Decomposing value chains within Swedish multinationals

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Background

- Declining costs for transportation, information and communication, and lower barriers to international trade and investment

  → increased fragmentation of production within global value chains.

- Multinational enterprises (MNEs) are highly instrumental in such processes.

- Some production stages of the value chains have been relocated to affiliates offshore, others have been retained or even expanded in the parents at home (onshore).

Aim of study I

- Examine which activities within Swedish MNEs are kept in parents onshore when their affiliates abroad are expanding or onshore in Swedish enterprises establishing a foreign affiliate.

- Many of the previous studies have focused solely on skills measured, e.g. in terms of educational attainment of the employees (Head & Ries 2002 Japan and Hansson 2005 Sweden).

- In addition, we study the impact of offshoring on the task content in the MNE parents (Becker et al. 2013 Germany).

Tasks and offshoring I

- Routine task follow a set of specific, well defined rules. Non-routine tasks more complicated activities, such as problem solving and decision making.
- Routine tasks more easily fragmented geographically. Can simply be translated into instructions for the offshore producers.
- Share of non-routine tasks increases in the parents at home when MNEs are expanding their activities abroad or onshore in enterprises initiating production abroad.

Tasks and offshoring II

- Non-routineness is one factor that determines the offshorability of a task.
- Another factor is the extent to which a task needs face-to-face contact with people other than fellow workers with no loss of quality.
- Examine whether the shares of non-offshorable tasks increase in Swedish MNE parents in connection with higher offshore employment shares in their affiliates.
- We take these often employed classifications of occupations regarding non-routine and offshorability at face value (Becker et al. 2013, Goos et al. 2014 and Blinder & Kreuger 2013).

The set-up

- Include all Swedish-owned enterprises that between 2001 and 2013 at least one year have employees abroad.
- Investigate impacts over a longer term and during a period when foreign direct investment has grown substantially in low- (and middle-) income countries, e.g. in China.
- Examine the relationship between relative demands for skills, non-routine or non-offshorable tasks in enduring MNE parents, as well as at home in enterprises becoming MNEs (onshore), and their employment shares in affiliates abroad (offshore).

Simultaneity problems

- Labor demand at home and employment abroad might be jointly determined → the link is a correlation, rather than a casual effect , and become difficult to interpret
- Lower costs of offshoring and increased demand abroad → increased employment in affiliates abroad
- Increased supply of skilled labor at home → offshoring of less-skilled activities to affiliates abroad
- Instrument employment in affiliates abroad using barriers towards FDI and GDP in the host countirs

Aim of study II

- Share of skilled labor growing at a similar rate in manufacturing MNEs and in service MNEs
- In manufacturing MNEs due to heavy decrease in the employment of less-skilled labor
- In service MNEs result of a substatial boost in the employment of skilled labor
- Examine relations between offshore affiliate employment in high- and low-income countries and the employment of skilled and less-skilled labor onshore separately

Preview of results I

- Instrumental variable estimates suggest a non-trivial causal relationship of increased employment shares in affiliates abroad (offshore) on higher relative demand for skills and non-routine tasks in the parents at home (onshore).
- Potentially offshorable tasks appear to be offshored to a lesser extent

Preview of results II

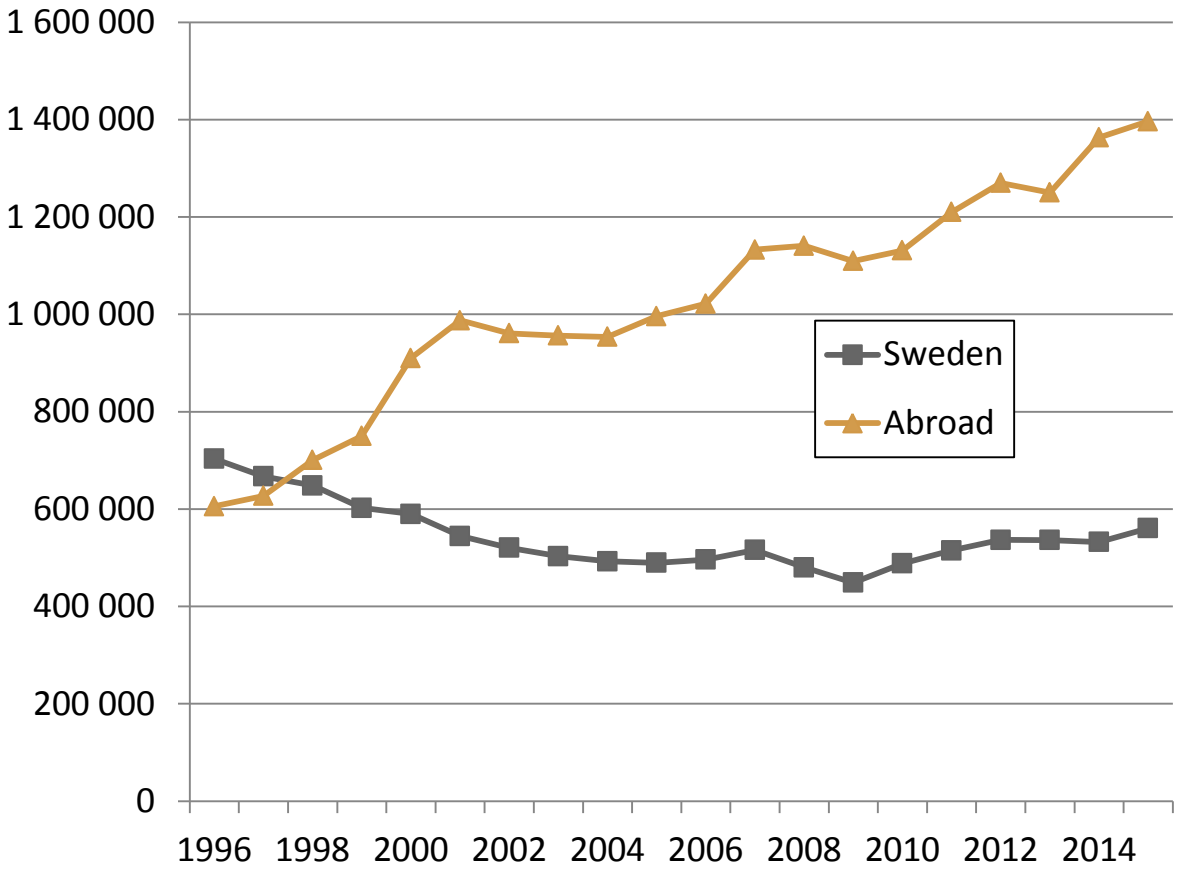
- Increased employment in affiliates in low-income countries is negatively related to employment of less-skilled workers in manufacturing MNE parents (*substitutes*)

- Increased employment in affiliates in high-income countries is positively related to employment of skilled and less-skilled labor in service MNE parents (*complement*)

Data

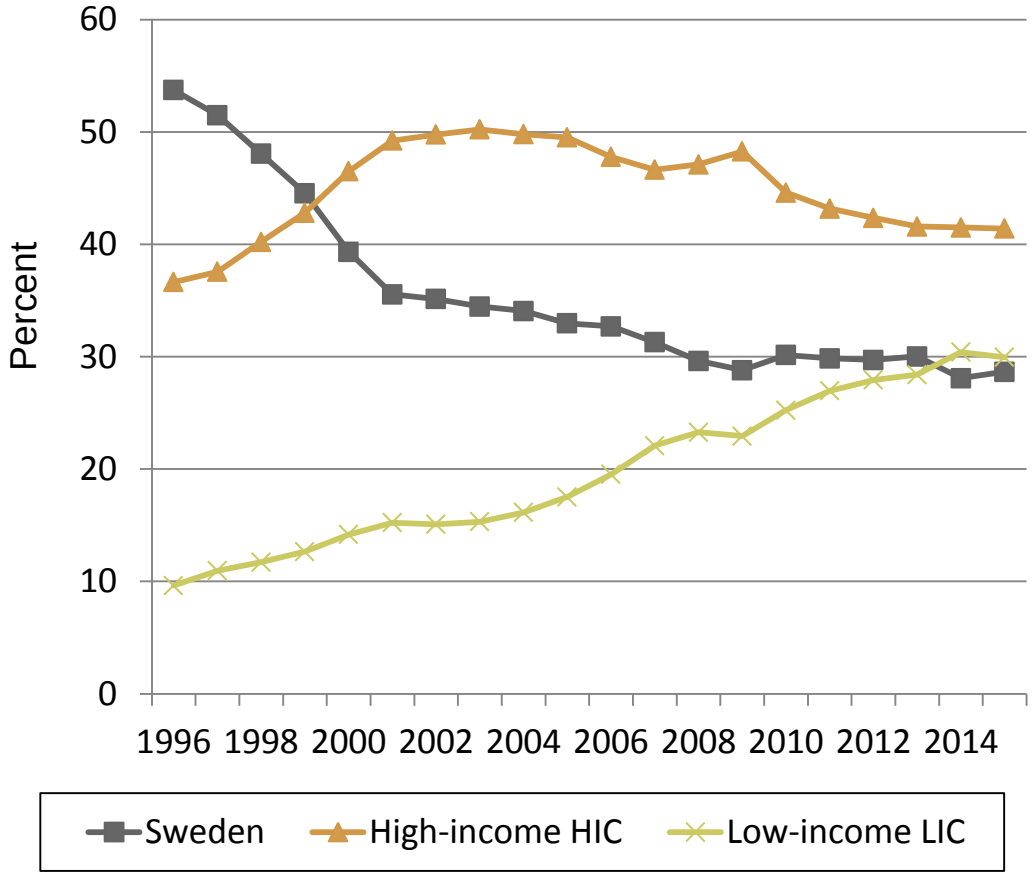
- Unique identification numbers of firms enable us to link information on financial accounts and register-based labor statistics (the education levels of employees and their occupations).
- The unit of analysis is Swedish-owned enterprises that between 2001 and 2013 at least one year have employees abroad.
- Include observations on enterprises that are MNEs, i.e. have employees abroad, and observations on enterprises that become MNEs or cease to be MNEs.

Employment in Swedish MNEs in Sweden and abroad



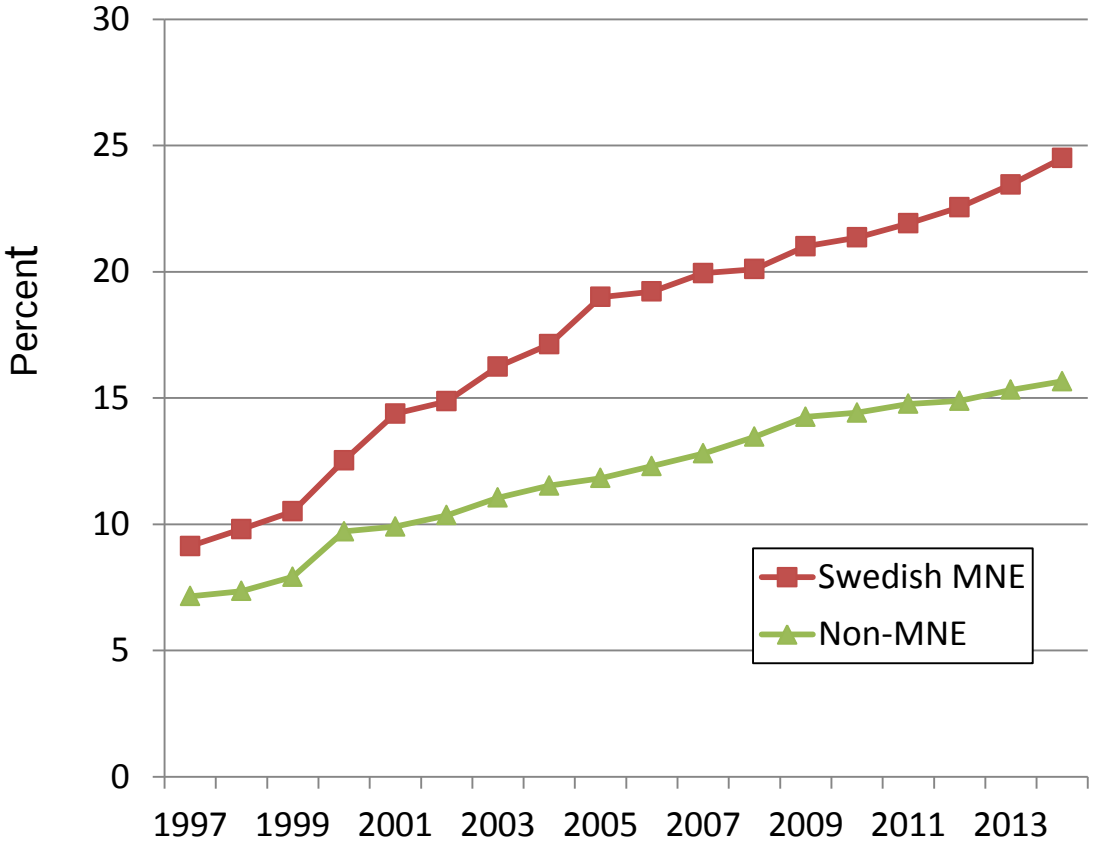
Source: Growth Analysis, Swedish Enterprise Groups with Affiliates Abroad

Employment shares of Swedish MNEs in Sweden and in high- and low-income countries



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.

Share of skilled labor in Swedish MNEs and in non-MNEs



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

Construction of task measures I

- Non-routineness and offshorability can be expected to impact on whether a task will be relocated abroad or not.

Non-routine intensity 1 NRTI1:

Based on survey questions regarding whether the respondent workers use a listed workplace tool or not. The respondents of the survey also state their occupation. The variable $NRTI1_k$ assume values between 0 and 100 and can be interpreted as the percentage of non-routine tasks in occupation *k*.

Construction of task measures II

Non-routine intensity 2 NRTI2:

Based on the Routine Task Intensity (*RTI*) index used for the US. The RTI index consists of three task aggregates: manual, routine, and abstract tasks, which are combined to create the summary measure *RTI* by occupations *k.* The measure rises with the importance of routine tasks in each occupation and declines with the importance of manual and abstract tasks. $NRTI2_k = 1 - RTI2_k$, values 0 to 100.

Non-offshoreability intensity NOFFI:

Based on professional coders' assessment of the ease with which an occupation could potentially be offshored. Values between 0 and 100.

Correlations of occupational non-routine, non-offshorable and skill intensity

	NRTI1	NRTI2	NOFFI	SKILL
NRTI1	1			
NRTI2	0.38*	1		
NOFFI	−0.20	0.47**	1	
SKILL	0.77***	0.51**	0.03	1

Remark: ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

Econometric specification I
Relative labor demand

As a measure of relative demand for task *i* in MNE parent *j* at time *t* we use the wage bill share

$$WS_{jt}^{i} = \frac{\sum_s \delta_s^i W_{sjt}}{W_{jt}}$$

W_{sjt}: sum of wages of workers in occupation *s* in MNE parent *j* at time *t*

δ_s^i: proportion of job task *i* in occupation *s*

W_{jt}: total wage bill in MNE parent *j* at time *t*

The wage bill share picks up both a higher proportion of task *i* in MNE parent *j* and a greater remuneration of task *i*

Econometric specification II
Relative labor demand

$$WS_{jnt}^{i} = \sum_{k} \gamma_k OES_{jkt} + \beta_K ln\left(\frac{K}{Y}\right)_{jt} + \beta_Y lnY_{jt} + \beta_W ln\left(\frac{w^i}{w^{-i}}\right)_{nt} + \beta_R \left(\frac{RD}{Y}\right)_{nt} + \beta_I \left(\frac{ICT}{Y}\right)_{nt} + \alpha_j + \alpha_t + \varepsilon_{jnt}^{i}$$

WS_{jnt}^{i} : wage bill share of work type *i* at parent *j* in industry *n* at time *t*.

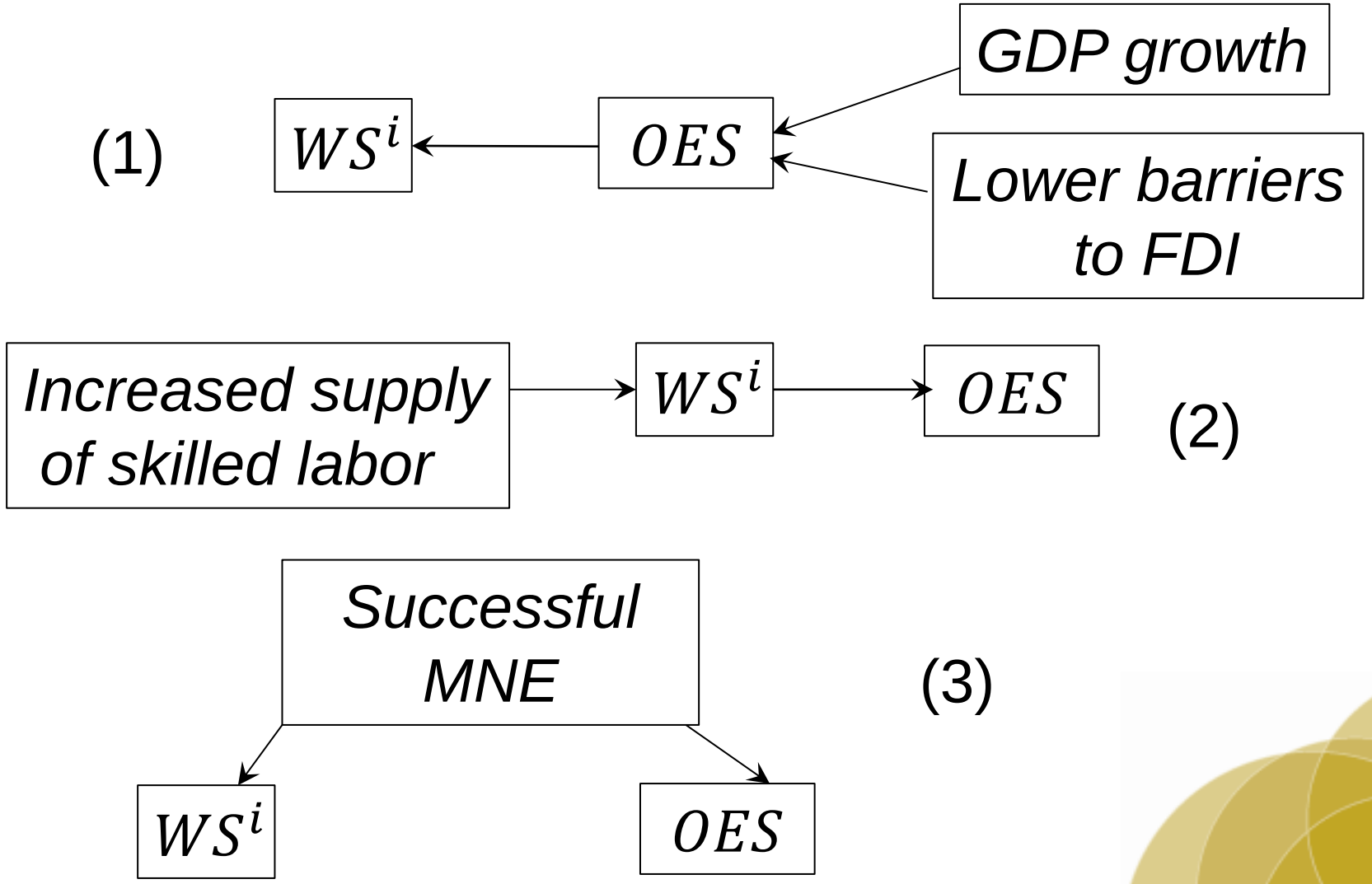
OES_{jkt}: the ratio of employment in foreign affiliates of MNE *j* in location *k* to total employment in MNE *j* at time *t*; a measure of MNE *j*'s offshore activities in location *k* at time *t* (the variable of greatest interest)

Offshore employment and onshore skill upgrading, non-routine and non-offshoreable task intensities. All sectors.

	Skill upgrading		Non-routine I		Non-routine II		Non-offshoreable	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
OES	0.013	4.246	0.839	1.228	0.690	2.121	0.157	0.854
	(0.02)	(4.13)	(2.46)	(2.03)	(1.63)	(2.80)	(0.46)	(1.44)
Obs	25,800	25,800	25,642	25,642	25,642	25,642	25,642	25,642
Groups	3,488	3,488	3,479	3,479	3,479	3,479	3,479	3,479

Remark: The specifications in the table also include control variables: capital-output, value added, R&D and ICT intensities. The reported *t*-values in parentheses are based on robust standard errors, clustered at the MNE group level.

Relation between WS^i and OES



Why are onshore and offshore employment within MNEs related?

- Lower costs to locate jobs in foreign countries due to reduced barriers to establish activities offshore and increased demand abroad owing to high growth

- Increased supply of skilled labor at home makes it more profitable to keep non-routine tasks and activities intensive in the use of skilled labor at home, while at the same time creating incentives to relocate routine tasks and less-skill intensive activities abroad

- Successful enterprises boost their presence abroad and increased relative demand for skills and non-routine tasks at home

Our instrument for OES_{jt}

1) We regress growth and reduced barriers on FDI in different countries *c* (together with the MNE_j variables in eq. (2) and MNE dummies and time dummies) on OES_{jct}
2) From the estimates we get predicted values of $\widehat{OES_{jct}}$
3) We obtain $\widehat{OES_{jt}}$ by summing $\widehat{OES_{jct}}$ over the countries *c*
4) We replace OES_{jt} with $\widehat{OES_{jt}}$

We try to disentangle effects of OES on wage-bill shares in the MNE parents that originate from factors in the host countries, such as high growth and reduced barriers to FDI.

First-stage IV regressions

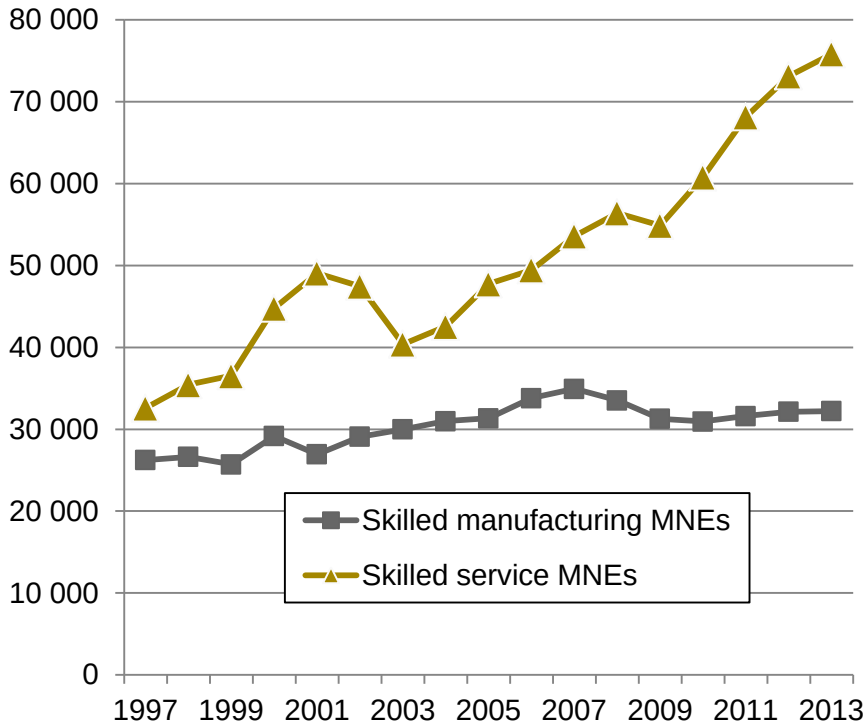
	Offshore employment share OES_{jct}	Offshore employment OE_{jct}
Gross Domestic Product	0.004	120.5
$lnGDP_{ct}$	(3.98)	(2.39)
FDI Restictiveness	−0.027	−481.6
$FDIR_{ct}$	(−3.31)	(−1.97)
Observations	86,305	86,305
Groups	3,487	3,487
F-statistics for instruments	11.38	3.15

Assessment of the economic relevance (IV-estimates)

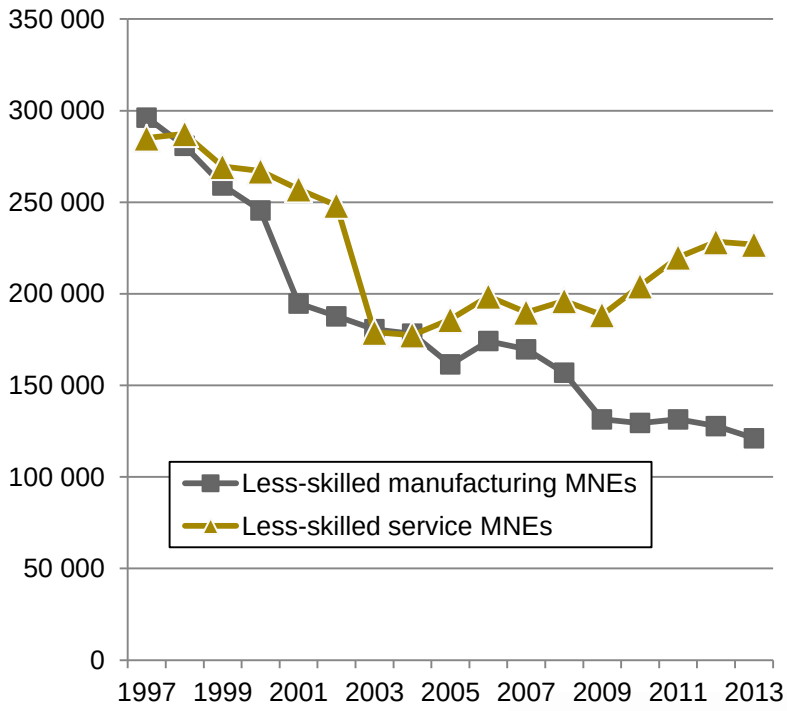
Coefficient estimate	Change in *OES*	Predicted ΔWS	Observed ΔWS	Contribution to ΔWS
Skill upgrading				
4.246	0.104	0.442	7.9	5.6%
Non-routine I				
1.228	0.104	0.128	1.6	8.0%
Non-routine II				
2.121	0.104	0.221	2.5	8.8%

Trends in employment of skilled and less-skilled workers in parents of manufacturing MNEs and in parents of service MNEs

(a) Skilled workers



(b) Less-skilled workers



Source: Growth Analysis, Swedish Enterprise Groups with Affiliates Abroad and Statistics Sweden, RAMS

Relations between offshore and onshore employment

Are employment in offshore affiliates in high- and low-income countries complements or substitutes to the employment of different skills in MNE parents onshore?

$$L^i_{jnt} = \sum_k \gamma_k OE_{jkt} + \beta_K ln\left(\frac{K}{Y}\right)_{jt} + \beta_Y lnY_{jt}$$
$$+\beta_R \left(\frac{RD}{Y}\right)_{nt} + \beta_I \left(\frac{ICT}{Y}\right)_{nt} + \alpha_j + \alpha_t + \varepsilon^i_{jnt}$$

L^i_{jnt}: employment of work type *i* at plant *j* in industry *n* at time *t*

Offshore and onshore employment manufacturing

	Total IV	Skilled IV	Less-skilled IV
Offshore employment	0.480	0.010	0.531
high-income OE_{high}	(0.54)	(0.64)	(0.79)
Offshore employment	−0.253	0.017	−0.309
low-income OE_{low}	(−3.10)	(0.72)	(−5.96)
Observations	7,613	7,613	7,613
Groups	1,148	1,148	1,148

Remark: The specifications in the table include capital-output, value added, R&D and ICT intensities. The reported *t*-values in parentheses are based on robust standard errors, clustered at the MNE group level.

Offshore and onshore employment services

	Total IV	Skilled IV	Less-skilled IV
Offshore employment	1.584	0.330	1.254
high-income	(3.07)	(3.87)	(2.73)
Offshore employment	−0.010	−0.000	−0.010
low-income	(−1.13)	(−0.01)	(−1.25)
Observations	18,188	18,188	18,188
Groups	2,676	2,676	2,676

Remark: The specifications in the table include capital-output, value added, R&D and ICT intensities. The reported *t*-values in parentheses are based on robust standard errors, clustered at the MNE group level.

Concluding remarks I

- In the 2000s, employment in Swedish MNEs grew rapidly in their affiliates abroad, whilst employment in the parents in Sweden remained more or less unchanged.
- In the 1990s: the largest employment growth occurred in affiliates in high-income countries
- In the 2000s: employment expanded in affiliates in low-income countries, e.g. China and the Central and Eastern European countries.
- Non-routine tasks are carried out by skilled workers. The correlation between different measures on non-routine intensity is surprisingly low.

Concluding remarks II

- Offshoring to affiliates abroad increased the demand for skills and non-routine tasks in the MNE parents in Sweden.
- Offshoring accounts for 5-9% of skill upgrading and increased non-routine intensity in Swedish MNE parents
- The non-offshorable intensity in MNE parents is unrelated to employment increases in affiliates overseas

Concluding remarks III

- Increased employment in affiliates in low-income countries is negatively related to the employment of less-skilled workers in manufacturing MNE parents (*substitute*)

- Increased employment in affiliates in high-income countries is positively related to the employment of skilled and less-skilled workers in service MNE parents (*complement*)

Extra slides

Regional employment effects of MNE offshoring

What is the impact of an expansion in affliates abroad within Swedish MNEs on their employment in different regions of Sweden?

The effects differ depending on:

i) characteristics of the region affected (large cities, regional centra, other)

ii) type of labor in the region (skilled, less-skilled)

iii) whether the expansion of Swedish MNEs are high- or low-income countries

Substitution or scale effects

In addition to direct effects on the employment in parents, indirect effects due to subcontracting relations and local externalities