Regional employment effects of MNE offshoring

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Abstract

The employment in Sweden has become more concentrated to the larger cities in Sweden (Stockholm, Göteborg and Malmö). This paper investigates whether Swedish multinational enterprises (MNEs) have contributed to that development. We examine the association between offshoring within Swedish MNEs and changes their parent employment at regional level (in local labor market regions, LA-regions). The relation may vary depending on: (i) the characteristics of the region (large city, regional center or other region) or (ii) the type of labor (skilled or less-skilled) or the type of job (routine or non-routine) in the parent. Our results reveal large spatial heterogeneities in the relationships between MNE offshoring and onshore employment in various regions. The results suggest that MNE offshoring might be a factor contributing to diverging onshore employment among Swedish regions; increased (unchanged) employment in larger cities and unchanged (decreased) employment in regional centers and other regions. Moreover, MNE offshoring seems to contribute to increased localization of skilled activities and non-routine tasks to larger cities. We use enterprise data on employment in the parents and the affiliates overseas in Swedish controlled enterprise groups with affiliates abroad (Swedish MNEs). Parent employment data are available for different regions in Sweden, skilled and less-skilled labor, as well as for various occupations.

Keywords: multinational enterprises (MNEs), offshoring, local labor markets, skilled and less-skilled employment, routine and non-routine and jobs.

JEL: F14, F16, F23, J23, J24

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1. Introduction

The strong growth of global value chains (GVC) has been a prominent feature of production in recent years, facilitated by increased trade and investment liberalizations and rapid progress in information and communication technologies (ICT). [1] At the forefront of organizing production in international networks stretching out across multiple borders are multinational enterprises (MNEs). This mode of globalization (within MNE offshoring) has entailed that some production stages have been relocated to affiliates abroad, whereas others have been retained or even expanded in the parent companies at home. In developed countries, MNEs may gain efficiency along the value chain from the international fragmentation of production through specialization by functions. They offshore low value added routine activities carried out by particularly less-skilled labor and keep and increase the higher value added, non-routine activities performed by highly skilled labor at home.

Previous studies analyzing the impact of such offshoring on employment in parent companies have focused on employment composition at the national level; they have examined the relationships between MNE offshoring and the relative demand for skills and non-routine tasks in the home country.[2] A common result in these studies is that expansions in MNE affiliates abroad seem to involve the increased relative demand of skilled labor and non-routine tasks in the parents companies at home. Furthermore, Eliasson et al. (2018) finds that MNE offshoring is negatively related to less-skilled onshore employment in Swedish manufacturing MNEs, whereas MNE offshoring is positively associated with onshore skilled employment in Swedish service MNEs.

[1] However, since the financial crisis of 2008-09 trade in goods and services and also FDI flows, both as shares of GDP, have been stagnating or shrinking (The Economist, 2009).
[2] See, e.g., Head and Ries (2002), Hansson (2005), and Becker et al. (2013).

However, MNEs might also be specialized functionally across regions within a country. Larger cities are often hosts of major MNE knowledge-related investments, and the functions located there are, largely, highly skilled, non-routine activities. In other parts of a country, other functions, particularly less-skilled and routine activities, are performed. In contrast to previous studies, this paper considers spatial heterogeneity across local labor markets within a country. MNE offshoring may have various impacts on different types of regions (larger cities, regional centers and other regions) and our aim is to uncover whether the relationship between MNE offshoring and onshore employment varies between different groups of regions. [3]

An indication that the impact of MNE offshoring might vary across regions is that, lately, employment in MNEs has been concentrated in larger cities in Sweden. Moreover, the variations in the relative endowments of skilled labor and the share of non-routine jobs across different regions are large – these endowments are substantially higher in larger cities than in other regions – and the gap between regions has widened over the studied period.

Moretti (2012) and others have documented the cumulative nature of skill agglomeration and its geographical consequences for economic development in different regions. An acceleration of globalization in combination with skilled biased technological change has strengthened the labor markets of human capital-intensive regions and weakened the labor markets of regions with a less skilled workforce. This has resulted in a redistribution of jobs, people and wealth across metropolitan areas in the US. Berry and Glaeser (2005) and Austin et al. (2018) analyze evidence on skill divergence across US local labor markets during the last three decades and find a robust and strong positive correlation between the change in the percentage of adults with a college degree and the initial share of adults with a college degree. This skill divergence coincides with declining or even reversed

[3] Iammariono et al. (2017) survey the development of the literature on the links between MNEs, cities and regions and competitiveness.

income convergence across US regions.[4] Eliasson and Westerlund (2018) find a similar pattern in Sweden. A rising geographical segregation of highly educated individuals has been accompanied by declining or even reversed income convergence across Swedish regions during the last 25 years. The tendency for increased regional dispersion in incomes in the US and Sweden in recent decades stands in stark contrast to the converging income pattern observed during most parts of the 20th century.

In this paper, we investigate whether the regional impact on employment of within MNE offshoring depends on: (i) the characteristics of the region (larger city, regional center, or other region), (ii) the type of labor (skilled or less-skilled) or the type of job (routine or non-routine) affected. More generally, we are interested in whether offshoring has contributed to the regional divergences observed in Sweden in recent years. This may have bearings also on other developed countries.

In addition to MNE offshoring, we examine to what extent other conceivable factors have influenced employment trends and compositions in local labor markets, that is regional variations in investment in information and communication technology ICT capital and in the intensity of import competition from rapidly growing low- and middle-income countries, such as China.

The units of analysis in this paper are Swedish MNEs and local labor market regions. Two related studies that also address the regional impact of outward foreign direct investments FDI are Gagliardi et al. (2015) on Great Britain and Elia et al. (2009) on Italy. However, they are not exploiting data on single MNEs but more aggregate regional data on employment and FDI. In our analysis the period of study is 1997 to 2016, a period of expansion for Swedish MNEs, especially in low- and middle-income countries, such as China, or in countries in Central and Eastern Europe.

[4] According to Ganong and Shoag (2017), the variance of per capita personal income among US metropolitan areas was 30 percent higher in 2016 than it was in 1980.

We find that increased employment in affiliates overseas by Swedish MNEs is positively (or not) related to parent company employment in larger cities, while there is no (or a negative) relationship with onshore employment in regional centers and in other regions. In addition, our results indicate that MNE offshoring is correlated with higher shares of skilled labor and non-routine jobs in MNE parent companies in larger cites, while there is no such connection in regional centers and other regions. In other words, MNE offshoring within Swedish MNEs appears to contribute to a concentration of employment to, and growing shares of skilled and non-routine activities in, the larger cities in Sweden.

The structure of the remainder of this paper is as follows. In Section 2.1, we discuss the Swedish micro data we employ. Section 2.2 describes the development of Swedish MNE employment in affiliates abroad and regionally at home. Section 2.3 presents how we measure non-routine task intensities in various occupations and how we calculate the number of non-routine and routine jobs in different regions. Section 3 contains the econometric analysis, with Section 3.1 setting out the econometric specification, and Section 3.2 showing the results from the estimations. Section 4 summarizes and concludes.

2. Data and description

2.1 Data definitions and sources

To construct our dataset, we connect data from a range of microdata sources. The unique identification numbers of the firms enable us to link information on financial accounts and register-based labor statistics (in our case, the education levels of employees and their occupations). In the analysis, we focus on Swedish-controlled enterprise groups with affiliates abroad, namely Swedish MNEs. We identify firms within the same enterprise group by means of Koncernregistret (the Business Group Register).

The basic variables in our study, aside from employment, are individuals' educational attainment and occupations, which we derive from annual registers of the Swedish population compiled by Statistics Sweden (SCB). The education register has existed since 1985, and a complete register on occupations has existed since 2001. Wage incomes[5] are from register-based labor market statistics (RAMS), and the variables derived from balance sheets and income statements, such as value added and capital, are from the Structural Business Statistics (SBS). Both RAMS and SBS are also register data collected by SCB. Employment in Swedish MNEs, in their Swedish parent companies, and in their affiliates abroad at the country level are from statistics compiled by the Swedish Agency for Growth Policy Analysis.

Since administrative boundaries (municipalities or counties) typically do not depict economic realities, we use 69 local labor markets (LA regions) for the regional dimension of the analysis. The commuting patterns between Sweden's 290 municipalities in 2015 define the local labor markets. LA regions are constructed by merging municipalities so that commuting flows across LA regions are minimized. This means that the local labor markets are economically integrated

[5] More precisely, wage incomes are gross annual earnings.

regions where people tend to live and work. We use the same set of 69 LA regions throughout the entire study period of 1997 to 2016.

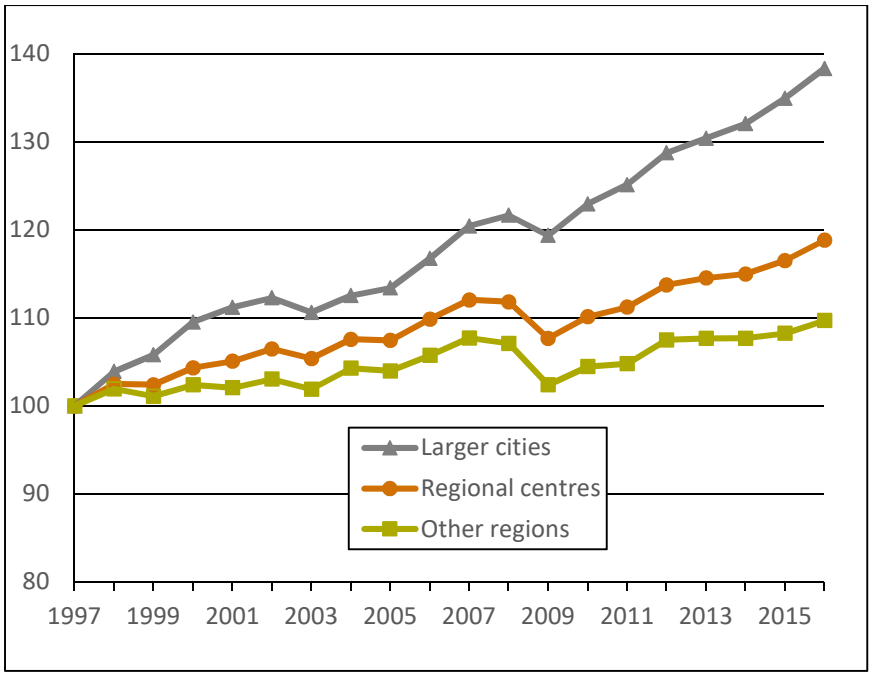
In our analysis, we sometimes aggregate LA regions into three types of *regional groups*, based on the size of the population in 2016: *larger cities* (population over 500,000), *regional centers* (population between 100,000 and 500,000) and *other regions* (population less than 100,000). In the category of larger cities, we find three metropolitan areas – Stockholm, Göteborg and Malmö. The group of regional centers consists of 19 LA regions that typically include a regional administrative center and contain the universities/university colleges located outside the metropolitan regions. Finally, the group of other regions consists of 47 LA-regions, which include, with a few exceptions, neither regional administrative centers nor university colleges.[6]

2.2 Regional employment in Sweden

We begin our analysis by describing the development over the last two decades of total employment and employment in MNEs (Swedish MNEs and foreign-owned firms) in the regional groups defined. Figure 1 shows the trends in total employment in larger cities, regional centers and other regions between 1997 and 2016.

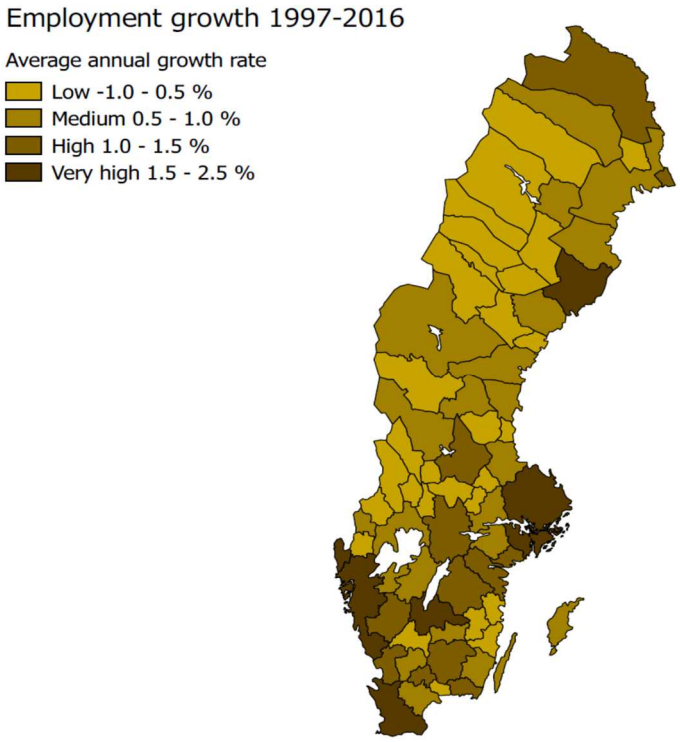
[6] The Appendix Table 8 and Table 9 presents the regional groups and shows the characteristics of the 69 LA regions.

Figure 1 Regional employment in larger cities, regional centers and other regions



Source: Statistics Sweden, Register-based Labor Market Statistics (RAMS)

Figure 2 Employment growth in Swedish LA regions



Source: Statistics Sweden, Register-based Labor Market Statistics (RAMS)

We notice from Figure 1 that the employment has grown considerably faster in larger cities than in regional centres and other regions in Sweden. During the period, employment increased by 38 percent in larger cities, 19 percent in regional centres and 10 percent in other regions. In other words, we observe an agglomeration of employment in Sweden to larger cities. Figure 2 shows the same pattern in more detail (for each LA region). [7]

The employment growth in the larger cities – Stockholm, Göteborg and Malmö – is high in all regions (annual average growth between 2.5 and 1.5 percent). This is also the case in Umeå, Jönköping and Strömstad. We observe low employment growth (annual average growth between −1.0 and 0.5 percent), in other regions mainly located in Northern Sweden, Dalarna, Värmland, and Småland. [8]

We hypothesize that offshoring within MNEs might be an important driving force behind that development. Table 1 describes the employment changes in MNEs (Swedish MNEs and foreign-owned firms) at the regional level and compares those with regional shifts in the entire economy.

Table 1 Regional employment in Swedish MNEs, foreign-owned firms and the entire economy

Region groups	Swedish MNEs			Foreign-owned firms			Entire economy		
	1997	2016	Δ	1997	2016	Δ	1997	2016	Δ
Larger cities	313 (48.5)	266 (52.9)	−46 (4.4)	168 (55.9)	397 (62.5)	230 (6.6)	1,868 (49.1)	2,584 (53.5)	716 (4.4)
Regional centres	239 (37.0)	174 (34.6)	−65 (−2.4)	93 (31.0)	170 (26.7)	80 (−4.3)	1,360 (35.8)	1,616 (33.4)	256 (−2.4)
Other regions	93 (14.4)	63 (12.5)	−30 (−1.9)	39 (13.1)	69 (10.8)	32 (−2.3)	573 (15.1)	629 (13.0)	55 (−2.1)
All	644	503	−141	301	636	335	3,801	4,828	1,027

Remark: The number of employees is in thousands and within parentheses are shares of employment in all regions (percent).

[7] See also Appendix Table .
[8] The annual average growth in the large cities is 2.0 percent, in regional centers 1.0 percent and in other regions 0.5 percent.

Because many large Swedish MNEs became foreign-owned in the late 1990s, employment in Swedish MNEs has fallen in all regions between 1997 and 2016, while employment in foreign-owned firms has been rising. However, if we look at the changes in employment shares, we can see that the share increased in larger cities, while it decreased in regional centres and other regions for Swedish MNEs and foreign-owned firms. We identify a similar pattern for the entire economy. This pattern is consistent with the idea that offshoring within MNEs leads to different employment trajectories in regional centres and in other regions compared to larger cities. Offshoring, therefore, could be a factor explaining the regional structural changes that we observe in Figure 1 and Figure 2.

In our econometric analysis in Section 3, we examine whether MNE offshoring is related to the skill compositions in different regions. We divide the employed into skilled and less-skilled labor based on educational attainment and define skilled labor as employees with three years or more of post-secondary education. Table 2 shows whether the skill composition in Swedish MNEs has developed differently in our three groups of regions.

Table 2 Skilled and less-skilled regional employment in Swedish MNEs

Region groups	Skilled labor			Less-skilled labor			Skill share		
	1997	2016	Δ	1997	2016	Δ	1997	2016	Δ
Larger cities	43 (73.7)	84 (70.0)	41 (−3.8)	270 (46.0)	182 (47.7)	−88 (1.6)	13.7	31.7	17.9
Regional centers	12 (21.0)	30 (24.6)	18 (3.6)	226 (38.6)	144 (37.8)	−82 (−0.9)	5.1	17.2	12.1
Other regions	3 (5.3)	7 (5.4)	4 (0.1)	90 (15.3)	56 (14.6)	−34 (−0.7)	3.3	11.3	8.0
All	58	121	63	586	382	−204	9.1	24.1	15.1

Remark: The number of employees is in thousands and within parentheses are shares of total (skill or less-skilled) employment in all regions in percent.

In contrast to Table 1, we find that the employment share for skilled labor in Swedish MNEs decreases in larger cities, while it increases in regional centers and is almost unchanged in other regions. However, for less-skilled labor the pattern is

the same as for total employment in Table 1, that is a rising employment share in larger cities.

The reason behind the relatively modest decline in total employment in Swedish MNEs in larger cities is that the sizable decrease in the employment of less-skilled labor that we observe in all regions is counteracted in larger cities by a substantial increase in the employment of skilled labor.

Lastly and most importantly, in Table 2, we notice that the share of skilled labor in Swedish MNEs is highest in larger cities; in 2016, almost one-third of the employees in the larger cities had a post-secondary education of three years or more. [9] This finding indicates that in larger cities Swedish MNEs carry out more qualified activities that require a high share of skilled workers. Moreover, this pattern appears to have strengthened since the skill share has grown significantly more in larger cities than in regional centers and, particularly, than in other regions. In larger cities, the share of skilled labor in Swedish MNEs increased by almost 18 percentage points between 1997 and 2016. Generally, Table 2 shows that Swedish MNEs destruct less-skilled jobs in all regions, while creating skilled jobs, above all, in larger cities.

2.3 Regional distribution of routine and non-routine jobs

Routine tasks are activities accomplished by following a set of specific, well-defined rules, while non-routine tasks are complex activities, such as problem solving and decision-making. Routine tasks are thus more easily geographically fragmented than non-routine tasks (or autonomously performed by a computer). They are simply translated into instructions for the offshore producers (or codified

[9] In Appendix Table 9, we see that compared to the Swedish MNEs in Table 2, the skill share is lower in the entire business sector in all regions; in 2016, the share of skilled labor in larger cities is 24.3 percent, in regional centers is 13.6 percent, and in other regions is 9.6 percent. In other words, Swedish MNEs seem to perform more advanced activities than in the business sector in general. The difference in skill share is greatest between the entire business sector and Swedish MNEs in larger cities (−7.4 percentage points) and smallest in other regions (−1.7 percentage points).

into a computer program). Hence, we expect that routine jobs are more vulnerable to offshoring than non-routine jobs, and therefore, that jobs within MNEs located in regions with high shares of routine jobs are more exposed to destruction by MNE offshoring.

The measure we use on the content of routine tasks in different occupations is based on a typology proposed by Acemoglu and Autor (2011). Their measure distinguishes between four types of tasks: non-routine cognitive, routine cognitive, routine manual, and non-routine manual. *Non-routine cognitive tasks* can be analytical or interpersonal. The former requires abstract thinking, creativity and problem solving – such tasks are common among engineers, IT specialists, and designers – whereas the latter – strong communication skills – is prevalent among managers. *Routine cognitive tasks* are structured, repetitive intellectual activities that require accuracy and being exact – often performed by office clerks, administrative workers, and cashiers. *Routine manual tasks* are repetitive physical activities that also require accuracy and meticulousness, and *non-routine manual tasks* necessitate manual dexterity, response to the environment and spatial orientation. An example of routine manual occupations is production workers, such as machine operators and assemblers, and examples of non-routine manual occupations are drivers, construction workers, and waiters.

In our analysis, we utilize a measure that has operationalized the typology above into an index, the Routine Task Intensity (*RTI*) index, used by, for example, Autor and Dorn (2013). In turn, Goos et al. (2014) normalize the *RTI* index to have zero mean and unit standard deviation and then map it onto the two-digit ISCO88. [10] The *RTI* index consists of three task aggregates: manual, routine, and abstract tasks, combined to create the summary measure *RTI* by occupations *s*, which increases with the importance of routine tasks in each occupation and declines with the

[10] We follow the recommendation of Autor (2013) and, rather than creating an own measure of the routineness of an occupation, we utilize an off-the-shelf measure for the routine content of occupations. A caveat is that the mapping from the US occupational code to the international ISCO88 code means that we are left with a crude occupational classification of only 21 occupations.

importance of manual and abstract tasks. To map the *RTI* values in Goos et al. (2014) onto a variable *RTI* that assumes values between 0 and 100, we use the cumulative normal distribution with a mean of 0 and a standard deviation of 1. From RTI_s, we obtain the non-routine task intensity of occupation *s*, $NRTI_s = 1 - RTI_s$. Table 3 presents the share of non-routine tasks $NRTI$ for various occupations *s*, $_s$.

Not surprisingly, we can see in Table 3 that employees working in occupations where the content of non-routine cognitive tasks is high tend to be well educated. In contrast, those having an occupation carrying out mainly routine manual tasks are considerably less educated. However, in occupations where routine cognitive tasks are significant, there are often middle-skilled workers, and in occupations where non-routine manual tasks are performed, the skill intensity is low. This finding explains why the correlation between the occupational non-routine intensity *NRTI* and the occupational skill intensity *SKILL* – share of employees in an occupation *s* that have a post-secondary education more than three years – is indeed positive (0.51) but far from perfectly correlated.[11]

[11] An alternative measure of the share of non-routine tasks in different occupations is employed, for instance, by Becker et al. (2013). This is based on whether certain tools, identified as indicating the performance of non-routine tasks, are used in an occupation. The great difference between this alternative measure and the one we utilize is that the former does not discern routine cognitive tasks and non-routine manuals tasks. As consequence, the tool-based, non-routine intensity measure is strongly correlated with skill intensity (0.77), whereas it is not very correlated with the *NRTI* measure in Table 3 (0.38 and only significant at the 10 percent level), a surprisingly low correlation given that both measures are supposed to capture the share of non-routine tasks in an occupation (Eliasson et al. 2018 Table 3).

Table 3 The share of non-routine tasks and skill intensity in different occupations

ISCO 88	Occupation	Non-routine *NRTI* ($_s$)	Main tasks	Skill *SKILL*	Employ-ment
11	Legislators and senior officials	..		62.5	4,833 (0.1)
12	Corporate managers	77.3	Non-routine cognitive	40.8	188,239 (4.3)
13	Managers of small enterprises	93.6	Non-routine cognitive	21.0	79,041 (1.8)
21	Physical, mathematical and engineering science professionals	79.4	Non-routine cognitive	57.2	206,146 (4.7)
22	Life science and health professionals	84.1	Non-routine cognitive	50.5	94,484 (2.2)
23	Teaching professionals	..		80.4	214,851 (4.9)
24	Other professionals	76.7	Non-routine cognitive	61.0	311,621 (7.1)
31	Physical and engineering science associate professionals	65.5	Non-routine cognitive	23.7	209,176 (4.8)
32	Life science and health associate professionals	62.9	Non-routine cognitive	65.8	132,554 (3.0)
33	Teaching associate professionals	..		43.9	99,713 (2.3)
34	Other associate professionals	67.0	Non-routine cognitive	24.9	411,100 (9.4)
41	Office clerks	1.3	Routine cognitive	11.3	262,620 (6.0)
42	Customer services clerks	7.9	Routine cognitive	11.0	71,096 (1.6)
51	Personal and protective services workers	72.6	Non-routine manual	6.4	677,186 (15.5)
52	Models, sales persons and demonstrators	48.0	Routine manual	6.5	225,312 (5.2)
61,62	Skilled agricultural and fishery workers	..		7.3	91,448 (2.1)
71	Extraction and building trades workers	57.5	Non-routine manual	2.0	260,910 (6.0)
72	Metal, machinery and related trades workers	32.3	Routine manual	1.7	129,472 (3.0)

Table 3 Continued

ISCO 88	Occupation	Non-routine *NRTI* ($_s$)	Main tasks	Skill *SKILL*	Employ-ment
73	Precision, handicraft, printing and related trades workers	5.6	Routine manual	8.4	11,724 (0.3)
74	Other craft and related trades workers	10.7	Routine manual	4.9	18,388 (0.4)
81	Stationary-plant and related operators	37.4	Routine manual	2.9	52,850 (1.2)
82	Machine operators and assemblers	31.2	Routine manual	2.9	183,917 (4.2)
83	Drivers and mobile plant operators	93.3	Non-routine manual	3.4	167,284 (3.8)
91	Sales and services elementary occupations	48.8	Routine manual	5.9	210,283 (4.8)
92	Agricultural, fishery and related laborers	..		7.0	3,831 (0.1)
93	Laborers in mining, construction, manufacturing and transport	32.6	Routine manual	3.9	48,676 (1.1)

Remark: The share of non-routine tasks *NRTI* and skill intensity *SKILL* in an occupation are in percent. Within parentheses are percent of total employment.

Source: Non-routine Goos et al. (2014) Table 1 and skill intensity and employment Statistics Sweden, Register-based Labor Market Statistics (RAMS).

We calculate the number of Swedish MNE non-routine jobs $L_{\ t}\ (SMNE)$ and routine jobs $L_{\ t}(SMNE)$ in region *r*, time *t* as: $L_{\ t}\ (SMNE) = \sum_j \sum_s (\ _s\ \times L_{sj\ t})$ and $L_{\ t}(SMNE) = \sum_j \sum_s ((1 -\ _s\ ) \times L_{sj\ t})$, where $L_{sj\ t}$ is employment in occupation *s*, in MNE *j*, in region *r*, at time *t*.

Table 4 shows the development of routine and non-routine jobs in the different Swedish regions between 2001 and 2013.[12]

[12] Not until 2001 was the Swedish register of occupation completed. After 2013, a new classification system of occupations was introduced. Unfortunately, the system is not entirely compatible with ISCO88. Moreover, after the introduction of the new classification in 2013, the Swedish register of occupation is again incomplete.

Table 4 Routine and non-routine jobs regionally in Swedish MNEs

Region groups	Non-routine			Routine			Non-routine share		
	2001	2013	Δ	2001	2013	Δ	2001	2013	Δ
Larger cities	136 (55.4)	139 (56.8)	3 (1.4)	141 (48.7)	106 (49.1)	−34 (0.5)	49.2	56.7	7.5
Regional centres	82 (33.3)	78 (31.9)	−4 (−1.4)	110 (37.9)	80 (37.0)	−29 (−0.9)	42.8	49.5	6.7
Other regions	27 (11.3)	27 (11.3)	0 (0.0)	39 (13.4)	30 (13.8)	−9 (0.4)	41.8	48.1	6.3
All	246	245	−1	289	216	−73	46.0	53.2	7.2

Remark: The number of jobs is in thousands and within parentheses are shares of total (non-routine or routine) jobs in all regions in percent.

At first, we notice, in Table 4, that more than half of the non-routine jobs are located in larger cities and that they have been somewhat more concentrated there. The number of non-routine jobs has increased in larger cities, has decreased in regional centers and has been unchanged in other regions. Routine jobs have disappeared in all regions, which has resulted in higher shares of non-routine jobs in all regions. We observe the largest increase in the non-routine share in larger cities (7.5 percentage points). Worth noting in Table 4 is that at the national level in Swedish MNEs the non-routine jobs have only decreased slightly, while the number of routine jobs has fallen significantly.

Generally, in the business sector between 2001 and 2013 the number of non-routine jobs increased from 1.13 million to 1.53 million (+35%), while the increase in routine jobs was much more modest, from 1.42 million to 1.47 million (+3%). As in Swedish MNEs, the share of non-routine jobs is higher in larger cities than in regional centers and in other regions (see Appendix Table 9).

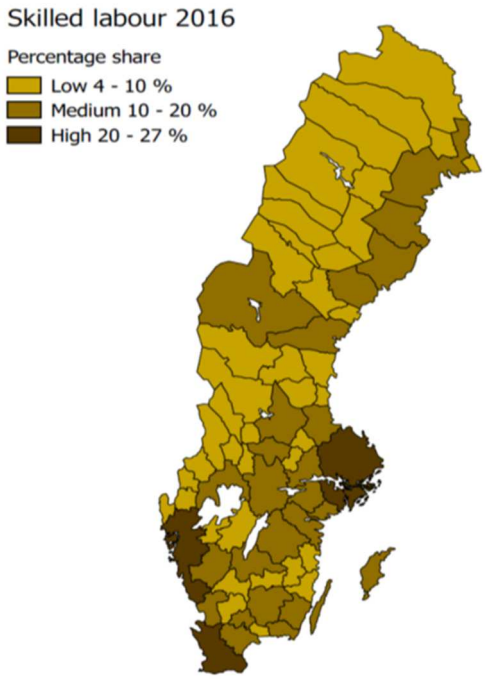
Finally, we notice that the dispersion of non-routine jobs in the business sector is larger among the local labor markets than skilled employment. In 2016, only in larger cities was the share of skilled labor higher than 20 percent, while almost all of the local labor markets with skill shares less than 10 percent were other regions (Figure 3). In other words, the concentration of skilled labor in the larger cities is

striking. An important driver behind that fact is the migration of highly skilled from small and mid-sized regions to the larger cities.[13]

The share of non-routine jobs in 2013 was indeed higher than 50 percent in the larger cities. Nonetheless, there are regional centers and other regions where more than half of the jobs in the business sector are non-routine (Figure 4). Mining regions, such as Kiruna and Gällivare, have high shares of non-routine jobs, while the share of skilled labor is low. The same goes for some small regions in the hinterland of Northern Sweden, such as Arjeplog, Åsele and Härjedalen. Karlstad, Ludvika and Sundsvall are also regions with high shares of non-routine jobs but with medium shares of skilled labor. The maps in Figure 3 and Figure 4 illustrate what we already observed in Table 3, namely, that non-routine jobs often have a high skill content. However, the correlation between the share of non-routine jobs and the share of skilled labor among Swedish LA regions in 2016 was indeed clearly positive but far from perfect (0.58).

[13] Eliasson and Westerlund (2018) Table 2 shows that almost one-third of the total increase in the number of university graduates between 2001 and 2010 in the larger cities is a contribution of the net migration from regional centers and other regions to larger cities.

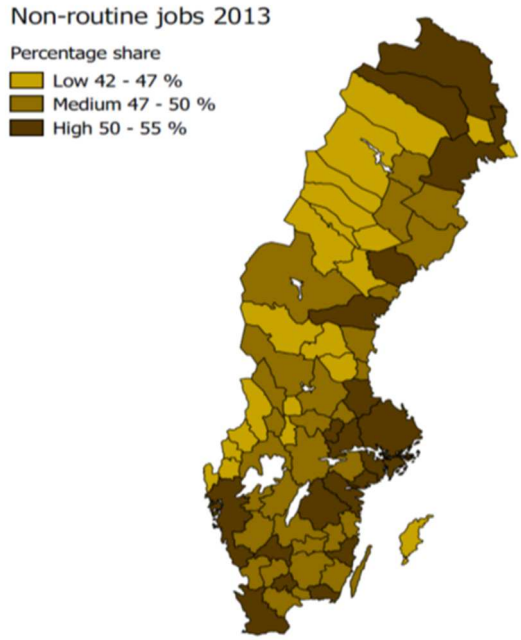
Figure 3 Spatial distribution of shares of skilled labor in the business sector across LA regions



Remark: The business sector includes all firms in the Structural Business Statistics (SBS)

Source: Statistics Sweden, Register-based Labor Market Statistics (RAMS)

Figure 4 Spatial distribution of shares of non-routine jobs in the business sector across LA regions

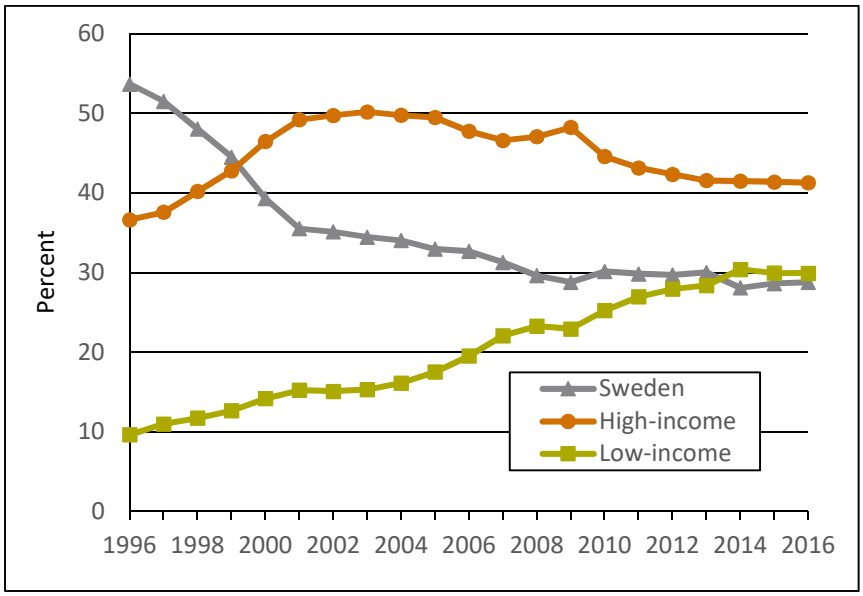


Source: Statistics Sweden, Register-based Labor Market Statistics (RAMS)

2.4 Employment in Swedish MNEs at home and abroad

In our econometric analysis, we examine whether offshoring within Swedish MNEs might be an explanation for the changed regional employment pattern that we observe in Sections 2.2 and 2.3. However, we first proceed and show the trends in the distribution of employment within Swedish MNEs between their parent companies in Sweden and their affiliates abroad during the period from 1996 to 2016. Figure 5 illustrates the development of the share of employment in Swedish MNEs in Sweden and in high- and low-income countries.

Figure 5 Employment shares in Swedish MNEs at home and abroad: Sweden, high- and low-income countries[14]



Remark: High-income countries are the "old" OECD countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Switzerland, the United Kingdom and the United States.

Source: Swedish Agency for Growth Policy Analysis, Swedish Groups with Affiliates Abroad

In Sweden, the proportion of total employment in Swedish MNEs has fallen from 54 percent in 1996 to 29 percent in 2016. In the late 1990s, the largest drop occurred, and in the 2000s, the onshore proportion flattened out. Since the financial

[14] Regarding the way we define high- and low-income countries (see the remark in the figure), low-income countries might be better termed as low- and middle-income countries.

crisis in 2008/09, the employment share in Sweden has been constant at approximately 30 percent, which indicates that the extent of offshoring has slowed.[15]

In the late 1990s, the share abroad grew in both high- and low-income countries. In affiliates in high-income countries, the proportion at the outset increased from 37 percent in 1996 to 50 percent in 2003, when it peaked. The share then decreased, and by 2016, it was 41 percent. In low-income countries, the employment share has a distinctly rising trend, from nearly 10 percent in 1996 to 30 percent in 2016; large employment growth has occurred in affiliates in Central and Eastern European countries and in China. [16]

[15] The Economist (2019) discusses the slower pace and changing character of globalization observed after financial crisis of 2008-09.
[16] Eliasson et al. (2018) Figure 2.

3. Econometric analysis

3.1 Econometric specifications

In our econometric work, we estimate the relationship between MNE offshoring and MNE parent company employment across Swedish local labor markets. The estimated equation has the following form:

$$L_{j\ t} = \beta_1 OE_{jt} + \beta_2 R_1 OE_{jt} + \beta_3 R_2 OE_{jt} +$$

$$+ {}_1E_{jt} + {}_2E_{\ t} + {}_3ICT_{\ t} + {}_4M_t^{Chi\ \ a} + \varepsilon_{j\ t} \qquad (1)$$

The dependent variable $L_{j\ t}$ is employment in MNE *j* in region *r,* at time *t.* Our key independent variable is OE_{jt}, which is offshore employment in MNE *j*, at time *t*. We allow for the relationship to vary between different regional groups by interacting OE_{jt} with two dummy variables R_1 and R_2; $R_1 = 1$ if region *r* is a larger city region and $R_2 = 1$ if region *r* is a regional center.

A factor that may affect MNE *j*'s employment in a region *r* is whether the MNE is successful overall and expanding or waning and declining. To control for that, we include in some of our specifications MNE *j*'s total employment (in Sweden and abroad) E_{jt} as an explanatory variable.

Structural changes and business cycles affect regions and regional employment differently depending on a region's industrial structure. To capture this we create a variable, which is based on a region's pre-existing industrial composition and the development of employment on the national level in various industries in the business sector.

$$E_{\ t} = \sum_i (E_{i\ t-5}/E_{it-5}) \times E_{it} = \sum_i \gamma_{i\ t-5} E_{it} \qquad (2)$$

High initial employment shares in industries *i* in a local labor market *r*, where the employment on national level E_{it} is growing rapidly, means that $E_{\ t}$ in region *r* is increasing more than in local labor markets where the pre-existing shares are low in

such industries. The reason why we employ initial employment shares is that we want to restrict endogenous local labor market adjustments to influence our explanatory variable.[17] We expect the prosperity of a region to be positively related to employment in MNEs in that region.

We use similar constructions of variables to control for regional trends in investment in information and communication technology (ICT) and import competition from China, which we believe affect regional MNE employment. In particular, we expect that such trends will be correlated with the composition of employment – shares of skilled labor or shares of non-routine jobs – in different local labor markets.

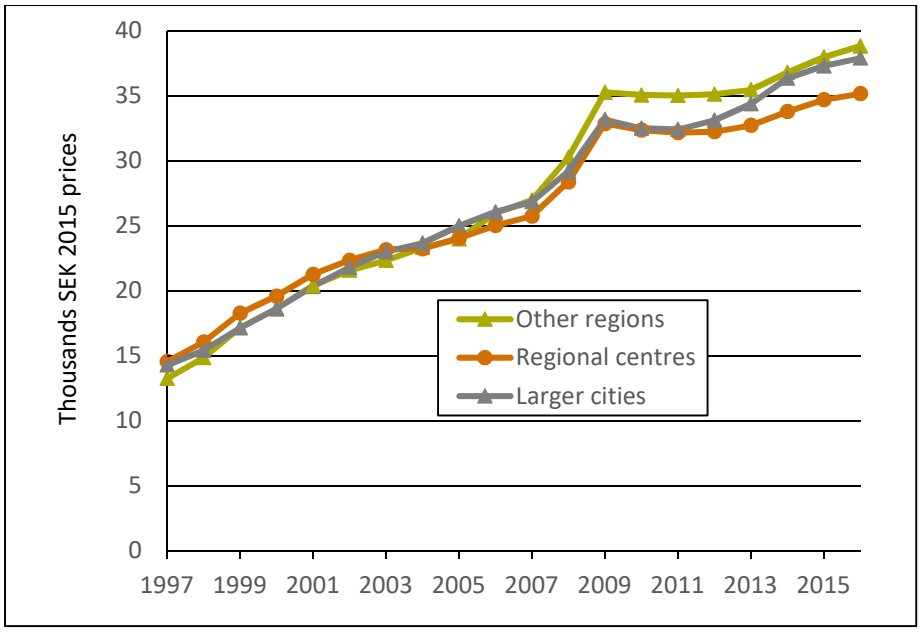
We calculate ICT stocks on regional level $ICT_{\ t}$ by using national ICT stocks on industry level, ICT_{it}. We distribute ICT_{it} on regional level by using a region's pre-existing share of employment in an industry i, that is $\gamma_{i\ t-5}$. Summing over the ICT stocks in different industries in a local labor market gives us the ICT stock in that region.

$$ICT_{\ t} = \sum_i \gamma_{i\ t-5}\, ICT_{it} \qquad (3)$$

ICT stocks are growing faster in regions with high pre-existing employment shares in industries where the ICT stocks on the national level are increasing rapidly. We expect that ICT capital is complementary to highly skilled workers, who can perform analytical and interpersonal work, that is, thus far, not replaceable by machines. In contrast, ICT capital substitutes for routine tasks (Goos et al. 2014). Hence, we believe that growing ICT stocks leads to increased relative demand for skilled labor and non-routine jobs. Figure 6 shows the development of ICT stocks per employed in our three groups of regions.

[17] See the discussion in Gagliardi et al (2015).

Figure 6 ICT stocks per employed in larger cities, regional centres and other regions



Source: Statistics Sweden, National Accounts

The pattern is more or less the same in the different groups of regions. The growth in the ICT stocks per employed is faster before than after the financial crisis 2008/09.

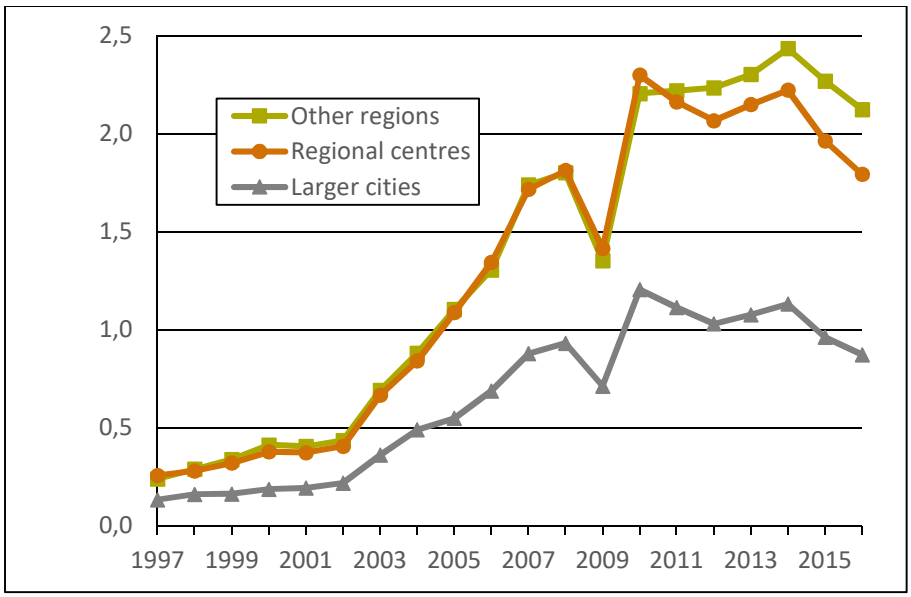
Similarly, we construct a proxy for exposure to import competition from China on regional level, $M_t^{Chi\ a}$. As for the ICT stocks, we only have access to data on import from China in various industries *i* at the national level in 2015 prices, $M_{it}^{Chi\ a}$. To obtain regional imports from China on the industry level, $M_{i\ t}^{Chi\ a}$, we allocate $M_{it}^{Chi\ a}$ to local labor markets *r* by employing the regions' initial shares of employment in industry *i*, $\gamma_{i\ t-5}$, and then we get $M_t^{Chi\ a}$ by summing $M_{i\ t}^{Chi\ a}$ over all industries.

$$M_t^{Chi\ a} = \sum_i \gamma_{i\ t-5}\, M_{it}^{Chi\ a} \qquad (4)$$

Import competition from China becomes more severe in regions where the pre-existing shares of employment are high in industries in which imports from China

grow rapidly.[18] Our hypothesis, which is in line with the previous literature, is that increased import competition from China is negatively related mainly to less-skilled employment and routine jobs. Figure 7 demonstrates how import competition from China has evolved between 1997 and 2016 in our three types of labor market regions.

Figure 7 Import competition from China per employed in larger cities, regional centers and other regions



Source: OECD STAN and Statistics Sweden, RAMS

Generally, we observe intensified competition from China in all types of regions until 2010. However, regional centers and other regions appear to have been hardest hit.

Finally, in equation (1), γ_j is an MNE-specific fixed effect, γ is a region effect, γ_t is a year effect, and $\varepsilon_{j\ t}$ is an error term.

3.2 Econometric results

[18] Compare with Autor et al. (2013) and Balsvik et al. (2015). They analyze the effects of rising Chinese import competition on local labor markets in the US and Norway and exploit regional variations in import exposure based on initial differences in industry specialization.

We estimate equation (1) beginning with total employment as dependent variable and then divide the employment into skilled and less-skilled employment. We base our estimations on Swedish MNEs with employees abroad in at least one year during the studied period from 1997 to 2016. We include local labor markets *r* for a Swedish MNE *j* in which MNE *j* has employed at least one year over the studied period. This entails that in many cases the dependent variable is zero. In Table 5, we present the OLS estimates of the model in equation (1).

The key variable in Table 5 is offshore employment OE_{jt} and an expansion of employment in affiliates abroad is positively related to onshore employment in large cities. In particular, this applies for less-skilled labor. In other words, within MNEs, increased offshore employment appears to *complement* onshore employment in larger cities. In regional centers and other regions, overseas expansions in employment are unrelated to parent company employment.

If we take into account how successful an MNE *j* is by adding its total employment (in Sweden and abroad) E_{jt}, we now find that an expansion overseas is negatively associated with onshore employment in regional centers and other regions. Hence, within MNEs, increased offshore employment seems to be a *substitute* for onshore employment in regional centers and other regions. As expected, the coefficient on E_{jt} is positive and strongly significant.

Finally, we remark that the control variables have the expected correlations with onshore employment, structural changes on regional level E_t (positive but not significant for skilled labor), regional ICT stocks ICT_t and regional import competition from China $M_t^{Chi\ a}$ (negative). Notice that for the latter two – ICT_t and $M_t^{Chi\ a}$ – not surprisingly, the negative correlations appear to be driven by less-skilled labor (unrelated with to skilled labor).

Table 5 Offshore employment and onshore employment regionally: total, skilled and less-skilled employment

	Total employment	Total employment	Skilled employment	Skilled employment	Less-skilled employment	Less-skilled employment
Larger cities	0.0151	0.0004	0.0048	0.0034	0.0103	−0.0030
OE_{jt}	(2.11)	(0.05)	(1.31)	(0.96)	(2.86)	(−0.73)
Regional centers	−0.0004	−0.0151	−0.0002	−0.0015	−0.0002	−0.0136
OE_{jt}	(−0.71)	(−4.57)	(−0.90)	(−2.84)	(−0.56)	(−4.68)
Other regions	−0.0010	−0.0158	−0.0002	−0.0015	−0.0009	−0.0143
OE_{jt}	(−1.25)	(−4.59)	(−0.80)	(−2.79)	(−1.34)	(−4.72)
MNE employment		0.0145		0.0013		0.0132
E_{jt}		(4.60)		(3.08)		(4.68)
Structural changes	0.0002	0.0002	$1.8\text{x}10^{-6}$	$2.0\text{x}10^{-6}$	0.0002	0.0002
E_t	(2.66)	(2.68)	(0.79)	(0.85)	(2.58)	(2.64)
ICT stock	−0.0023	−0.0025	0.0001	$8.5\text{x}10^{-6}$	−0.0024	−0.0026
ICT_t	(−2.09)	(−2.15)	(0.42)	(0.31)	(−2.41)	(−2.47)
Import competition	$-2.8\text{x}10^{-6}$	$-3.2\text{x}10^{-6}$	$-4.9\text{x}10^{-7}$	$-8.9\text{x}10^{-7}$	$-2.7\text{x}10^{-6}$	$-3.1\text{x}10^{-6}$
$M_t^{Chi\ a}$	(−2.50)	(−2.43)	(−0.22)	(−0.37)	(−2.79)	(−2.68)
R^2 (overall)	0.0596	0.1157	0.0657	0.0789	0.0469	0.1119
Observations	289,140	289,140	289,140	289,140	289,140	289,140
Groups	5,421	5,421	5,421	5,421	5,421	5,421

Remark: MNE group *j* is included in the sample all years during the studied period of 1997 to 2016 if it has employment overseas at least one year. Region *r* is included in the sample for MNE *j* if it has employment in region *r* for at least one year during the studied period. We base the reported *t*-values within parentheses on robust standard errors, clustered at the MNE group level. We estimate the model with MNE-specific fixed effects and add region and time dummies in all specifications.

In Table 6, we show the estimates of the model in equation (1), where we have replaced skilled and less-skilled labor with non-routine and routine jobs.

Table 6 Offshore employment and onshore jobs regionally: non-routine and routine jobs

	Non-routine jobs	Non-routine jobs	Routine jobs	Routine jobs
Large cities OE_{jt}	0.0083 (1.64)	0.0016 (0.31)	0.0065 (3.44)	−0.0022 (−0.93)
Regional centers OE_{jt}	−0.0002 (−0.47)	−0.0070 (−4.46)	0.0001 (0.28)	−0.0086 (−5.05)
Other regions OE_{jt}	−0.0005 (−0.80)	−0.0072 (−4.48)	−0.0003 (−0.66)	−0.0090 (−5.20)
MNE employment E_{jt}		0.0065 (4.88)		0.0084 (5.08)
Structural changes E_t	$5.8\text{x}10^{-6}$ (1.46)	$6.6\text{x}10^{-5}$ (1.52)	0.0001 (2.35)	0.0001 (2.35)
ICT stock ICT_t	−0.0006 (−1.19)	−0.0006 (−1.26)	−0.0008 (−1.62)	−0.0008 (−1.72)
Import competition $M_t^{Chi\ a}$	$-8.8\text{x}10^{-6}$ (−1.91)	$-9.5\text{x}10^{-6}$ (−1.78)	$-1.0\text{x}10^{-6}$ (−1.94)	$-1.1\text{x}10^{-6}$ (−1.82)
R^2 (overall)	0.0668	0.1029	0.0551	0.0980
Observations	191,628	191,628	191,628	191,628
Groups	4,759	4,759	4,759	4,759

Remark: See Table 5. Unlike in Table 5, the studied period in Table 6 is from 2001 to 2013.

The results for non-routine and routine jobs in Table 6 are not as clear-cut as in Table 5 for skilled and less skilled labor. However, if we do not control for total employment in MNE j E_{jt}, offshore employment appears to complement onshore routine jobs in larger cities, and if we control for E_{jt}, offshore employment seems to substitute for onshore jobs, routine jobs and non-routine jobs.

As in Table 5, the coefficient on E_{jt} is positive and clearly significant, and the estimates of the structural changes at the regional level E_t are positive and significant for routine jobs. The coefficients on ICT_t and $M_t^{Chi\ a}$ have the

expected negative sign for routine jobs but are never significant at the five-percent level.

Most of the previous studies of MNE offshoring on parent company employment at the national level, e.g., Eliasson et al. (2018) and Becker et al. (2013), examine the impact on relative labor demand. The main result in these studies is that offshoring within MNEs gives rise to increased relative demand of skilled labor and non-routine jobs in the parent companies in the home country. As a comparison and an extension of these studies, Table 7 presents the results from specifications where we use the share of skilled labor and the share of non-routine jobs as dependent variables.

Table 7 Offshoring and regional employment: share of skilled labor and non-routine jobs

	Skilled labor share	Non-routine jobs share
Large cities OES_{jt}	0.0669 (5.97)	0.0370 (3.66)
Regional centers OES_{jt}	0.0035 (0.35)	0.0175 (1.55)
Other regions OES_{jt}	0.0163 (1.20)	0.0057 (0.40)
Structural changes $E_{\ t}$	$-4.4\text{x}10^{-8}$ (−0.53)	$-4.8.\text{x}10^{-8}$ (−0.64)
ICT stock $ICT_{\ t}$	$1.1\text{x}10^{-6}$ (1.39)	$-4.8.\text{x}10^{-7}$ (−0.64)
Import competition $M_t^{Chi\ \ a}$	$2.8\text{x}10^{-8}$ (3.01)	$2.1.\text{x}10^{-8}$ (1.97)
R^2 (overall)	0.1289	0.0517
Observations	108,157	69,338
Groups	5,122	3,719

Remark: Unlike in Table 5 and Table 6 in Table 7 we use employment share in affiliates abroad OES instead of absolute overseas employment OE, which makes the results comparable with previous studies at the national level, for instance, Eliasson et al. (2018).

Interestingly, there is solely a positive relationship, although strongly significant, between expansions in affiliates overseas and relative demand for skilled labor and

non-routine jobs in larger cities. Offshoring within Swedish MNEs is associated neither with skill upgrading nor with a higher share of non-routine jobs in regional centers or other regions. Regarding the control variables, the estimates on imports from China have the expected positive sign and are significant, which is consistent with the finding that increased imports from China have a more severe impact on less-skilled employment and routine jobs than on skilled labor and non-routine jobs.

In sum, the main message we bring with us from Tables 5 to 7 is that MNE offshoring within Swedish MNEs appears to contribute to the concentration of employment to, and growing shares of skilled and non-routine activities in, the larger cities in Sweden.

university graduates, while regional centers and other regions experience larger net out-migration flows. Interestingly, the study also shows that larger regions are not only net attractors of young university graduates in quantitative terms. Within the group of university graduates, the larger regions, in particular, attract those with the highest school grades and the most favorable parental background in terms of parents' education and earnings.

Efficiency or Equity?

Due to agglomeration effects, the larger cities in Sweden are powerful engines of economic growth. Therefore, we should embrace the efficiency gains that the geographical fragmentation offshoring within MNEs appears to contribute to, namely increasing concentration of highly skilled, non-routine activities to the larger cities and the locations of less-skilled and routine activities abroad.

For the larger cities in Sweden, it is important to maintain their specialization in high-wage activities, constantly being able to, if necessary, replace old activities with new ones on the technological frontier, and continue being innovative. The aim has to be to sustain the prosperity of these dynamic regions to preserve international competitiveness in such activities.[24]

However, as we have noted above, the current mechanisms of knowledge diffusion from leading to lagged regions are too weak, the direction of the internal migration is misdirected, and the amount of labor mobility is insufficient to bring about income convergence. Hence, we deem that there is a need to pursue both efficiency (through greater agglomeration and density) and equity (through supporting less favored regions) at the same time. Persistent and growing territorial inequality is

[24] A strategy to achieve such sustainment should, according to Iammarino et al (2018), contain some common elements: "cutting-edge technology strategies, science-led and R&D-based innovation, outward internationalisation of both upstream and downstream production functions (e.g. R&D and logistics) business-university research collaboration, artistic creativity, forward-looking postgraduate education, environmental and anti-congestion measures, high openness to international flows of human capital, strong synergies between public and private actors supporting long-term investments in new and uncertain technological areas and urban environments that nurture cultural and ethnic diversity".

economically inefficient because, most likely, this implies that much potentials for economic development are untapped, particularly in less-developed and declining regions.

To exploit such potentials Iammarino et al. (2018) propose a place-sensitive development strategy. The policies must be sensitive to the different characteristics of and conditions in a region, that is responding to the structural opportunities, potentials and constraints of each place (no one-size-fits-all strategy). It is crucial to improve the incentives for improving skills and entrepreneurship and empowering local stakeholders to take greater control of the future. A place-sensitive strategy differs from previous policies by creating better opportunities for the resident population in less-developed and declining regions and not just providing welfare and shelter.

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Appendix: Larger cities, regional centers and other regions

Table 8 Population, employment in MNEs and annual employment growth in local labor markets

Local labor markets (LA regions)	Population 2016	Swedish MNEs 2016	MNE share 2016	Employment growth annual 1997 to 2016	
				Percent	Rank
Larger cities					
Stockholm	2,678,904	145,935	37.2	2.16	1
Göteborg	1,346,208	71,556	39.4	1.94	3
Malmö	1,149,525	48,880	38.1	1.75	4
Total	**5,174,637**	**266,371**	**37.9**	**2.02**	
Regional centres					
Örebro	293,981	14,421	38.9	1.05	16
Linköping	287,799	18,892	41.5	1.15	11
Västerås	243,960	12,809	40.5	0.94	21
Jönköping	222,305	13,120	39.6	1.53	6
Borås	199,925	11,148	34.6	1.05	17
Karlstad	195,080	7,544	34.8	0.58	36
Skövde	184,703	10,169	35.4	0.67	30
Norrköping	183,100	6,591	30.9	1.17	10
Kristianstad	179,326	6,245	28.9	0.61	32
Luleå	175,666	8,489	30.1	0.95	20
Gävle	163,602	10,907	38.6	0.53	39
Eskilstuna	163,335	9,192	34.8	0.88	24
Falun	156,913	8,070	31.6	1.08	14
Umeå	153,370	7,647	32.9	1.59	5
Sundsvall	151,081	6,556	32.5	0.58	35
Växjö	140,011	8,229	35.6	1.14	12
Halmstad	134,156	5,389	32.6	1.44	7
Kalmar	129,139	5,106	30.9	0.93	23
Östersund	106,664	3,683	22.7	0.96	19
Total	**3,464,116**	**174,207**	**35.1**	**0.99**	
Other regions					
Karlskrona	95,469	4,478	38.9	1.04	18
Skellefteå	76,391	4,059	33.8	0.77	28
Lidköping	73,918	2,963	28.9	0.78	27
Värnamo	72,999	6,915	37.1	0.21	51
Nyköping	66,845	4,385	39.6	1.06	15
Gotland	58,003	1,028	14.3	0.82	26
Örnsköldsvik	55,964	1,585	33.9	0.54	37
Hudiksvall	46,810	1,342	21.5	0.53	40
Oskarshamn	46,481	2,090	45.7	0.44	42
Karlshamn	45,547	1,782	43.8	0.11	55
Ludvika	42,848	1,063	45.5	0.20	53
Vetlanda	38,637	1,804	34.5	0.93	22
Avesta	38,622	1,472	35.5	0.20	52
Bollnäs	38,560	1,632	31.8	0.41	44
Ljungby	37,999	3,233	41.0	0.54	38
Västervik	36,438	974	26.2	0.02	57

Table 8 Continued

Local labor markets (LA regions)	Population 2016	Swedish MNEs 2016	MNE share 2016	Employment growth annual 1997 to 2016	
				Percent	Rank
Arvika	34,580	1,747	32.5	0.27	48
Mora	34,179	1,347	23.5	0.59	34
Vimmerby	30,243	1,037	27.1	0.23	49
Älmhult	29,767	1,021	52.0	1.37	8
Kiruna	29,283	3,706	41.1	1.09	13
Söderhamn	25,992	531	21.4	–0.23	62
Strömstad	25,685	673	25.5	2.15	2
Torsby	25,594	586	26.4	0.44	41
Fagersta	23,669	2,558	44.4	0.41	43
Sollefteå	19,846	530	22.9	–0.28	64
Ljusdal	19,067	336	14.9	0.73	29
Kramfors	18,681	662	27.2	–0.35	66
Gällivare	17,956	2,555	46.8	0.84	25
Lycksele	15,287	616	24.3	0.21	50
Bengtsfors	14,717	424	35.8	–0.49	68
Hagfors	11,917	185	43.2	–0.34	65
Strömsund	11,809	300	12.5	–0.07	59
Filipstad	10,960	248	43.4	–0.37	67
Härjedalen	10,200	207	19.1	0.28	46
Malung	10,091	891	30.7	0.31	45
Årjäng	9,958	375	35.5	0.60	33
Haparanda	9,864	205	30.6	1.17	9
Vansbro	6,884	284	27.5	–0.12	61
Vilhelmina	6,805	112	13.8	–0.23	63
Arvidsjaur	6,442	142	12.2	0.63	31
Storuman	5,899	206	18.6	0.07	56
Arjeplog	5,411	68	20.1	–0.07	60
Jokkmokk	5,105	249	19.9	–0.06	58
Överkalix	3,378	49	7.3	0.12	54
Åsele	2,875	59	13.6	–0.77	69
Dorotea	2,719	17	3.7	0.28	47
Total	**1,356,394**	**62,731**	**33.7**	**0.51**	
Total Sweden	**9,995,147**	**503,309**	**36.5**	**1.42**	

Remarks: MNE share is employment in Swedish MNEs and in foreign MNEs as a share of business sector employment. The employment in employment growth is total employment, namely business sector and public sector employment.

Table 9 Employment in the business sector, shares of skilled labor and non-routine jobs in local labor markets

Local labor markets (LA regions)	Business sector employment 2016	Share of skilled labor 2016	Share of non-routine jobs 2013
Larger cities			
Stockholm	970,191	26.6	54.5
Göteborg	446,742	21.9	51.9
Malmö	332,502	20.8	50.7
Total	**1,749,435**	**24.3**	**53.1**
Regional centres			
Linköping	86,549	18.7	50.9
Örebro	81,546	12.0	47.6
Västerås	72,649	16.8	49.8
Jönköping	67,742	13.2	47.7
Borås	60,402	11.3	46.5
Karlstad	53,032	14.0	50.0
Norrköping	52,636	13.6	49.0
Skövde	50,950	9.7	44.8
Luleå	48,628	13.8	50.8
Kristianstad	46,017	11.0	47.1
Gävle	45,528	12.8	50.7
Falun	44,196	12.4	49.3
Växjö	42,152	14.4	48.6
Umeå	41,631	18.7	49.6
Sundsvall	41,251	13.3	51.3
Eskilstuna	40,912	11.5	46.3
Halmstad	38,022	12.7	47.3
Kalmar	36,502	12.4	46.3
Östersund	29,178	12.6	49.8
Total	**979,523**	**13.6**	**48.6**
Other regions			
Värnamo	27,447	7.3	42.9
Karlskrona	23,013	15.9	48.9
Lidköping	22,434	8.9	44.4
Skellefteå	22,222	12.4	49.5
Nyköping	18,683	11.4	49.0
Örnsköldsvik	16,827	13.3	49.7
Gotland	16,150	10.4	46.4
Oskarshamn	14,725	9.2	48.2
Karlshamn	12,936	9.2	45.4
Ljungby	12,705	8.2	43.8
Vetlanda	12,578	6.4	43.4
Ludvika	12,063	14.4	50.4
Älmhult	11,712	19.2	48.1
Hudiksvall	11,288	9.1	47.6
Bollnäs	11,220	8.6	46.8
Avesta	11,145	8.1	49.0
Kiruna	10,660	9.5	50.9
Mora	9,308	7.4	49.1
Arvika	8,898	7.7	44.0
Vimmerby	8,337	6.6	44.7

Table 9 Continued

Local labor markets (LA regions)	Business sector employment 2016	Share of skilled labor 2016	Share of non-routine jobs 2013
Strömstad	8,337	8.3	46.7
Västervik	8,227	8.0	45.8
Torsby	6,671	6.4	45.1
Fagersta	6,641	9.6	45.1
Gällivare	6,635	8.3	52.6
Söderhamn	6,118	6.9	47.7
Ljusdal	5,412	6.8	48.5
Kramfors	4,590	8.6	48.1
Sollefteå	4,394	6.7	47.1
Lycksele	4,030	7.1	47.7
Bengtsfors	3,932	5.6	44.0
Malung	3,740	5.8	48.4
Härjedalen	3,182	5.7	50.2
Strömsund	3,180	6.7	44.9
Hagfors	3,101	8.0	45.8
Årjäng	3,030	5.6	45.4
Filipstad	2,449	6.2	44.3
Haparanda	2,025	6.2	48.5
Vansbro	1,860	4.9	46.7
Arjeplog	1,652	6.4	51.7
Storuman	1,628	5.7	49.5
Arvidsjaur	1,431	6.2	46.8
Vilhelmina	1,427	5.0	46.3
Jokkmokk	1,380	8.0	48.1
Överkalix	813	6.0	42.7
Dorotea	707	3.5	45.6
Åsele	641	8.3	50.8
Total	**393,502**	**9.6**	**47.1**
Total Sweden	**3,122,460**	**19.1**	**50.9**