0.064 (0.004)***	--
Additional firm characteristics	No	No	No	No	Yes	No	No	No	No	Yes
Firm controls	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Year dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
R2 adj.	0.55	0.55	0.55	0.56	0.79	0.55	0.55	0.55	0.56	0.79
No. of observations	16,997	16,997	16,997	27,746	27,160	16,997	16,997	16,997	27,746	27,160

Notes: The dependent variable is the wage cost share for employees with non-routine tasks. 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. 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. 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 changes on the demand for non-routine job tasks controlling for additional firm characteristics.

	1	2	3	4	5	6	7	8	9	10	11	12
	From Swedish local to MNE				From Swedish local to foreign				From Swedish MNE to foreign			
Acquisition	0.011 (0.005)**	0.014 (0.005)***	0.010 (0.004)**		0.007 (0.005)	0.010 (0.005)**	0.008 (0.004)*		0.007 (0.007)	0.008 (0.007)	0.004 (0.006)	
Acquisition (t=0)				0.009 (0.004)**				0.006 (0.004)				0.009 (0.006)
Acquisition (t+1)				0.012 (0.005)**				0.006 (0.005)				0.005 (0.007)
Acquisition (t+2)				0.008 (0.006)				0.004 (0.008)				0.008 (0.007)
Offshoring	0.023 (0.041)				-0.023 (0.057)				-0.031 (0.048)			
Log Firm size		-0.027 (0.009)***				-0.022 (0.011)**	--			-0.039 (0.017)**	--	
Additional firm characteristics		No	Yes			No	Yes			No	Yes	
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.02	0.02	0.29	0.02	0.02	0.02	0.17	0.01	0.03	0.04	0.38	
No. of observations	2,454	3,778	3,769	3,778	1,722	2,566	2,564	2,566	1,351	1,492	1,490	0.03
												1,492

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. 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. Offshoring is a firm-level variable defined as the share of imported intermediate goods in total sales. Firm controls are the same as in Tables 4 and 6, i.e log capital intensity, log value added and ICT-capital 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. 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 changes on the demand for non-routine job tasks. Alternative dependent variables.

	1	2	3	4	5	6	7	8	9	10
	Foreign firms vs. Domestic firms	MNEs vs. Swedish local firms	From Swedish local to MNE	From Swedish local to foreign	From Swedish MNE to foreign	Foreign firms vs. Domestic firms	MNEs vs. Swedish local firms	From Swedish local to MNE	From Swedish local to foreign	From Swedish MNE to foreign
	Spitz-Oener					Non-routine employment shares				
Foreign Firms	0.005* (0.003)	--	--			0.021 (0.004)***	--	--		
Multinational	--	0.005 (0.003)**	--	--	--	--	0.023 (0.004)***	--	--	--
Acquisition	--	--	0.009 (0.004)**	0.009 (0.004)**	0.005 (0.008)	--	--	0.005 (0.005)	0.006 (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	0.58	0.58	0.02	0.02	0.03	0.56	0.56	0.01	0.01	0.01
No. of obs.	27,746	27,746	3,778	2,566	1,492	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 non-routine tasks according Spitz-Oener's definitions. 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, for 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 for 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)
ICT	Capital compensation for computing and communications equipment as a share of total capital compensation	0.226 (0.186)	0.219 (0.183)	0.240 (0.191)	0.237 (0.181)
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. The task shares are constructed as a share of non-routine (or interactive) job tasks in the total job tasks of an employee with a certain occupation. The firm-level wages cost shares are the sum of the task shares multiplied with the wage costs of the employees in total wages costs.

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.