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Globalization, occupational restructuring and firm performance[1]

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Abstract: In this study, the patterns of occupational restructuring and their micro-level mechanisms are examined by applying standard measures of job and worker flows at the occupation and firm levels using longitudinal employer-employee data from the Finnish business sector for the years 2000-2006. Special attention is given to determining how global firms (i.e., multinational enterprises and offshoring firms) contribute to occupational restructuring and to establishing the role of occupational structures when explaining productivity and profitability gaps between global and local firms. The findings indicate that global firms have contributed to reshaping occupational structures, and although this contribution is clearly reflected in their productivity, it is not as clearly reflected in their profitability. The findings imply that employees have captured a dominant share of the productivity advantage of global firms.

Keywords: globalization, offshoring, occupational restructuring, productivity, profitability

JEL Codes: J24, F23

Tiivistelmä: Tutkimuksessa tarkastellaan ammattirakenteiden muutosta ja sen mikrotason mekanismeja soveltamalla perinteisiä työpaikka- ja työntekijävirtamittaimia ammattiryhmä- ja yritystasolla. Aineistona käytetään pitkittäistä työntekijä-työantaja-aineistoa Suomen yrityssektorilla vuosina 2000–2006. Erityistä huomiota kiinnitetään siihen, miten globaalit yritykset (so. monikansalliset yritykset tai sellaiset yritykset, jotka ovat siirtäneet toimintoja ulkomaille) vaikuttavat ammattirakenteiden muutokseen sekä siihen, miten ammattirakenteiden erot selittävät globaalien ja paikallisten yritysten välillä havaittavaa tuottavuuden ja kannattavuuden eroa. Tulokset kertovat, että globaaleilla yrityksillä on ollut merkittävä vaikutus yrityssektorin ammattirakenteiden muutokseen ja että ammattirakenne selittää osan globaalien ja paikallisten yritysten välillä havaittavasta tuottavuuserosta. Toisaalta kannattavuudessa vastaavaa eroa ei havaita, mikä kertoo siitä, että globaalien yritysten henkilökunta hyötyy tuottavuusedusta.

Avainsanat: globalisaatio, offshoring, ammattirakenteiden muutos, tuottavuus, kannattavuus

JEL-luokat: J24, F23

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1 Introduction

Algebraically, economic growth is the sum of the growth of labor productivity and labor input. In the long term, because labor productivity growth is dominant, its sources and mechanisms are of great importance not only for policy makers but also for society as a whole. Ultimately, because labor productivity growth is based on technological progress, its greatest productivity effects typically give rise to through incessant restructuring of various forms (job and worker flows) and at various levels of aggregation (industry, firm and occupation). Accordingly, while the importance of globalization as a factor of technological progress and technology diffusion and as a driver of restructuring is widely acknowledged, to fully understand the effects of globalization on labor market dynamics and economic growth, a more detailed analysis of the micro-level mechanisms of restructuring is necessary.

This paper examines how global firms contribute to the patterns of micro-level restructuring and gives special attention to the role of occupational structures and links to productivity and profitability. For a detailed account of micro-level mechanisms of occupational restructuring, a breakdown by job creation and job destruction at the firm and occupational levels, on the one hand, and by hiring and separation at the individual level, on the other hand, is employed. Decomposition is performed by applying standard measures of job and worker flows (Davis and Haltiwanger 1999). Distinct from local firms, in this analysis, global firms refer either to domestic- or foreign-owned multinational enterprises (MNEs) or to firms that have offshored abroad some of their core business functions. Longitudinal employer-employee data with an almost complete coverage of the Finnish business sector provide exceptional opportunities for this type of empirical analysis.

The main findings are as follows. 1) Echoing findings from a number of other developed countries (e.g. Goos et al. 2010), the results are indicative of “job polarization” between 2000 and 2006, i.e., net job creation is lowest among medium-wage occupations. 2) Restructuring at both the industry and firm levels has contributed to the polarization, particularly by decreasing the employment share of medium-wage occupations (plant operators and craftsmen) and increasing the share of low-wage occupations (elementary and service jobs). In contrast, a strong increase in the employment share of manager occupations is predominantly an

intra-firm development. 3) Job polarization patterns appear to emerge primarily from the "creation side" (i.e., job creation and worker hiring), which has a strikingly pronounced U-shape pattern over occupations sorted by wage level, whereas the "destruction side" (i.e., job destruction and worker separation) exhibits significantly flatter patterns. 4) MNEs and offshoring[2] firms play an important role in reshaping occupational structures, particularly in the manufacturing sector. 5) Differences in occupational structures explain a significant portion of the productivity gap between local and global firms, even after careful control for the industry effects, education effects (in terms of field and level) and age structures of the labor force. 6) Because the productivity gaps between local and global firms are narrower than the wage gaps, global firms negatively contribute to the labor income share in industries.

Productivity-enhancing restructuring takes different forms, which should be kept separate. They involve an increase in the industrial sector at the expense of the agricultural sector (*industry-level restructuring*) or the reallocation of labor and other factors of production between efficient and inefficient firms (*between firms within industry restructuring*) (Foster et al. 2001). However, at bottom, productivity growth process involves *occupational restructuring* (i.e., the employment shares of occupations change) that may take the form of reallocation between firms (within a total economy and within industries) or within firms.

The latter mechanism has become, at least potentially, increasingly relevant, as both the globalization and rapid development of information and communication technology makes it increasingly easy for a firm to unbundle tasks[3] and thus change its occupational structure by outsourcing (including both domestic outsourcing and offshoring) certain tasks (e.g. Baldwin 2012). Productivity effects at the firm level, as well as that of the total economy, depend on the manner in which outsourcing and technological progress transform the employment structures between low-, medium- and high-value-added tasks.

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[2] Offshoring firms (also called international sourcing firms) refer to firms that have moved their business functions abroad. These include MNEs that have moved business functions abroad within the firm but also non-MNEs that have outsourced business functions to external suppliers abroad. For example, Becker et al. (2009) focus on the offshoring activities of MNEs.

[3] Ultimately, we are interested in the restructuring of tasks, but an empirically feasible approach to examine it is based on the analysis of occupations.

From the perspective of the total economy, the types of business functions and tasks that are sourced abroad, i.e., offshoring's contributions to occupational restructuring are of particular interest. Offshoring, however, is not necessarily only limited to low-skilled employees. It may also destroy jobs for highly skilled employees (Baldwin 2006, Blinder 2009, Baldwin 2012). The literature has increasingly focused on the impact of globalization (along with technological change) on the demand for educational skills and tasks.[4] The employment shares of high-wage occupations have increased in the most developed countries, suggesting that globalization has led to a restructuring that favors high-value-added tasks and has thus contributed to an increase in value added per employee. However, there is also an increasing amount of empirical evidence of "job polarization" in developed countries, whereby the employment shares of both high- and low-wage occupations have increased at the expense of medium-wage occupations.[5] Consequently, if the wage differentials between occupations reflect those of productivity, the net effect of occupational restructuring on value added per person in developed countries remains to be empirically confirmed.

To shed light on the associated mechanisms, an occupational restructuring analysis can be augmented that of job creation[6] and destruction[7], i.e., job flows, or that of worker inflow (hiring) and worker outflow (separation) (Bauer and Bender 2004, Abowd et al. 1999, Askenazy and Moreno-Galbis 2007). As occupational restructuring is a consequence of differential net employment changes in occupations and because the net employment change is the difference between job creation and job destruction, the job flow perspective allows for a somewhat more detailed consideration of the mechanisms underlying occupational restructuring. Clearly, offshoring can be expected to reshape occupational structures from the destruction side of the net employment change. Furthermore, the importance of offshoring as a driver of micro-level dynamics in the economy can be judged by comparing the number of jobs destroyed by offshoring to all jobs destroyed in the economy. Generally, job destruction is very intensive, at approximately 10 per

[4] See a review by Acemoglu and Autor (2011) and the references therein.

[5] For recent studies, see, for example, Acemoglu and Autor (2011) and Goos, Manning and Salomons (2010).

[6] Job creation means that a firm has increased employment between two points of time.

[7] Job destruction means that a firm has decreased employment between two points in time

cent annually, in Finland (Ilmakunnas and Maliranta 2003) and many other developed countries (Davis and Haltiwanger 1999). In the end, occupational restructuring is a consequence of worker inflow and outflow between occupations. These flows can be further decomposed into internal (promotions or demotions within firms) and external (promotions or demotions across firms) (Askenazy and Moreno Galbis 2007, Bauer and Bender 2004).

Jaimovich and Siu (2012) show that in the Unites States polarization has predominantly taken place during recessions when the medium-wage jobs have experienced strongly negative net employment growth whereas low- and high-wage jobs have been better secured from such losses. Hence it is interesting to examine the patterns of occupational restructuring in Finland years 2000-2006, which was a period of a favourable economic development.

The remainder of this paper is organized as follows. Section 2 describes the methods for measuring the micro-level mechanisms of occupational restructuring and links with productivity growth. Section 3 provides an empirical analysis of occupational restructuring, and Section 4 presents the analysis of productivity and profitability gaps. Section 5 concludes the paper.

2 Productivity, occupational restructuring and underlying micro-level dynamics

A simple approach to assessing the role of occupational restructuring is based on a standard production function augmented by measures of occupational structures as follows:

$$\ln\frac{Q}{L} = \sum_{k=2}\phi_k^* S_k + \alpha_K \ln\frac{K}{L} + \left(1-\alpha_K-\alpha_L\right)\ln L + \ln A, \qquad (1)$$

where Q denotes output, L denotes labor input, K denotes capital, and A denotes technology. Variable $S_k = \frac{L_k}{L}$ indicates the labor input (employment) share of occupation k. In this formulation, occupation group k = 1 is set as the base group (which is omitted in the regression model). The coefficient of the occupation share variable for occupation k ($k \neq 1$) is $\phi_k^* = \alpha_L \phi_k$, where ϕ_k approximates the relative productivity difference between the base group (k=1) and occupation k ($k \neq 1$) (Hellerstein et al. 1999, Ilmakunnas and Maliranta 2005).

Differencing Equation (1) over time provides us with the following formula for the relationship between productivity growth and occupational restructuring:

$$\Delta \ln \frac{Q}{L} = \sum_{k=2} \phi_k^* \Delta S_k + \alpha_K \Delta \ln \frac{K}{L} + \left(1 - \alpha_K - \alpha_L\right) \Delta \ln L + \Delta \ln A \qquad (2)$$

The patterns of occupational restructuring are captured by the terms ΔS_k (k = 2, …).

Equation (2) can be applied at different levels of aggregation, i.e., at the levels of the total economy, industries, and firms (or plants). The employment share of occupation k at the total economy level can be decomposed into industry-level sources using a shift-share analysis based on the decomposition method established by Berman, Bound, and Griliches (Berman et al. 1994):

$$\Delta S_k = \sum_{jk} \Delta S_{jk} \overline{W_j} + \sum_{jk} \overline{S}_{jk} \Delta W_j , \qquad (3)$$

for j = 1, …, N industries. $\Delta S_{jk} = \frac{L_{jkt}}{L_{jt}} - \frac{L_{jk,t-1}}{L_{j,t-1}}$ is the change in employment share for occupation k in industry j from year t-1 to t, $\overline{W_j} = 0.5\left(\frac{L_{j,t-1}}{L_{t-1}} + \frac{L_{jt}}{L_t}\right)$ is the average employment share for industry j in years t and t-1, $\overline{S}_{jk} = 0.5\left(\frac{L_{jk,t-1}}{L_{j,t-1}} + \frac{L_{jkt}}{L_{jt}}\right)$ is the average employment share for occupation k, and $\Delta W_j = \frac{L_{jt}}{L_t} - \frac{L_{j,t-1}}{L_{t-1}}$ is the change in employment share for industry j from year t-1 to t.

The first term on the right-hand side of Equation (3) gauges the change in the aggregate employment share for occupation k within industries. In other words, the first term is the weighted average change in the employment shares in the industries, where each industry is weighted by its average employment share in years t-1 and t. The second term in Equation (3) measures the change in employment share attributable to shifts in employment shares between industries with different occupational structures. In other words, the use of Equation (3) allows the effect of changing industry structures on the occupational structure in the total economy to be isolated.

A similar concept underlying Equation (3) can be used to decompose the change in employment share for occupation *k* in industry *j* into firm (or plant)-level components. However, as opposed to industries, firms (and plants) make entries and exits. As noted by Vainiomäki (1999), Equation (3) can be applied to firm-level (or plant-level) decompositions with slight modifications to include the contributions of entries and exits as follows:

$$\Delta S_k = \sum_{ik} \Delta S_{ik}^C \overline{W}_i^C + \sum_{ik} \overline{S}_{ik}^C \Delta W_i^C + W_i^N \left(S_{kt}^N - S_{kt}^C \right) + W_i^D \left(S_{k,t-1}^C - S_{k,t-1}^D \right), \quad (4)$$

where superscript *C* denotes continuing firms or plants (i.e., those that appear in both *t*-1 and *t*), *N* denotes new firms (i.e., those that appear in *t* but not in *t*-1), and *D* denotes exiting firms (i.e., those that exist in *t*-1 but not in *t*). $W_i^N = \frac{L_t^N}{L_t}$ is the employment share of new firms (in year *t*), and $W_i^D = \frac{L_{t-1}^D}{L_{t-1}}$ is the employment share of exiting firms (in year *t*-1). This decomposition can be applied separately to each industry, to the entire sector or to the total economy.

The interpretation of the first two terms on the right-hand side of Equation (4) is similar to that of Equation (3). The third component indicates the contribution of entries, which is positive when the employment share for occupation *k* in new firms is higher than in continuing firms (i.e., $S_{kt}^N > S_{kt}^C$). The fourth component indicates the contribution of exits, which is positive when the employment share for occupation *k* in exiting firms is lower than in continuing firms. Note that according to Equation (4), the net effect of entries and exits on the employment share change for occupation *k* is the difference of the change among all firms and the change among continuing firms only. Accordingly, the net entry is equal to $\Delta S_k - \Delta S_k^C$ ($\Delta S_k^C = \sum_{ik} \Delta S_{ik}^C \overline{W}_i^C + \sum_{ijk} \overline{S}_{ik}^C \Delta W_i^C$).

Job creation for occupation *k* is defined as the sum of positive employment changes for occupation *k* in firms. The job creation rate for occupation *k* (JCR_k) is obtained as $JCR_k = \sum_i \Delta L_{ik}^+ \Big/ \sum_i \overline{L}_{ik}$, where the superscript "+" refers to positive changes and $\overline{L}_{ik} = 0.5\left(L_{ikt} + L_{ik,t-1} \right)$. Correspondingly, job destruction for occupation *k* is defined as the sum of the absolute values of negative employment chang-

es for occupation *k* in firms. The job destruction rate for occupation *k* (JDR_k) is computed as $JDR_k = \sum_i \left|\Delta L_{ik}^-\right| \Big/ \sum_i \overline{L}_{ik}$, where the superscript "-" refers to negative changes. Using these definitions, the rate of net employment for occupation *k* ($NETR_k$) is obtained as

$$NETR_k = \frac{L_{kt} - L_{k,t-1}}{\overline{L}_k} = JCR_k - JDR_k \tag{6}$$

Note that $\Delta S_k > 0$ implies that $NETR_k > NETR$, where $NETR = \left(L_t - L_{t-1}\right)\Big/\overline{L}$ is the total net employment growth. Furthermore, $\Delta S_k > 0$ implies that $JCR_k > JCR$ or $JDR_k < JDR$ or both, where $JCR = \sum_i \Delta L_i^+ \Big/ \sum_i \overline{L}_i$ and $JDR = \sum_i \left|\Delta L_i^-\right| \Big/ \sum_i \overline{L}_i$.

Finally, occupational restructuring reflects patterns of worker inflow and outflow across and within firms. Worker inflow into occupation *k* consists of employees who worked in occupation *k* of firm *i* in year *t* but not in year *t*-1. The number of hired workers is H_{ik}. The worker inflow rate of occupation *k* is obtained as $WIFR_k = \sum_i H_{ik} \Big/ \overline{L}_k$. Analogously, worker outflow from occupation *k* consists of employees who worked in occupation *k* of firm *i* in year *t*-1 but not in year *t*. The number of separated workers is indicated by S_{ik}. The worker outflow rate for occupation *k* is $WOFR_k = \sum_i S_{ik} \Big/ \overline{L}_k$. The rate of net employment for occupation *k* ($NETR_k$) can now be presented as

$$NETR_k = WIFR_k - WOFR_k \left(= JCR_k - JDR_k\right) \tag{7}$$

Worker inflow can be divided into two components. The first component is the internal worker inflow, which consists of employees who work in year *t* in the same firm as in year *t*-1 but in a different occupation. The number of these workers is H_{ik}^{INT}. The second component is the external worker inflow, which consists of employees who have changed both their occupation and firm. The number of these workers is H_{ik}^{EXT}. Worker outflow can be decomposed in a similar manner. The net employment growth rate of occupation *k* is now presented as

$$NETR_k = \left(WIFR_k^{INT} + WIFR_k^{EXT}\right) - \left(WOFR_k^{INT} + WOFR_k^{EXT}\right), \tag{8}$$

where $WIFR_k^{INT} = \sum_i H_{ik}^{INT} \Big/ \sum_i \overline{L}_{ik}$,

$$WIFR_k^{EXT} = \sum_i H_{ik}^{EXT} \Big/ \sum_i \overline{L}_{ik} \,,$$

$$WOFR_k^{INT} = \sum_i S_{ik}^{INT} \Big/ \sum_i \overline{L}_{ik} \quad \text{and}$$

$$WOFR_k^{EXT} = \sum_i S_{ik}^{EXT} \Big/ \sum_i \overline{L}_{ik} \,.$$

3 Occupational restructuring and the role of globalization in the Finnish business sector

3.1 Data

The empirical analysis of this paper makes use of the *Finnish Longitudinal Employer-Employee Data* (FLEED), which is a by-product of the Finnish administrative registry network and the Finnish statistical system, whose backbones are the unique identification codes for persons, companies and plants that are used in the various registers and surveys. This source (FLEED) provides an excellent opportunity to construct cross-sectional and dynamic representative data for various research purposes by linking different administrative and survey data sources (see Abowd and Kramarz 1999). These sources include employment statistics, educational statistics, taxation records, business registers, financial statement statistics, and structural business statistics surveys, among others. As a result, the FLEED includes comprehensive information about all labor force members as well as employers/enterprises (including information on their establishments) subject to value-added tax (VAT). Information on the occupation of individuals, which is one of the main interests in this paper, originates from employment statistics data. The occupation variable is based on the ISCO-88 classification scheme[8], and it is available for years 1990, 1993, 1995, 2000 and 2004-2007. As both the plant and firm codes are available for each employed individual, our data allow us to examine occupational structures at the firm and plant levels[9].

Information on the globalization of businesses, which is the second area of interest, is derived from two different data sources. The business register includes information that allows us to make a distinction between local and global firms. The latter firms can be further categorized as foreign-owned multinational enterprises (foreign MNEs) and domestic-owned multinational enterprises (domestic

[8] For more detailed information, see http://tilastokeskus.fi/meta/luokitukset/ammatti/001-2001/index_en.html (accessed 4 June 2012).

[9] An analysis of the micro-level dynamics at the plant level (instead of firm level) is useful, as it provides a robustness check.

MNEs), which refers to the domestic-owned Finnish firms that have foreign affiliates.

Another important globalization-related distinction between firms applied in this study pertains to whether a firm has moved its business functions abroad (i.e., offshored its jobs during a certain period). Note that with this classification, "global firms" may also include domestic-owned firms that do not have foreign affiliates (i.e., non-MNEs). Information for this classification is obtained by linking the international sourcing survey that determines whether a firm has sourced its functions internationally in the period 2001-2006 (see Statistics Denmark et al. 2008). The international sourcing survey is a census for those firms that employ at least 100 persons (the response rate was 83%) and for a random sample of smaller firms. Due to the questionnaire's framework, the data cover a large proportion of the total employment in the Finnish business sector. For instance, in manufacturing, the coverage is 60%, and in the services industry, it is 46% for firms employing at least 5 persons (compare tables A.1 and A.3 in Appendix 1).

In addition to the occupational structures and globalization of the firms, we are interested in firm performance with respect to productivity and profitability. Information for measuring labor productivity (value added per labor input) and profitability (operating margin per value added) and estimating the production function is obtained from the Structural Business Statistics database. For larger firms, this information originates from detailed annual surveys,[10] and for the remaining firms, information is obtained from administrative sources.[11]

Tables A.1-A.3 in Appendix 1 introduce the industry classification scheme used in this study. In addition, some descriptive statistics on our data for the year 2006 are presented.

[10] As a rule, "larger firms" refers to those employing at least 20 persons, but the limit may vary to some extent between sectors.

[11] For the firms that are not covered in the Structural Business Statistics survey, information on the number of persons employed is obtained from the business register. Generally, this information comes from the survey conducted by the business register for firms employing at least 5 persons. For smaller firms, the employment variable is estimated based on wages.

3.2 Occupational restructuring

In sub-section 3.2.1, we first portray the general features of occupational restructuring in the Finnish business sector. We then examine the roles of job flows (i.e., job creation and destruction) and worker flows (i.e., hiring and separation). With this backdrop, we then assess the role of globalization by examining the corresponding developments among global firms (i.e., in the domestic- and foreign-owned MNEs) in sub-section 3.2.2. Finally, in sub-section 3.2.3, we compare occupational restructuring between offshoring (firms that have moved functions abroad in the period 2001-2006) and non-offshoring firms. To maintain coherency, we focus on the period from 2000 to 2006, which is a natural time window for an analysis using the International Sourcing survey, which refers to actions undertaken in the period 2001-2006. All computations are also performed for the period 2000-2005, and the results are found to be quite similar.

Our analysis of occupational restructuring is based on the ISCO-88 classification at the 1-digit level. As our analysis focuses on the business sector, we have excluded the armed forces as well as workers in the agricultural and fishery industries. Consequently, we are left with eight main occupation groups, which are presented in Table 1 with their associated 2-digit groups. We have also included five measures of skill content and offshorability that were obtained from the study by Goos, Manning and Salomons (2010). According to these indicators, occupations that are facing the greatest threat due to globalization (i.e., have a high level of offshorability) are plant and machine operators and assemblers (ISCO 8), clerks (ISCO 4) and craftsmen and related trade workers (ISCO 7).

< TABLE 1 ABOUT HERE >

3.2.1 General patterns and underlying micro-level dynamics

Table 2 provides some descriptive statistics on the development of employment and occupational structures by sector and year. The data come from almost 30,000 firms, which employ roughly one million persons per year. The employment share of managers exhibits an increasing trend over time in all three sectors. The share

of the craft occupation has declined, particularly in the manufacturing sector, while the employment shares of the service and elementary occupations have been reasonably stable within sectors.

< TABLE 2 ABOUT HERE >

Figure 1 presents the changes in the employment shares by occupation in percentages between 2000 and 2006 for the total business sector and separately for the manufacturing and service sectors. In this figure and those following, the occupations have been ordered by the annual gross earnings, obtained from the Eurostat, of the full-time employees in Finland in 2000. Each of the three panels in Figure 1 includes three lines. The first is "Aggregate", which indicates changes in the total population. The second is "Within industries", where the effect of changing industry structures is eliminated.[12] The third is "Within firms", where the effect of micro-level restructuring within industries due to entries, exits and reallocations between continuing firms is removed.[13]

Figure 1 displays an apparent polarization in the occupational structures in the Finnish business sector. Highly paid managerial and professional occupations, as well as low-paid service and elementary occupations, exhibit noticeably increased employment shares, whereas the employment shares of craft and plant operator occupations exhibit an equally noticeable decline. Looking deeper to identify the underlying mechanisms by controlling for the effect of changing industry structures, we find that an increase in service occupations and a decrease in plant operator occupations can be largely attributed to the industry-level restructuring (i.e., the share of service occupations has increased at the aggregate level but not within industries). An analogous treatment of the firm-level restructuring within industries further changes the patterns of occupational restructuring in the same direction. Accordingly, at the firm level, occupational restructuring has been somewhat less dramatic (i.e., the pattern of the changes is flatter), with the exception that the employment share of manager occupations has substantially increased, while the craft occupation has declined regardless of whether industry- or

[12] This effect is eliminated by performing the computations separately for each industry and then aggregating these results using the average employment shares of industries in 2000 and 2006 according to Equation (3).

firm-level restructuring is taken into account. Examining the results for the manufacturing sector separately provides some support for the view that the right-hand (i.e., low-wage) side of the polarization of occupational structures largely reflects the increase in the service sector. Interestingly, the figure shows that the employment share of plant operation occupations has substantially increased within manufacturing firms. However, the employment share of the craft occupation has decreased substantially. The bottom panel of Figure 1 shows that the increase in the employment shares for manager occupations pertains to the service sector industries as well. In addition, at least some indication of polarization can be observed in the service sector, and restructuring at the industry and firm levels appears to play a role in driving the patterns of the changes.

An examination of growth *rates* of the occupational employment shares in Figure 2 indicates even more striking patterns in the occupational restructuring of the business sector.[14] In relative terms, the growth of the employment share of manager occupations is outstanding, and the decline of craftsman, clerks and plant operator occupations is notable. However, the pattern for the manufacturing sectoring indicates considerable bias toward higher paying occupations, i.e., there is a positive relationship between the employment growth and wage level of the occupation, which is indicative of skill upgrading in the manufacturing sector. The service sector witnesses a dramatic growth rate of jobs in manager occupations, but otherwise, the pattern of growth rates by occupation exhibits a relatively pronounced polarization tendency.

<FIGURE 1 ABOUT HERE>

<FIGURE 2 ABOUT HERE>

We previously noted that the employment shares of high-wage occupations have increased while those of medium-wage occupations have decreased in the total business sector. These trends are due to the fact that the net employment growth has been lower in medium-wage occupations than in high-wage occupations. Net employment growth, in turn, is an outcome of the difference in the job

[13] This has been performed by applying Equation (4).

[14] Growth rates are computed by using the average employment shares of the occupation group in 2000 and 2006 as a denominator.

creation and job destruction rates, as indicated by Equation (6). Figure 3 presents job creation and destruction rates by occupation (performed at the firm level) separately for the total business, manufacturing and service sectors.

The upper panel of Figure 3 indicates that job destruction rates are surprisingly uniform across occupations with the exception of manager occupations, which have had a low destruction rate. We also see that the low net employment growth (relative to other occupations) in medium-wage occupations is primarily due to a low job creation rate rather than to a high job destruction rate, as evidenced by the U-shaped pattern of net employment changes found in Figure 2 that is due more to a U-shaped pattern of job creation than to the inverted U-shaped pattern of job destruction. However, the results for the manufacturing sector indicate an increasing tendency in the destruction rates toward lower-wage occupations. Again, we find an indication of a polarization of job creation rates. As for the service sector, the pattern of job destruction is reasonably flat, but again, the lowest job creation rates are found in medium-wage occupations. As a whole, a breakdown of the net employment changes into two components, job creation and job destruction, reveals that the polarization tendencies are more discernible on the creation side.

<FIGURE 3 ABOUT HERE>

At an even deeper level, we examine the occupational patterns of worker flows (Figure 4). Consistent with the findings for job flows, we find that the relatively low net employment growth rates in medium-wage occupations are not due to high separations (quits and layoffs) but rather to low hiring rates. As expected based on the job flows, the results for the manufacturing sector indicate even stronger polarization on the hiring side. In turn, the separation side of the net employment growth exhibits an upward trend. In the service sector, we find a U-shaped pattern for the hiring rates and a reasonably flat pattern for the separation rates, again with the exception of manager occupations.

<FIGURE 4 ABOUT HERE>

To conclude the analysis of the general patterns of micro-level dynamics underlying the occupational restructuring, a distinction between internal (i.e., within firms) and external (i.e., between firms) hiring and separation has been made. Figures for external worker flows are shown in Appendix (Figure A.1). A strong polarization tendency is found in external hiring (the hiring rates are highest in the two lowest-wage occupations) for the total business sector. As for internal hiring, we find a downward-sloping tendency (not shown). In the manufacturing sector, external hiring is lowest in medium-wage occupations, the clerk occupation in particular. Finally, we find that external separations are clearly highest in elementary and service occupations and lowest in manager occupations.

The computations performed for Figures 1 to 4 have been repeated with plant-level data as well. These analyses displayed patterns that were quite similar to those displayed by firm-level data.

3.2.2 Role of multinational enterprises

Figure 5 presents occupational structures in 1) local firms (i.e., domestic firms that do not have foreign affiliates), 2) domestic MNEs[15], and 3) foreign MNEs

[15] These firms are domestic enterprises that have foreign affiliates.

during 2006. To remove the effect of differential industry compositions, the industry structures are standardized for comparison purposes by performing the computations separately for each industry and then aggregating the industry-level results to the level of the entire sector (manufacturing and service) using average employment shares. Two features in Figure 5 concerning the manufacturing sector merit attention. First, when compared to local firms, multinational firms clearly have higher shares of professional and technician occupations and lower shares of craft occupations. Second, the relevant distinction lies between local and multinational firms, not between domestic- and foreign-owned firms (see Pfaffermayr and Bellak 2002). In fact, the differences between domestic and foreign MNEs are strikingly minor. To determine the extent to which differences in the occupational patterns could emerge from the differential size structures of local firms and MNEs, we have also repeated these computations by including only firms that employ at least 100 persons. While these results are not reported herein, we briefly note that they have patterns similar to those presented above. The lower panel of Figure 5 displays similar comparisons for the service sector industries. Again, local and globalized firms are found to have differential occupational structures.

<FIGURE 5 ABOUT HERE>

To determine whether these differential structures between globalized and local firms are a recent feature, we examine the changes in the occupational structures in these different firm groups between 2000 and 2006.[16] Again, we control for the effect of differential industry structures between local and global firms by standardizing the industry structures. Figure 6 indicates that an important part of the differential occupational structures between local and global firms has occurred in the globalized firms of the manufacturing sector after 2000. The employment shares of professional and technician occupations have increased more in global firms (domestic and foreign MNEs) than in local firms, while the employment shares of manager and elementary occupations have increased in local firms more than in global firms. The lower panel of Figure 6 shows the results for the service sector industries. The trends for these industries differ markedly from those of the manufacturing sector. Furthermore, the changes in occupational struc-

[16] Here, we focus on continuing firms. The firms are classified based on the situation in 2006.

tures exhibit a U-shaped pattern for local firms, whereas the pattern of restructuring in global firms is less clear.

<FIGURE 6 ABOUT HERE>

3.2.3 Role of offshoring

The patterns of occupational restructuring in the firms that have offshored their functions between 2000 and 2006 differ from those firms that are not offshored. Offshoring activity is identified by using data from the international sourcing survey in Finland. The upper panel of Figure 7 illustrates the results for the manufacturing sector. The figure displays the transitions of the employment shares from craft occupations to professional and technician occupations in the offshoring firms, while such transitions appear to be quite modest in the non-offshoring firms. Again, to improve the comparability of the patterns between these two firm groups, the industry structures have been standardized. The difference in this pattern between the firm groups is even more pronounced when the comparison is restricted to those firms that employ at least 100 persons (results are not reported herein). In the service sector, the patterns of occupational restructuring are less systematic.

<FIGURE 7 ABOUT HERE>

4 Firm performance, occupational structures and global firms

4.1 Firm productivity

In the previous sections, we saw that the employment shares of high-wage occupations have increased during the 2000s. This transition, particularly in the manufacturing sector, can be attributed to globalized firms (domestic- and foreign-owned MNEs) and those firms that have offshored their functions overseas. We now examine the extent to which these patterns of occupational restructuring are reflected in the productivity (and profitability) of firms. A standard production function is estimated in which the level of a firm's labor productivity is explained by the occupational structure and by other relevant factors, such as capital intensity (capital per labor). In particular, which part of the productivity gap between local and global firms can be attributed to differential occupational structures?

The results reported in Table 3 imply that the productivity level of the firm has a strong link with the occupational structures in the business sector (columns (1) to (3)), manufacturing sector (columns (4) to (6)) and service sector (columns (7) to (9)), in an anticipated manner. Generally, high productivity levels are associated with the high employment shares of managers and professionals, and low productivity levels are associated with high employment shares in service occupations. As shown in Section 2, the regression coefficients can be used to measure the relative productivity levels of the different occupation groups.

The results of the productivity levels are illustrated in Figure 8. As in previous figures, the occupation groups are ordered by the relative wage levels. As noted previously, we see that the relative productivity level of the occupation group decreases with decreasing wage level, with the exception of clerks, who have a relative productivity level that is higher than that which can be expected based on

their wages.[17] Generally, similar patterns can be found in all sectors to some degree.

These findings indicate that offshoring may increase productivity in the home country via occupational restructuring. Interestingly, the role of occupational structure appears to be significant, even when the effects of education level and field of labor are controlled for, as shown in columns (2), (5) and (8).

<TABLE 3 ABOUT HERE>

<FIGURE 8 ABOUT HERE>

The level and field of education clearly play an important role. Our findings are consistent with the view that the task is an important determinant of productivity and that education contributes to productivity by enabling workers to perform highly productive tasks. When we also control for the independent effect of education, occupation still exerts a positive effect on productivity, particularly for managers (see Figure 8).

In this paper, we are interested in determining the proportion of the productivity gap between local and multinational firms (domestic and foreign) that can be attributed to differences in occupational structures. To do so, we first estimate the size of the productivity gap with and without control of the firm's occupational structure and then compute the difference between the productivity gaps in these two estimations. Using a seemingly unrelated estimation technique, we estimate the standard error (and statistical significance) of the contribution of occupational structure to the productivity gap.

The coefficients reported in Table 4.a indicate that the productivity gap between local and domestic (foreign-owned) multinational firms is 17.5% (37.6%) in the business sector when only basic controls, such as capital intensity, size and industry, are included in the model. Note that no causal interpretations for these findings are proposed. Instead, we are interested in determining the extent to which these gaps can be explained by differential occupational structures. When

[17] Consistent with these results, Kampelmann and Rycx (2012) also find that clerks have relatively high productivity levels. In fact, their estimates imply that their productivity levels are significant-

the occupational structure is also included in the model the gap narrows by 9.8%-points (by 15.8%-points) to 7.7%-points (to 21.8%-points), respectively. When the controls also include the field and level of education, the additional effect of occupational structure is substantially less, but it is still economically and statistically significant. In this case, the occupational structure explains 2.8% of the productivity gap between local- and domestic-owned multinational firms and 5.5% of the productivity gap between local and foreign-owned multinational firms. Including the age structure of the labor force does not have a major effect on the results. Thus, we can conclude that the productivity gap between local and global firms is significant (both economically and statistically) and that a portion of the gap can be explained by differential occupational structures.

The upper panel of Table 4.b shows the results for firms in the manufacturing sector, and the lower panel shows the results for those in the service sector. Generally, the productivity gaps between local and multinational firms are markedly smaller in the manufacturing sector than in the total business sector, and the same holds true for the independent effect of occupational structure on productivity. The lower panel of Table 4.b shows that in the service sector, the productivity gaps between local firms and MNEs are large, and these gaps are largely explained by the differential occupational structures.

<TABLE 4 ABOUT HERE>

A similar analysis, including information on offshoring activity, is performed with a smaller sample of firms. The results shown in Table 5 indicate that firms that have offshored during the previous six years have a 6.2% higher productivity rate than non-offshoring firms. Interestingly, this gap can be completely explained by the differential occupational structures. The effect of occupational structure on the productivity gap is statistically significant when we do not control for the effect of education. When education is also included as a control, the effect of occupational structure becomes both economically and statistically insignificant. In summary, the productivity gap between offshoring and non-offshoring firms can be completely explained by the fact that the former have

ly (both economically and statistically) higher than those in other occupational groups, with the exception of managers.

more skilled workers than the latter, which is also reflected in the more productive occupational structures of offshoring firms.

<TABLE 5 ABOUT HERE>

4.2 Firm profitability

The final issue is how globalization is related to the profitability of firms. Conceptually, the productivity gap can be decomposed into the wage gap and profitability gap. Formally, this can be presented as

$$\ln \frac{Y_G / L_G}{Y_N / L_N} = \ln \frac{W_G / L_G}{W_N / L_N} + \ln \frac{Y_G / W_G}{Y_N / W_N} \tag{9}$$

where Y and W denote value added and labor input compensation, respectively. The expression on the left-hand side of the equation indicates the productivity gap in log percentages between firms *G* and *N*. The first term on the right-hand side indicates the wage, and the second term indicates the profitability gap between firms. Note that this type of profitability measure can also be presented as

$$\ln\left(\frac{Y}{W}\right) = \ln\left(\frac{W+O}{W}\right) = \ln\left(1+\frac{O}{W}\right) \tag{10}$$

where *O* denotes the operating margin.[18]

Estimations analogous to those presented in tables 4 and 5 are performed using the profitability measure Y/W rather than the labor productivity measure Y/L. The results for the profitability gaps between local firms and MNEs are presented in Tables 6.a and 6.b, and those between non-offshoring and offshoring firms are presented in Table 7.

<TABLE 6 ABOUT HERE>

<TABLE 7 ABOUT HERE>

[18] This profit variable is related to the profitability measure "return to the dollar" (Althin et al. 1996), which is the ratio of revenues to costs.

Somewhat surprisingly, in the total business sector, domestic MNEs have a profitability level that is lower than that of local firms, and this negative gap is significant both economically and statistically (Table 6.a). In contrast, the profitability gap between foreign-owned and local firms is not significant. Table 6.b reports the results separately for the manufacturing and service sectors. In the manufacturing sector, the "profitability divide" between domestic- and foreign-owned firms is more pronounced than in the service sector. The estimates show that domestic MNEs have a lower profitability level and foreign-owned MNEs a higher profitability level than local firms. In both cases, occupational structures have a negative impact, implying that foreign MNEs have an even higher profitability level when the effects of occupational structures are taken into account. In the service sector, the profitability gaps are less significant.

Based on Equation (9), the findings for productivity and profitability gaps between local firms and MNEs imply that the employees of MNEs have benefitted significantly from the firms' superior productivity level. For example, the wages in foreign MNEs are significantly higher than those in local firms, even when controlling for a variety of other factors (education, age and occupation). According to these estimates, the wage gap in the total business sector is 18.1% (=19.1% - 1.0%). These findings are consistent with those of Pesola (2011), who finds that tenure in the MNEs has extra returns, particularly for highly educated workers. Furthermore, Ilmakunnas et al. (2009) find that employees who have been hired by a local firm from foreign-owned (domestic-owned) MNEs have 42% (21%) higher wages than incumbents of the new employer and that these wage gaps are, for the most part, in alignment with the productivity effects of the hired workers.

Table 7 presents the results for profitability gaps between non-offshoring and offshoring firms and indicates that the gaps are not statistically significant. While the occupational structures have a modest positive effect on the profitability gap, the effect is statistically insignificant at the conventional levels of significance.

5 Conclusions

This paper has examined how the globalization of firms has contributed to occupational restructuring, productivity and profitability in the Finnish business sector. Special attention has been given to the two separate but interrelated aspects of globalization, i.e., multinational firms that are born by foreign direct investments, on one hand, and by sourcing business functions abroad, on the other hand. In addition, the patterns of the occupational restructuring have been scrutinized, and the relationship with productivity and profitability has been examined. The analysis is performed using longitudinal employer-employee data that include most Finnish businesses.

This study documents the so-called "job polarization" between 2000 and 2006 in the Finnish business sector, which is in accordance with findings from other developed countries (Acemoglu and Autor 2011, Goos et al. 2010). Accordingly, job polarization means that the employment shares of high-wage occupations (e.g., managers and professionals) and low-wage occupations (e.g., elementary and service occupations) have increased at the cost of medium-wage occupations (e.g., plant operators, craftsmen and clerks). The study further shows that increases in the employment shares of low-wage occupations can be largely attributed to both industry- and firm-level restructuring within industries. At the same time, the restructuring of employment, both at the industry and firm levels, has contributed to a decrease in employment shares for plant operator and craft occupations, which are typical medium-wage occupations. In contrast, increasing employment shares for high-wage occupations (i.e., managers and professionals) is an outcome that has occurred primarily within firms, with industry- or firm-level restructuring having little effect. The patterns observed at the level of the total business sector, however, mask marked sectoral differences. For example, in the service sector, the pattern of occupational restructuring has been U-shaped, while in the manufacturing sector, the pattern tends to be downward sloping, i.e., the employment shares of high-wage occupations have increased at the expense of low-wage occupations. In other words, in the manufacturing sector, the patterns of occupational restructuring are indicative of skill upgrading, whereas in the service sector, the situation is still undetermined.

The use of the longitudinal employer-employee data enables new insights into the micro-level mechanisms underlying job polarization. It is found that the polarization of occupational structures in the total business sector is derived from the job creation side rather than from the job destruction side. While job destruction rates have been surprisingly similar over different occupations, job creation rates have been greatest among high- and low-wage occupations. Furthermore, the employment share of medium-wage occupations has not decreased due to exceptionally high job destruction rates but rather due to low job creation rates. Similar patterns are found by examining worker flows between occupations. However, the analysis of job and worker flows again demonstrates differences between the manufacturing and service sectors. In both sectors, more or less pronounced U-shaped patterns are found with job creation and worker inflow measures. However, in the manufacturing sector, job destruction and worker outflows increase toward low-wage occupations, whereas in the service sector, these patterns are reasonably flat over all occupation groups.

The results point to the role of globalization in reshaping occupational structures. The firm-level data show that multinational firms have a greater proportion of high-wage occupations (professionals and technicians, in particular) and a smaller proportion of medium-wage occupations (plant operators and craftsmen), particularly in the manufacturing sector, even when the effect of differential industry structures are taken into account. Furthermore, the analysis of the manufacturing sector shows that the employment share of high-wage occupations (managers, professionals and technicians) has increased and that the employment share of medium-wage occupations (craftsmen, in particular) has decreased in offshoring firms between 2000 and 2006, whereas non-offshoring firms have had relatively stable occupational structures. The results for the service sector do not exhibit clear patterns.

Occupational restructuring, which appears to be driven, at least partly, by MNEs and offshoring business functions, also appears to play a significant role in explaining productivity gaps between local and global firms. Interestingly, the results suggest that the employees of MNEs benefit greatly from the productivity advantage of those firms. As a consequence, the patterns of profitability gaps do not closely echo those of productivity. In fact, domestic MNEs are less profitable than local firms, and the profitability advantage of foreign MNEs is much less

than that of their productivity. In summary, the findings of this study indicate that globalization increases productivity in the manufacturing sector by reshaping occupational structures, whereas such effects are not as visible in the service sector.

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ÄLÄ POISTA RIVIÄ (Osan vaihto)

Appendix 1. Descriptive statistics

Table A.1. The number of firms and their employment by occupation in 2006

SECTOR/Industry	Number of firms	Employment	Employment share by occupation, %							
			Managers	Professionals	Technicians	Clerks	Service	Craftsmen	Plant operators	Elementary
MANUFACTURING	6419	353 347	6.4	12.3	16.4	3.2	1.1	24.4	29.4	6.9
Food (15-16)	552	32 197	4.6	5.4	13.0	3.3	4.1	14.9	38.8	15.9
Textiles (17-19)	265	8 826	5.5	5.0	12.7	3.3	1.8	16.0	47.5	8.2
Wood (20)	523	24 222	4.8	4.5	12.0	2.5	0.8	26.8	44.6	4.0
Paper (21),	99	27 426	3.9	7.8	20.2	3.0	0.8	10.4	47.0	7.0
Printing (22)	686	24 551	8.7	26.6	16.8	7.3	2.4	10.5	19.8	7.9
Chemicals (24)	148	14 438	7.6	13.2	26.5	3.5	0.5	7.4	35.7	5.5
Rubber (25)	292	13 366	6.5	5.7	12.9	3.1	0.9	9.2	56.1	5.7
Non-met. minerals (26)	229	14 829	4.5	6.6	11.7	3.1	1.1	6.9	63.2	3.0
Basic metals (27)	82	16 750	3.7	8.3	14.0	2.7	0.7	30.5	31.6	8.7
Metal products (28)	1395	37 533	6.5	5.9	9.1	2.6	0.5	52.9	14.3	8.2
Machinery (29)	884	51 024	6.5	13.5	18.7	2.9	0.6	37.8	15.2	4.8
Electr. mach.(30-31)	236	16 592	7.0	13.0	18.7	2.5	0.6	24.8	28.1	5.3
Telecom. equip. (32-33)	319	44 336	10.5	31.4	25.4	2.7	0.3	10.3	16.0	3.5
Vehicles (34-35)	264	15 677	4.2	5.4	12.1	2.0	0.8	46.1	22.6	6.9
Other manuf. (36-37)	445	11 580	7.1	4.2	11.5	3.4	1.8	38.4	24.0	9.7
CONSTRUCTION	4272	84 075	5.7	7.1	10.7	2.6	0.6	56.2	10.4	6.7
Construction (45)	4272	84 075	5.7	7.1	10.7	2.6	0.6	56.2	10.4	6.7
SERVICES	17446	513 804	7.3	11.1	18.8	10.3	24.4	5.9	7.7	14.5
Trade (50-52)	7159	194 848	7.3	4.8	21.7	5.3	41.7	9.0	1.6	8.7
Hotels and restaur. (55)	1742	37 429	10.2	1.1	3.6	6.3	64.4	1.1	0.4	12.8
Transport (60-63)	2667	79 781	4.9	3.0	11.4	13.9	6.6	7.2	41.1	12.0
Post and tel. (64)	172	36 696	3.0	6.9	22.5	45.4	4.5	1.9	2.2	13.5
Real estate activities (70)	1088	17 186	9.0	5.4	30.9	9.9	3.0	4.3	1.6	35.9
Renting (71)	126	3 046	6.4	4.2	22.3	8.2	27.7	14.9	6.9	9.4
Computer activities (72)	916	36 264	12.7	56.4	21.4	4.7	0.3	1.5	0.2	2.8
R&D (73)	98	3 024	13.6	41.0	24.8	7.7	0.9	4.8	1.7	5.5
Legal services (741)	916	15 409	12.3	31.9	32.5	17.0	1.1	1.0	0.2	3.9
Engineering (742-743)	1072	26 207	9.3	38.1	35.9	5.2	0.3	5.9	0.6	4.7
Other services (744-748)	1490	63 914	4.9	7.7	10.0	7.8	17.5	4.1	3.2	44.8

Notes: Data include firms that employ at least 5 persons, and employment is calculated using data from Employment Statistics.

Table A.2. The number of plants and their employment by occupation in 2006

SECTOR/Industry	Number of plants	Employment	Employment share by occupation, %							
			Managers	Profession-als	Technicians	Clerks	Service	Craftsmen	Plant operators	Elementary
MANUFACTURING	7600	346 562	6.2	12.1	16.3	3.2	0.9	24.6	29.7	7.0
Food (15-16)	670	30 651	4.2	5.4	12.8	3.3	3.1	15.2	39.9	16.2
Textiles (17-19)	274	8 476	5.3	5.1	12.1	3.0	0.7	16.5	48.9	8.3
Wood (20)	597	23 223	4.5	4.4	10.4	2.4	0.6	27.6	45.8	4.3
Paper (21),	181	25 880	3.6	7.1	17.7	2.7	0.8	11.1	49.5	7.4
Printing (22)	811	23 648	8.6	26.5	16.9	7.4	2.2	10.7	20.3	7.4
Chemicals (24)	213	15 334	6.6	13.0	29.6	3.8	0.5	6.9	34.3	5.3
Rubber (25)	346	13 757	6.2	6.0	13.0	3.1	0.9	8.6	56.7	5.5
Non-met. minerals (26)	350	13 886	4.5	6.7	11.3	3.1	0.4	7.0	64.4	2.5
Basic metals (27)	112	14 842	3.4	7.9	13.6	2.5	0.6	31.1	33.0	7.9
Metal products (28)	1494	35 474	6.4	5.5	9.2	2.8	0.5	51.0	15.2	9.3
Machinery (29)	1123	54 547	6.2	13.2	18.3	2.9	0.4	38.5	15.3	5.0
Electr. mach.(30-31)	280	14 966	6.8	13.7	18.9	2.1	0.6	21.7	30.7	5.5
Telecom. equip. (32-33)	375	42 224	10.7	31.5	25.5	2.8	0.2	10.2	15.5	3.6
Vehicles (34-35)	285	18 399	3.7	5.6	13.8	2.3	0.7	47.6	20.0	6.3
Other manuf. (36-37)	489	11 255	6.7	3.9	11.2	3.2	1.3	38.0	25.7	10.1
CONSTRUCTION	4606	81 602	5.5	7.1	10.6	2.6	0.4	57.3	9.9	6.6
Construction (45)	4606	81 602	5.5	7.1	10.6	2.6	0.4	57.3	9.9	6.6
SERVICES	22992	468236	7.1	11.8	18.6	10.8	23.0	5.6	7.9	15.2
Trade (50-52)	10391	167 978	7.6	5.5	22.2	5.6	39.1	9.3	1.4	9.3
Hotels and restaur. (55)	2532	35 527	8.1	0.9	3.3	6.9	66.3	0.9	0.2	13.4
Transport (60-63)	2993	73 791	5.0	2.9	10.8	13.9	6.8	5.4	42.7	12.5
Post and tel. (64)	824	35 559	3.0	6.9	21.9	45.6	4.3	1.9	2.3	14.0
Real estate activities (70)	1089	17 231	7.8	4.9	26.0	9.2	2.8	4.3	1.5	43.6
Renting (71)	160	1 860	8.4	5.7	21.7	10.4	15.9	17.2	9.1	11.7
Computer activities (72)	1058	34 558	12.2	57.0	21.5	4.6	0.2	1.7	0.1	2.7
R&D (73)	116	3 333	12.6	40.5	25.1	7.4	0.7	4.3	4.5	5.0
Legal services (741)	847	14 292	12.3	32.9	31.2	17.9	1.1	1.0	0.2	3.4
Engineering (742-743)	1249	25 609	9.0	38.0	36.6	5.0	0.3	5.7	0.9	4.5
Other services (744-748)	1733	58 498	4.9	7.9	10.1	8.3	18.1	4.1	2.1	44.4

Notes: Data include plants that employ at least 5 persons, and employment is calculated using data from Employment Statistics.

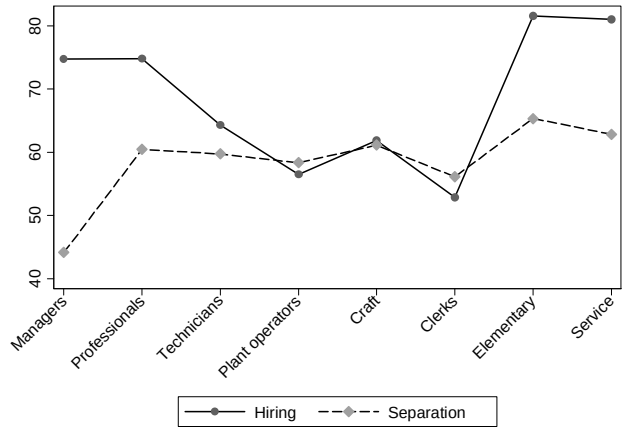
Table A.3. The number of firms and their employment by occupation in 2006, International Sourcing survey

SECTOR/Industry	Number of firms	Employment	Employment share by occupation, %							
			Managers	Professionals	Technicians	Clerks	Service	Craftsmen	Plant operators	Elementary
MANUFACTURING	652	214 431	5.1	15.0	19.4	3.1	0.8	20.1	29.6	7.1
Food (15-16)	47	16 993	3.1	6.6	14.9	3.4	1.6	14.7	36.0	19.7
Textiles (17-19)	23	4 028	3.0	7.7	16.4	3.2	1.6	11.9	45.8	10.4
Wood (20)	35	10 478	2.9	5.0	12.0	2.4	0.5	25.9	46.9	4.5
Paper (21),	29	20 808	3.4	8.0	19.2	2.8	0.8	12.7	45.8	7.3
Printing (22)	74	13 671	5.9	27.3	16.7	7.5	2.8	10.1	20.7	9.0
Chemicals (24)	38	10 126	5.6	14.0	27.6	3.6	0.4	8.2	35.9	4.8
Rubber (25)	27	5 890	3.3	6.4	15.8	2.8	0.6	7.6	59.4	4.2
Non-met. minerals (26)	37	9 541	3.2	6.7	12.8	3.0	1.3	4.0	65.9	3.1
Basic metals (27)	25	15 225	3.3	8.6	14.7	2.8	0.7	27.8	33.2	8.9
Metal products (28)	75	10 820	4.1	8.3	12.9	2.4	0.4	40.6	21.0	10.3
Machinery (29)	118	33 566	4.7	15.0	22.2	2.7	0.5	34.0	15.9	5.1
Electr. mach.(30-31)	31	11 271	5.8	14.1	22.0	2.3	0.5	25.0	26.0	4.4
Telecom. equip. (32-33)	43	37 538	9.9	33.7	27.5	2.8	0.2	8.2	14.4	3.4
Vehicles (34-35)	29	10 848	2.9	5.9	14.0	1.8	0.8	42.5	25.3	6.8
Other manuf. (36-37)	21	3 628	4.0	5.6	15.6	2.9	1.4	31.1	27.8	11.6
CONSTRUCTION	76	29 414	4.1	11.9	16.5	2.8	0.3	46.4	9.5	8.7
Construction (45)	76	29 414	4.1	11.9	16.5	2.8	0.3	46.4	9.5	8.7
SERVICES	602	234 868	4.5	10.7	18.2	14.3	23.9	5.2	6.1	17.1
Trade (50-52)	191	78 879	3.7	5.1	21.1	5.2	45.1	7.9	1.4	10.6
Hotels and restaur. (55)	39	13 978	13.2	1.2	3.9	7.4	61.8	0.4	0.3	11.8
Transport (60-63)	98	39 772	3.2	3.9	14.3	17.4	9.9	8.7	28.8	13.8
Post and tel. (64)	29	31 195	2.4	6.1	19.8	52.0	4.0	1.3	1.4	13.0
Real estate activities (70)	12	1 744	7.7	10.4	36.9	12.0	3.0	3.6	0.2	26.1
Renting (71)	4	964	3.6	4.4	34.8	7.5	2.7	28.0	7.7	11.4
Computer activities (72)	64	17 569	9.6	54.7	26.3	5.8	0.1	1.7	0.1	1.7
R&D (73)	6	728	7.7	31.6	35.0	4.0	0.3	10.6	6.2	4.7
Legal services (741)	26	4 307	11.4	48.0	19.1	20.4	0.2	0.1	0.0	0.9
Engineering (742-743)	48	9 744	7.1	35.2	44.8	3.6	0.1	5.0	0.5	3.6
Other services (744-748)	85	35 988	2.0	5.0	7.7	7.6	18.3	2.7	3.0	53.7

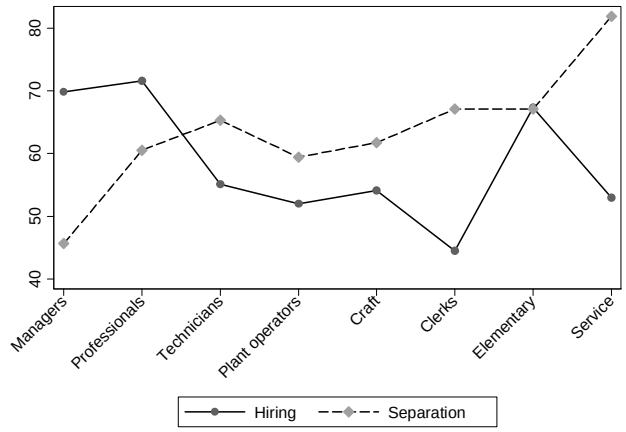
Notes: Data include firms that employ at least 5 persons, and employment is calculated data from Employment Statistics

Figure A.1. External worker inflows and outflows by occupation, %

a) Business sector



b) Manufacturing



c) Services

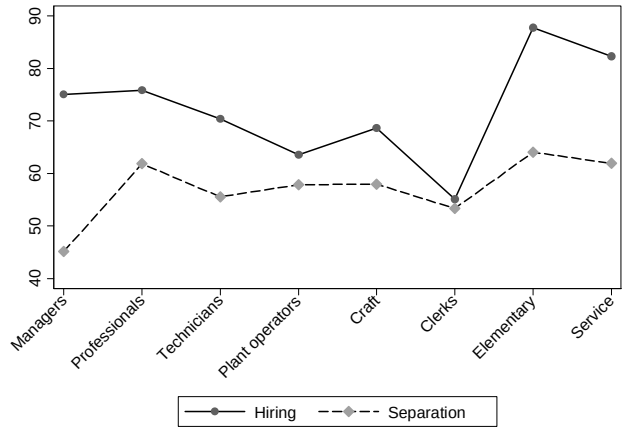


Table 1. ISCO-88 classification of occupations and indicators

ISCO classification 1-digit		2-digit		Abstract (1)	Routine task im-portance (2)	Service task im-portance (3)	Routine intensity (4)	Off-shorability (5)
1	Managers	12	Corporate managers	1.80	-1.18	1.15	-1.29	-0.59
		13	Managers of small enterprises	1.80	-1.18	1.15	-1.29	-0.59
2	Professionals	21	Physical, mathematical and engineering science professionals	1.50	-0.86	-0.35	-0.80	-0.37
		22	Life science and health professionals	1.47	-0.16	1.73	-0.81	-0.64
		23	Teaching professionals					
		24	Other professionals	1.29	-1.63	1.14	-1.49	-0.51
3	Technicians and associate professionals	31	Physical and engineering science associate professionals	0.89	0.20	-0.44	-0.02	-0.27
		32	Life science and health associate professionals	0.36	0.21	0.86	-0.26	-0.64
		33	Traffic instructors and other teaching associate professionals					
		34	Other associate professionals	0.75	-1.37	0.93	-1.25	-0.12
4	Clerks	41	Office clerks	-0.42	-1.29	0.04	-0.89	1.21
		42	Customer services clerks	-0.36	-0.82	0.74	-0.75	-0.27
5	Service and care workers	51	Personal and protective services workers	-0.37	-0.16	0.82	-0.35	-0.64
		52	Models, salespersons and demonstrators	-0.53	-0.94	1.00	-0.86	-0.64
7	Craft and related trades workers	71	Extraction and building trades workers	-0.23	0.98	-0.64	0.82	-0.59
		72	Metal, machinery and related trades workers	0.43	1.16	-0.29	0.65	0.29
		73	Precision, handicraft, craft printing and related trades workers	-1.30	0.81	-1.79	1.51	-0.62
		74	Other craft and related trades workers	-1.36	0.67	-1.30	1.18	-0.27
8	Plant and machine op-erators and assemblers	81	Stationary plant and related operators	-0.49	1.33	-1.21	1.38	1.63
		82	Machine operators and assemblers	-0.46	1.31	-1.33	1.41	3.18
		83	Drivers and related water traffic operators	-0.59	1.33	0.01	0.90	-0.63
9	Elementary occupations	91	Sales and services elementary occupations	-1.38	-0.11	-0.55	0.28	-0.37
		93	Laborers in manufacturing and construction	-1.00	0.52	-0.53	0.64	0.87

Notes: Indicators are obtained from the study by Goos, Manning and Salomons (2010).

Table 2. Firms, employment and occupational structures by sectors and years

SECTOR/Industry	Firms	Emp.	Occupation share, %							
			Managers	Profes-sionals	Tech-nicians	Clerks	Service	Craft	Plant operators	Elemen-tary
MANUFACTURING										
Year 2000	5 891	346 433	3.7	9.8	17.2	4.0	1.7	26.7	30.2	6.8
Year 2005	6 052	340 904	5.6	12.0	15.9	3.5	1.8	23.7	30.8	6.6
Year 2006	6 419	353 347	6.4	12.3	16.4	3.2	1.1	24.4	29.4	6.9
Year 2007	6 574	360 869	6.4	12.5	16.8	3.1	1.1	24.5	28.4	7.1
CONSTRUCTION										
Year 2000	3 412	64 242	2.2	4.5	13.0	3.4	0.9	59.3	8.2	8.5
Year 2005	3 790	78 880	4.3	7.2	10.7	2.8	0.8	56.6	10.4	7.2
Year 2006	4 272	84 075	5.7	7.1	10.7	2.6	0.6	56.2	10.4	6.7
Year 2007	4 531	90 204	5.9	6.9	10.8	2.7	0.7	55.6	10.1	7.2
SERVICES										
Year 2000	14 337	407 692	5.2	11.5	18.7	11.2	24.6	6.1	7.5	15.1
Year 2005	15 844	474 325	6.5	10.6	18.8	10.6	25.4	6.1	8.0	14.0
Year 2006	17 446	513 804	7.3	11.1	18.8	10.3	24.4	5.9	7.7	14.5
Year 2007	18 498	544 984	7.0	11.6	18.9	9.9	23.9	5.8	7.7	15.2

Note: Data include firms that employ at least 5 persons

Table 3. Determinants of labor productivity, 2006

	Business sector			Manufacturing			Services		
	(1)	(2)	(3)	(4)	(5)	(6)	(4)	(5)	(6)
Share of									
Managers	1.052***	0.781***	0.722***	0.971***	0.696***	0.728***	1.100***	0.815***	0.731***
	(0.0394)	(0.042)	(0.0429)	(0.137)	(0.144)	(0.144)	(0.0475)	(0.0506)	(0.0519)
Professionals	0.986***	0.534***	0.482***	0.673***	0.311**	0.323**	1.045***	0.553***	0.489***
	(0.0346)	(0.0434)	(0.044)	(0.130)	(0.145)	(0.146)	(0.0409)	(0.0519)	(0.0528)
Technicians	0.718***	0.494***	0.462***	0.623***	0.418***	0.465***	0.717***	0.485***	0.447***
	(0.0266)	(0.0308)	(0.0313)	(0.128)	(0.133)	(0.134)	(0.0299)	(0.0356)	(0.0361)
Plant operators	0.478***	0.428***	0.394***	0.423***	0.342***	0.374***	0.419***	0.365***	0.322***
	(0.0286)	(0.03)	(0.0306)	(0.116)	(0.119)	(0.119)	(0.0401)	(0.0415)	(0.0421)
Craftsmen	0.380***	0.270***	0.242***	0.407***	0.297**	0.333***	0.344***	0.187***	0.159***
	(0.0271)	(0.0326)	(0.033)	(0.117)	(0.121)	(0.122)	(0.0383)	(0.0514)	(0.0514)
Clerks	0.599***	0.456***	0.422***	0.596***	0.475***	0.528***	0.595***	0.443***	0.399***
	(0.0446)	(0.0458)	(0.0461)	(0.174)	(0.177)	(0.177)	(0.0515)	(0.0527)	(0.0531)
Elementary	0.250***	0.228***	0.213***	0.390***	0.349***	0.368***	0.220***	0.194***	0.173***
	(0.0292)	(0.0297)	(0.0298)	(0.129)	(0.130)	(0.130)	(0.0336)	(0.0344)	(0.0345)
Service task	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Education									
High & tech.		0.746***	0.690***		0.346**	0.322*		0.837***	0.738***
		(0.068)	(0.0686)		(0.170)	(0.171)		(0.0814)	(0.0826)
High & non-tech.		0.785***	0.731***		0.485***	0.476***		0.882***	0.788***
		(0.067)	(0.0675)		(0.172)	(0.173)		(0.0789)	(0.0799)
Medium & tech.		0.543***	0.509***		0.406***	0.358***		0.612***	0.555***
		(0.0596)	(0.0599)		(0.131)	(0.131)		(0.0756)	(0.0763)
Medium & non-tech.		0.181***	0.142**		0.485***	0.302		0.138*	0.100
		(0.0638)	(0.0652)		(0.180)	(0.184)		(0.0747)	(0.0765)
Mow & tech.		0.613***	0.571***		0.427***	0.483***		0.812***	0.708***
		(0.0748)	(0.0763)		(0.147)	(0.148)		(0.106)	(0.109)
Low & non-tech.		0.351***	0.283***		0.0780	0.128		0.386***	0.250***
		(0.0479)	(0.0503)		(0.119)	(0.121)		(0.0573)	(0.0621)
vocational & tech.		0.209***	0.175***		0.105*	0.0880		0.265***	0.182***
		(0.0322)	(0.0327)		(0.0563)	(0.0571)		(0.0528)	(0.0543)
vocational & non-tech.		-0.0910**	-0.139***		-0.242***	-0.288***		-0.0563	-0.139***
		(0.0389)	(0.0396)		(0.0900)	(0.0914)		(0.0480)	(0.0497)
basic schooling		ref.	ref.		ref.	ref.		ref.	ref.
Age									
-24 years			-0.262***			0.0137			-0.368***
			(0.0397)			(0.0874)			(0.0528)
25-34 years			-0.0662*			0.165**			-0.152***
			(0.0385)			(0.0771)			(0.0521)
35-44 years			ref.			ref.			ref
45-54 years			-0.129***			-0.0927			-0.162***
			(0.0405)			(0.0746)			(0.0571)
55-years			-0.163***			-0.0712			-0.231***
			(0.043)			(0.0794)			(0.0605)
Observations	15283	15283	15283	4062	4062	4062	9012	9012	9012
R-squared	0.251	0.268	0.27	0.212	0.222	0.226	0.279	0.300	0.304
Adj. R-squared	0.249	0.265	0.267	0.205	0.214	0.217	0.276	0.297	0.301

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: “High” education refers to, at the least, a higher-degree level of tertiary education, “medium” refers to a lower-degree level of tertiary education, and “low” refers to the lowest level of tertiary education. Models also include controls for capital intensity, size, industry effects and whether the firm existed 6 years earlier.

Table 4.a. Productivity gaps between local firms and MNEs and the role of occupational structure - total business sector

	Productivity gap		Difference	Productivity gap		Difference	Productivity gap		Difference
	(1)	(2)	(3)=(1)-(2)	(4)	(5)	(6)=(4(-(5)	(7)	(8)	(9)=(7)-(8)
Local firms	ref.	ref.	ref	ref.	ref.	ref	ref.	ref.	ref
Domestic MNEs	0.175	0.077	0.098	0.089	0.061	0.028	0.081	0.059	0.022
	(0.019)	(0.018)	(0.005)	(0.018)	(0.018)	(0.003)	(0.018)	(0.018)	(0.003)
Foreign MNEs	0.376	0.218	0.158	0.251	0.196	0.055	0.236	0.191	0.045
	(0.020)	(0.022)	(0.008)	(0.022)	(0.022)	(0.004)	(0.022)	(0.022)	(0.004)
Occupational structure	NO	YES		NO	YES		NO	YES	
Field and level of education	NO	NO		YES	YES		YES	YES	
Age structure	NO	NO		NO	NO		YES	YES	
Number of firms: 15283									
R^2	0.189	0.260		0.254	0.275		0.260	0.277	
Adj. R^2	0.187	0.258		0.252	0.273		0.257	0.274	

Notes: Productivity gaps and their standard errors (in parentheses) are based on seemingly unrelated estimations. All models include controls for capital intensity, size, industry effects and whether the firm existed 6 years earlier.

Table 4.b. Productivity gaps between local firms and MNEs and the role of occupational structure by sector

	Productivity gap		Difference	Productivity gap		Difference	Productivity gap		Difference
	(1)	(2)	(3)=(1)-(2)	(4)	(5)	(6)=(4(-(5)	(7)	(8)	(9)=(7)-(8)
MANUFACTURING									
Local firms	ref.	ref.	ref	ref.	ref.	ref	ref.	ref.	ref
Domestic MNEs	0.069	0.047	0.021	0.041	0.039	0.002	0.044	0.042	0.002
	(0.028)	(0.028)	(0.005)	(0.027)	(0.027)	(0.002)	(0.027)	(0.027)	(0.002)
Foreign MNEs	0.256	0.223	0.033	0.219	0.213	0.006	0.221	0.215	0.006
	(0.033)	(0.033)	(0.007)	(0.033)	(0.033)	(0.004)	(0.032)	(0.033)	(0.004)
Occupational structure	NO	YES		NO	YES		NO	YES	
Field and level of education	NO	NO		YES	YES		YES	YES	
Age structure	NO	NO		NO	NO		YES	YES	
Number of firms: 4 062									
R^2	0.209	0.225		0.222	0.228		0.228	0.233	
Adj. R^2	0.204	0.218		0.216	0.221		0.221	0.225	
SERVICES									
Local firms	ref.	ref.	ref	ref.	ref.	ref	ref.	ref.	ref
Domestic MNEs	0.223	0.088	0.135	0.111	0.070	0.042	0.098	0.065	0.032
	(0.027)	(0.026)	(0.009)	(0.026)	(0.026)	(0.005)	(0.026)	(0.026)	(0.004)
Foreign MNEs	0.424	0.214	0.209	0.255	0.185	0.070	0.232	0.178	0.055
	(0.029)	(0.029)	(0.011)	(0.028)	(0.029)	(0.006)	(0.028)	(0.029)	(0.006)
Occupational structure	NO	YES		NO	YES		NO	YES	
Field and level of education	NO	NO		YES	YES		YES	YES	
Age structure	NO	NO		NO	NO		YES	YES	
Number of firms: 9 012									
R^2	0.193	0.288		0.282	0.228		0.292	0.310	
Adj. R^2	0.190	0.285		0.279	0.221		0.288	0.306	

Notes: Productivity gaps and their standard errors (in parentheses) are based on seemingly unrelated estimations. All models include controls for capital intensity, size, industry effects and whether the firm existed 6 years earlier.

Table 5. Productivity gaps between non-offshoring and offshoring firms and the role of occupational structure

	Productivity gap		Difference	Productivity gap		Difference	Productivity gap		Difference
	(1)	(2)	(3)=(1)-(2)	(4)	(5)	(6)=(4(-(5)	(7)	(8)	(9)=(7)-(8)
BUSINESS SECTOR									
Non-offshoring	ref.	ref.	ref	ref.	ref.	ref	ref.	ref.	ref
Offshoring	0.062	0.002	0.060	0.023	0.007	0.015	0.010	0.002	0.008
	(0.037)	(0.035)	(0.013)	(0.035)	(0.035)	(0.007)	(0.035)	(0.035)	(0.005)
Occupational structure	NO	YES		NO	YES		NO	YES	
Field and level of education	NO	NO		YES	YES		YES	YES	
Age structure	NO	NO		NO	NO		YES	YES	
Number of firms: 1 282									
R^2	0.312	0.393		0.407	0.420		0.418	0.426	
Adj. R^2	0.296	0.375		0.389	0.399		0.399	0.404	

Table 6.a. Profitability gaps between local firms and MNEs and the role of occupational structure - total business sector

	Profitability gap		Difference	Profitability gap		Difference	Profitability gap		Difference
	(1)	(2)	(3)=(1)-(2)	(4)	(5)	(6)=(4(-(5)	(7)	(8)	(9)=(7)-(8)
Local firms	ref.	ref.	ref	ref.	ref.	ref	ref.	ref.	ref
Domestic MNEs	-0.037	-0.040	0.003	-0.047	-0.044	-0.002	-0.044	-0.042	-0.002
	(0.017)	(0.017)	(0.003)	(0.017)	(0.017)	(0.019)	(0.017)	(0.017)	(0.002)
Foreign MNEs	0.022	0.014	0.007	0.008	0.010	-0.002	0.010	0.010	0.000
	(0.019)	(0.014)	(0.005)	(0.019)	(0.020)	(0.003)	(0.020)	(0.020)	(0.003)
Occupational structure	NO	YES		NO	YES		NO	YES	
Field and level of education	NO	NO		YES	YES		YES	YES	
Age structure	NO	NO		NO	NO		YES	YES	
Number of firms: 15 280									
R^2	0.091	0.096		0.093	0.099		0.095	0.100	
Adj. R^2	0.089	0.093		0.091	0.096		0.092	0.097	

Notes: Profitability gaps and their standard errors (in parentheses) are based on seemingly unrelated estimations. All models include controls for capital intensity, size, industry effects and whether the firm existed 6 years earlier.

Table 6.b. Profitability gaps between local firms and MNEs and the role of occupational structure by sector

	Profitability gap		Difference	Profitability gap		Difference	Profitability gap		Difference
	(1)	(2)	(3)=(1)-(2)	(4)	(5)	(6)=(4(-(5)	(7)	(8)	(9)=(7)-(8)
MANUFACTURING									
Local firms	ref.	ref.	ref	ref.	ref.	ref	ref.	ref.	ref
Domestic MNEs	-0.057	-0.046	-0.011	-0.047	-0.045	-0.001	-0.040	-0.040	0.000
	(0.026)	(0.026)	(0.004)	(0.025)	(0.025)	(0.002)	(0.024)	(0.0247)	(0.002)
Foreign MNEs	0.055	0.070	-0.015	0.069	0.071	-0.002	0.077	0.077	0.000
	(0.030)	(0.030)	(0.006)	(0.030)	(0.030)	(0.004)	(0.029)	(0.030)	(0.004)
Occupational structure	NO	YES		NO	YES		NO	YES	
Field and level of education	NO	NO		YES	YES		YES	YES	
Age structure	NO	NO		NO	NO		YES	YES	
Number of firms: 4061									
R^2	0.090	0.098		0.094	0.100		0.110	0.116	
Adj. R^2	0.083	0.090		0.086	0.091		0.101	0.106	
SERVICES									
Local firms	ref.	ref.	ref	ref.	ref.	ref	ref.	ref.	ref
Domestic MNEs	-0.027	-0.037	0.010	-0.048	-0.043	-0.005	-0.047	-0.043	-0.005
	(0.023)	(0.024)	(0.005)	(0.024)	(0.024)	(0.003)	(0.024)	(0.024)	(0.003)
Foreign MNEs	0.009	-0.006	0.015	-0.021	-0.014	-0.007	-0.020	-0.014	-0.006
	(0.025)	(0.024)	(0.007)	(0.026)	(0.026)	(0.005)	(0.026)	(0.026)	(0.004)
Occupational structure	NO	YES		NO	YES		NO	YES	
Field and level of education	NO	NO		YES	YES		YES	YES	
Age structure	NO	NO		NO	NO		YES	YES	
Number of firms: 9 010									
R^2	0.102	0.106		0.107	0.110		0.107	0.110	
Adj. R^2	0.099	0.102		0.103	0.106		0.103	0.106	

Notes: Profitability gaps and their standard errors (in parentheses) are based on seemingly unrelated estimations. All models include controls for capital intensity, size, industry effects and whether the firm existed 6 years earlier.

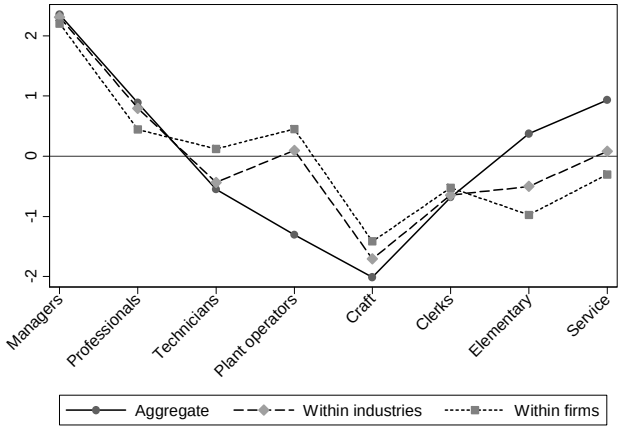
Table 7. Profitability gaps between non-offshoring and offshoring firms and the role of occupational structure

	Profitability gap		Difference	Profitability gap		Difference	Profitability gap		Difference
	(1)	(2)	(3)=(1)-(2)	(4)	(5)	(6)=(4(-(5)	(7)	(8)	(9)=(7)-(8)
BUSINESS SECTOR									
Non-offshoring	ref.	ref.	ref	ref.	ref.	ref	ref.	ref.	ref
Offshoring	-0.022	-0.035	0.012	-0.022	-0.030	0.007	-0.022	-0.028	0.006
	(0.030)	(0.031)	(0.006)	(0.031)	(0.031)	(0.004)	(0.031)	(0.031)	(0.004)
Occupational structure	NO	YES		NO	YES		NO	YES	
Field and level of education	NO	NO		YES	YES		YES	YES	
Age structure	NO	NO		NO	NO		YES	YES	
Number of firms: 1 282									
R^2	0.211	0.216		0.220	0.193		0.222	0.199	
Adj. R^2	0.192	0.193		0.196	0.138		0.196	0.138	

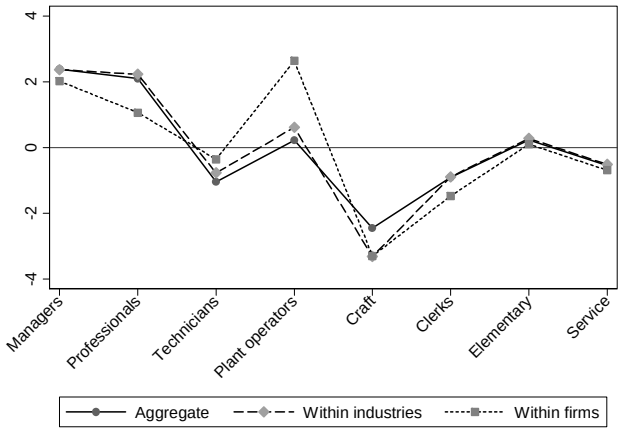
Notes: Profitability gaps and their standard errors (in parentheses) are based on seemingly unrelated estimations. All models include controls for capital intensity, size, industry effects and whether the firm existed 6 years earlier.

Figure 1. Change of occupation shares between 2000 and 2006, %-points

a) Business sector



b) Manufacturing



c) Services

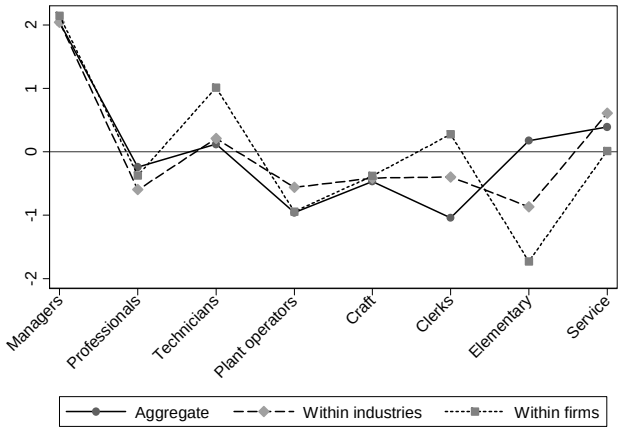
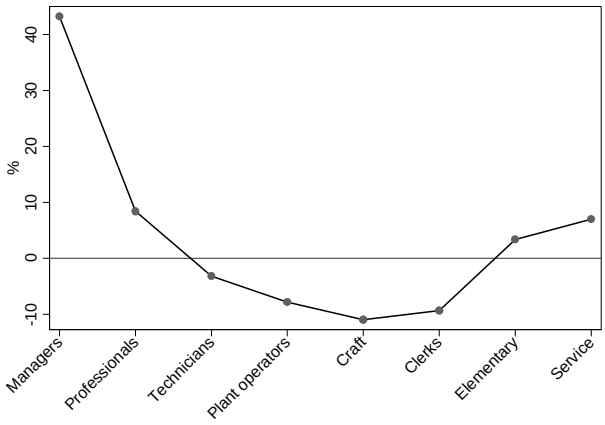
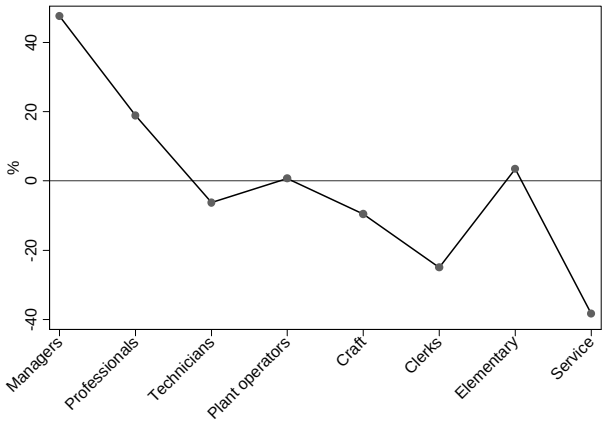


Figure 2. Change of occupation shares in relative terms between 2000 and 2006, %

a) Business sector



b) Manufacturing



c) Services

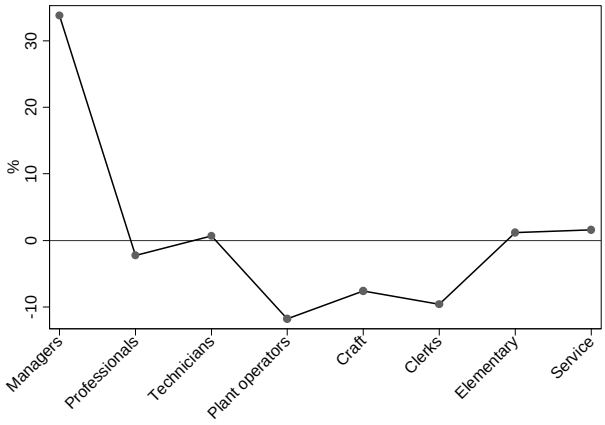
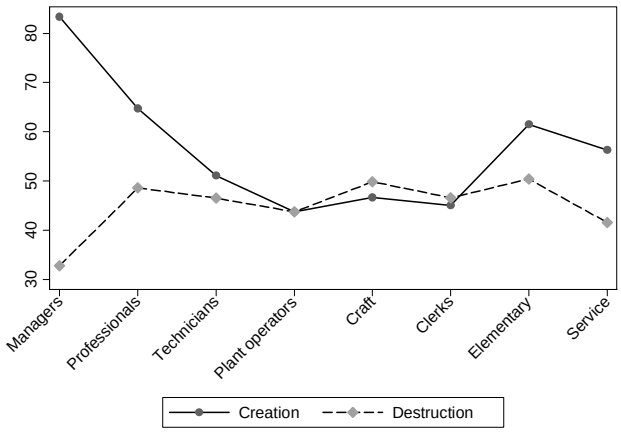
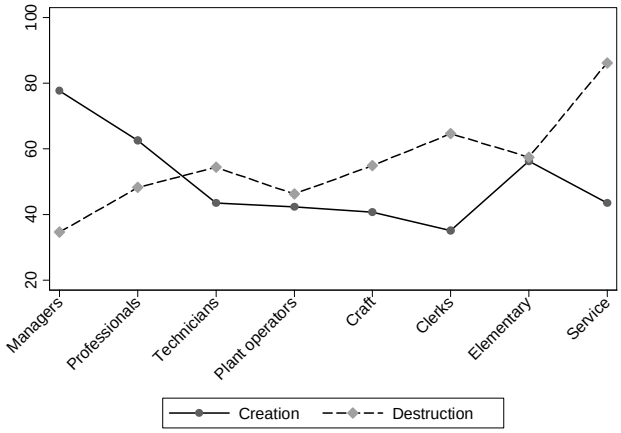


Figure 3. Job creation and destruction by occupation between 2000 and 2006, %

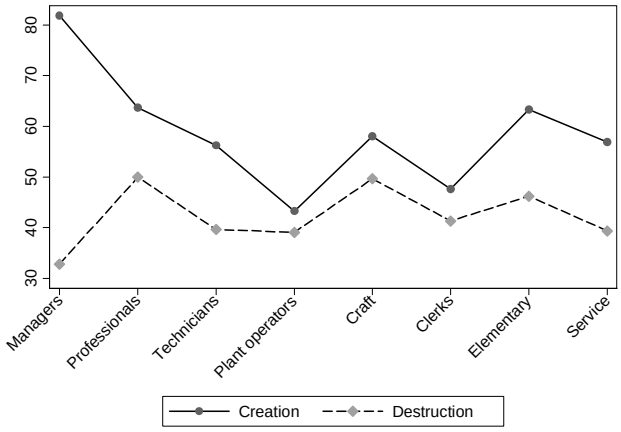
a) Business sector



b) Manufacturing



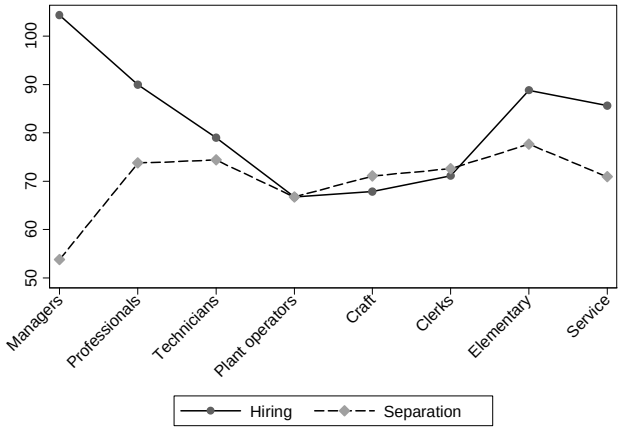
c) Services



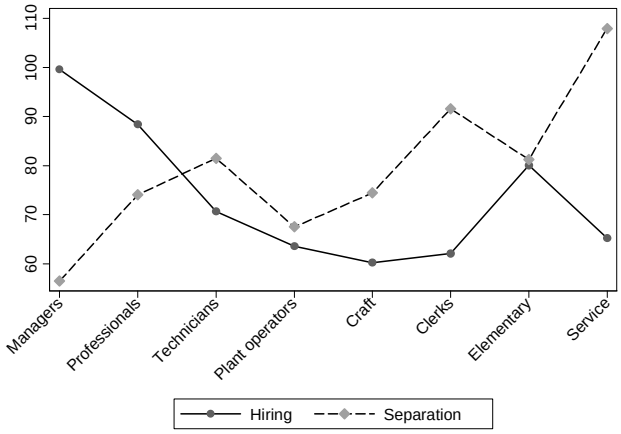
Notes: Analysis has been conducted with data that are linked to individuals at the firm level

Figure 4. Worker inflows and outflows by occupation, %

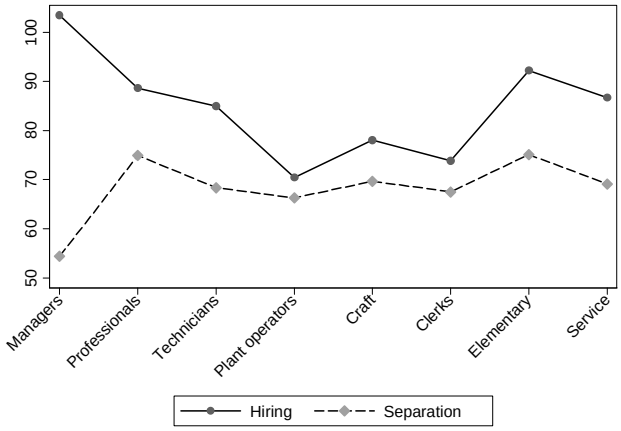
a) Business sector



b) Manufacturing



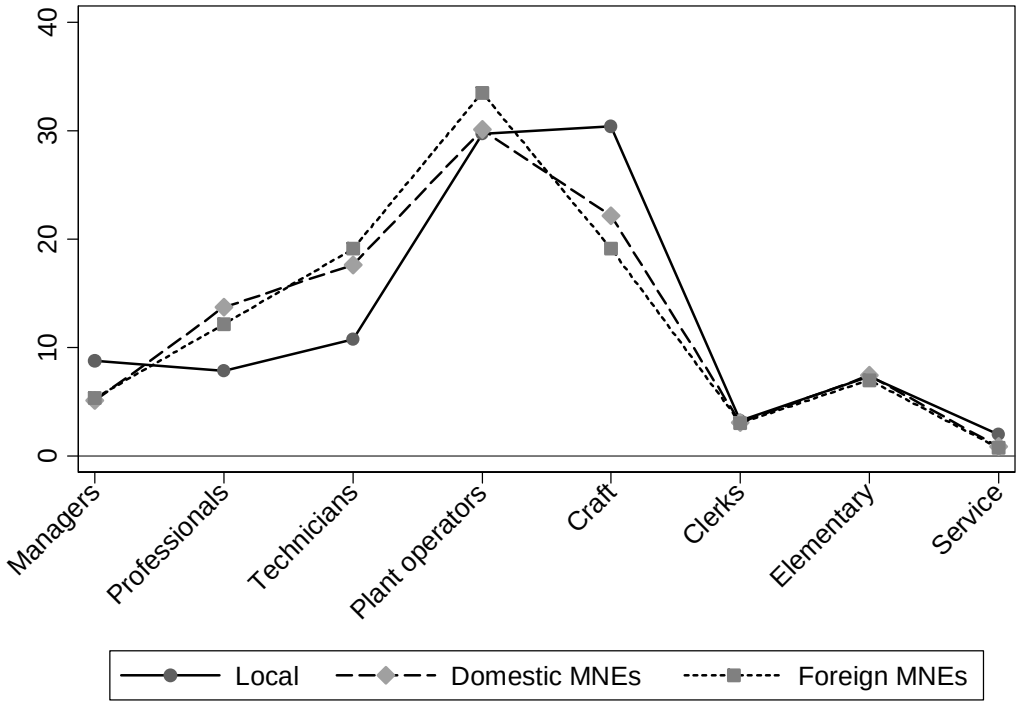
c) Services



Notes: Analysis has been conducted with data that are linked to individuals at the firm level

Figure 5. Occupational structures in the local firm and MNEs in 2006, standardized industry structures, %-points

a) Manufacturing



b) Services

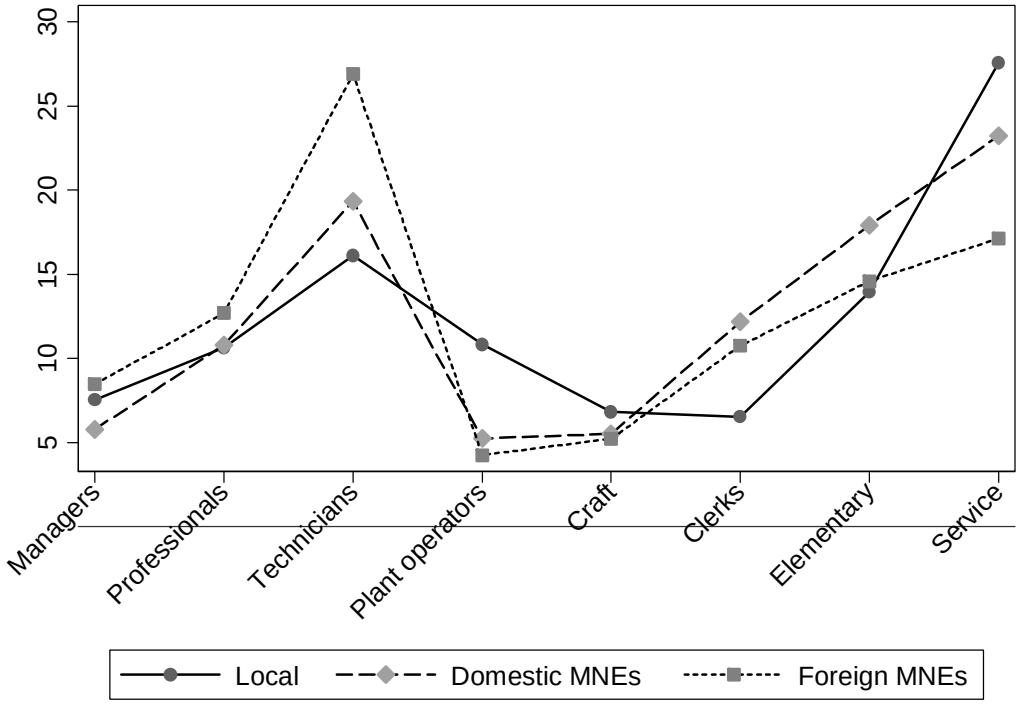
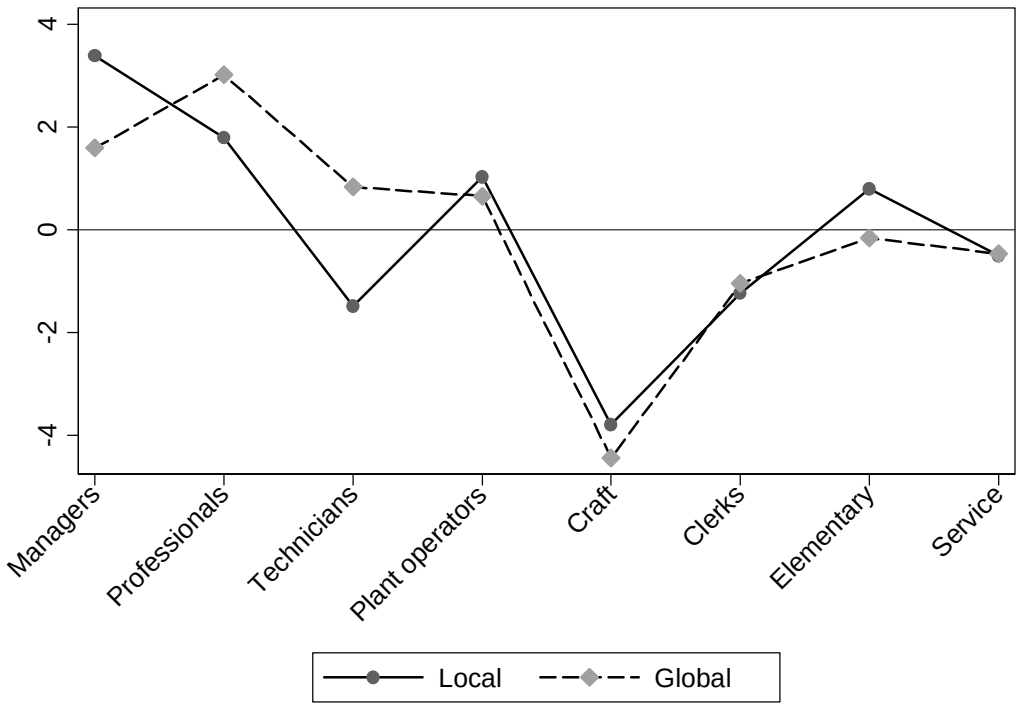


Figure 6. Occupational restructuring in local and global firms between 2000 and 2006, standardized industry structures, %-points

a) Manufacturing



b) Services

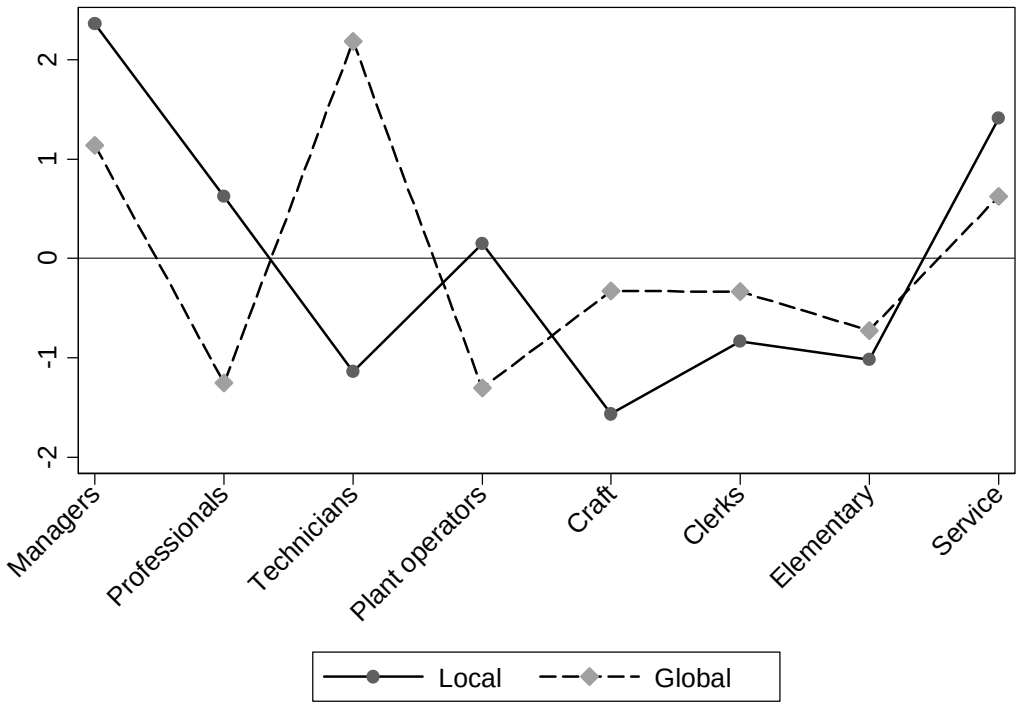
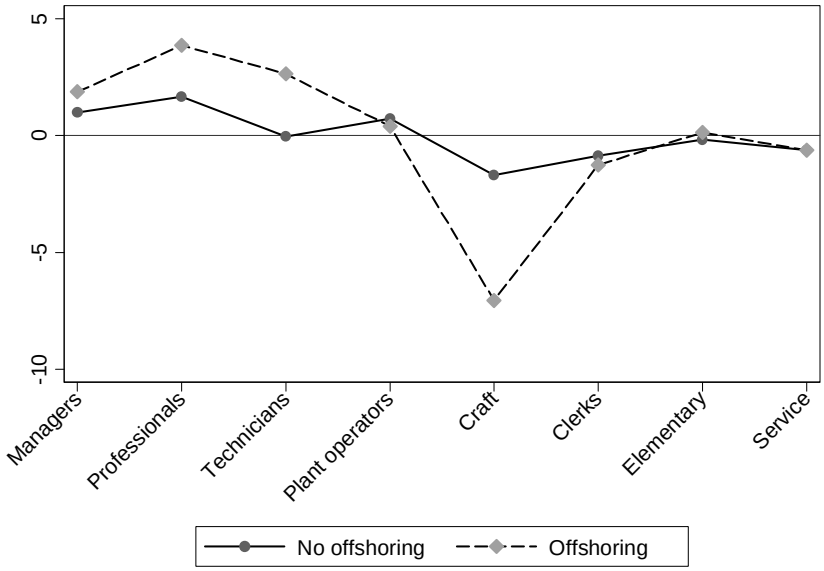


Figure 7. Occupational structures in offshoring and non-offshoring firms, standardized industry structures, %-points

a) Manufacturing



b) Services

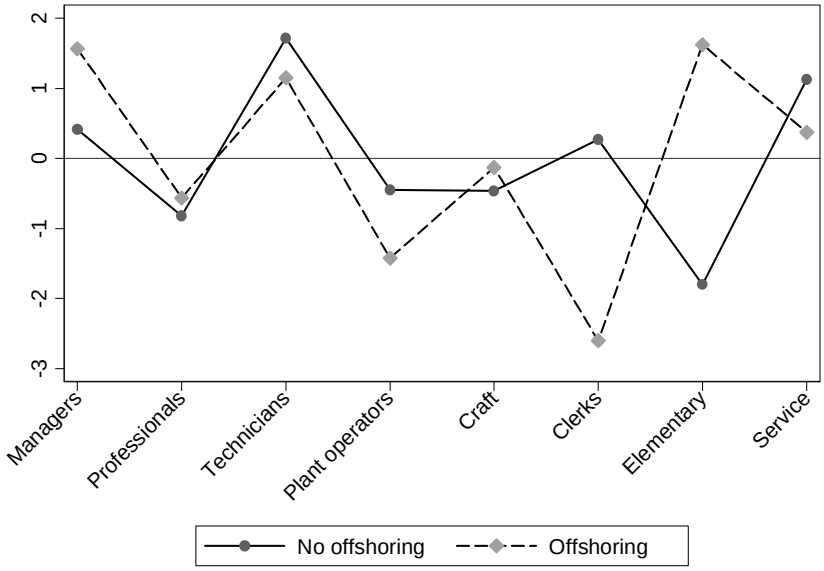
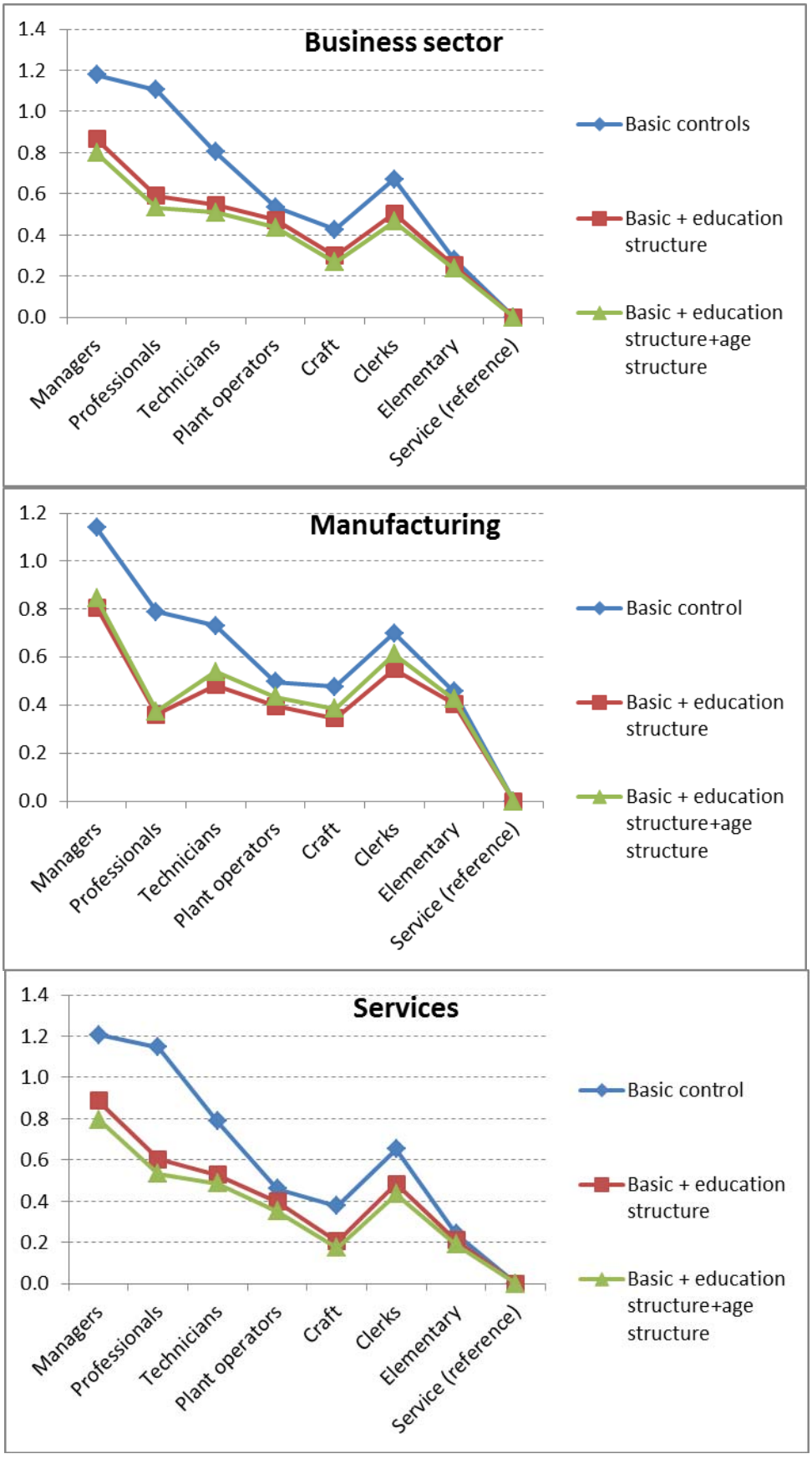


Figure 8. Relative productivity levels of the occupation groups (service occupation=1)



Note: Based on the regression parameters of the estimations presented in Table 3.