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Within and between firm trends in job polarization: Role of globalization and technology

Sari Pekkala Kerr (PT), **Terhi Maczulskij** (PT) and Mika Maliranta (JY)

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Introduction

- Polarization of the labor markets is a ”universal” phenomenon (e.g., Autor et al. 2003, Autor 2010, Goos, Manning & Salomons 2009, 2014)
- ..also in Nordic countries (e.g., Asplund et al. 2011, Maliranta 2013, Böckerman et al. 2016)
- Influential studies started a new literature trying to understand the extent, mechanisms and causes of the polarization

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Causes of job market polarization

- R&D (Böckerman et al. 2012)
- ICT (e.g. Böckerman et al. 2016, Michaels et al. 2014, Harrigan et al. 2016)
- International trade (e.g., Harrigan et al. 2016, Autor 2006 for discussion)
  - Michaels et al. (2014) found that the result is not robust to controlling for related factors such as R&D
  - Van Reenen (2011) argues that international trade does have a role, but it acts via ICT
- Outsourcing (Nilsson Hakkala & Huttunen 2016)
- Chinese import shocks (Autor et al. 2014, Keller and Utar 2016)

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Where are the firms?

Question: Where does polarization stem from? Answer: Individual firms' decisions to hire & fire workers and/or open & close establishments

- Firm data could tell us, e.g.:
  - Are mid-level jobs disappearing because certain firms exit?
  - Are service jobs increasing due to entry and/or expansion?
  - Are existing firms outsourcing / offshoring mid-level jobs while keeping managers and professionals?
- Harrigan, Reshef & Toubal (2016) find that job polarization happens mainly via within firms in France
- Cortes and Salvatori (2015) find that the increase in the number of establishments specializing in non-routine tasks seem to explain much of the polarization in the UK
- Heyman (2016) find that both within-firm and between-firm components are important in explaining overall job polarization in Sweden

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What we do?

- We examine the occupational polarization within and across firms
  - What is the role of establishment level restructuring…
  - ..or the role of entry-exit dynamics?
- We also examine the relation of globalization and technology on job polarization for continuing firms
- We also use international trade shocks as instruments for trade and outsourcing

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Data

- FLEED (Total):
  - Firm – worker panel data 2000-09, incl. all firms & workers
  - Combines employment & wage statistics, education registers, tax records, business register, financial statement statistics
- Auxiliary firm level data sources
  - Customs data on goods & service exports and imports
  - ICT surveys
  - R&D surveys
  - International sourcing survey (outsourcing & offshoring)
- Other data sources
  - UN Comtrade data on imports and exports by country pair and detailed goods classification

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Data restrictions

- Workers
  - Working at least 6 months in the calendar year
  - Known occupation and earnings
  - Earnings winsorized (top- and bottom-1%)
  - ISCO-88 classification
  - No farmers / agricultural workers
- Firms
  - Private sector only
  - At least 10 employees

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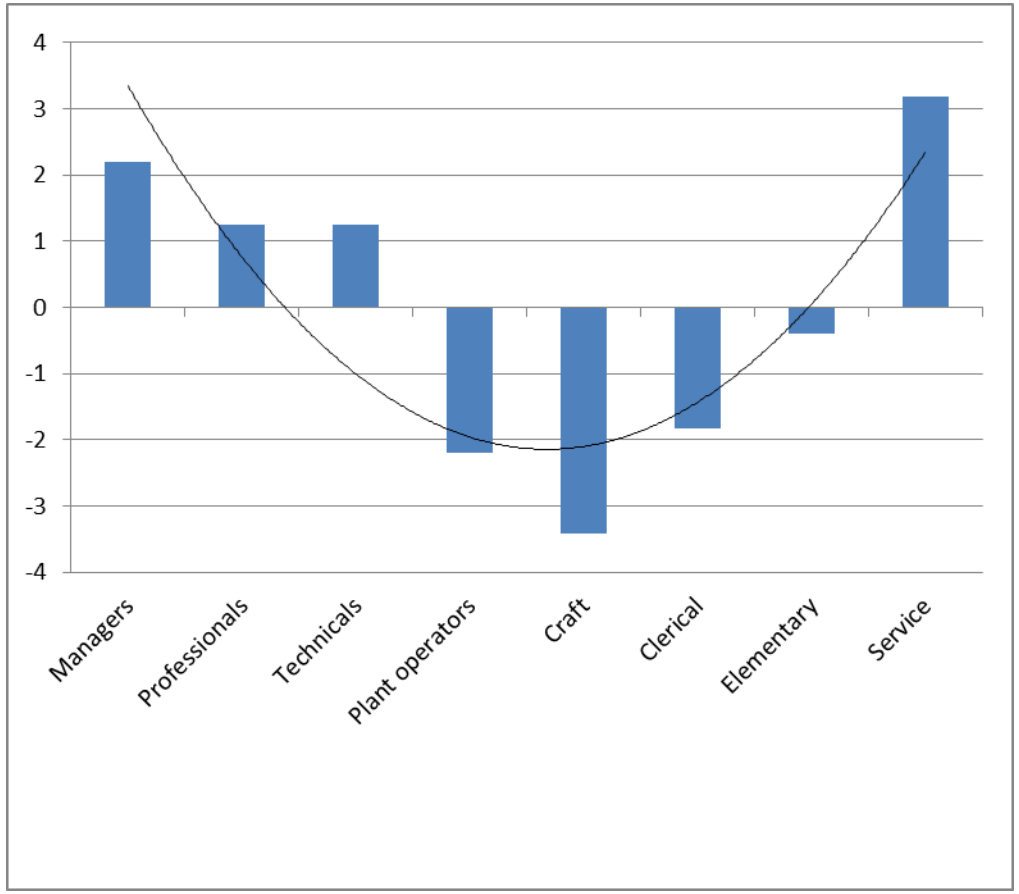
Overall Pattern 2000-2009



Percent change in the occupation employment share, 2000 to 2009

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Decomposition of job polarization at the firm level

- We follow Vainiomäki (1999) and decompose the change in share of occupation group *j* into four components
- Three types of firms in the market:
  1. Continuing firms: were in the market both in years *t* and *t-1* (here 2000 and 2009)
  2. Entering firms: were in the market in year *t* but not in year *t-1*
  3. Exiting firms: were in the market in year *t-1* but not in year *t*
- Continuing firms: within and between firms

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$$\Delta S_j = \sum_{i \in C} \Delta S_{ij}^C \bar{W}_i^C + \sum_{i \in C} \bar{S}_{ij}^C \Delta W_i^C + W^N \left(S_{jt}^N - S_{jt}^C \right) + W^D \left(S_{j,t-1}^C - S_{j,t-1}^D \right),$$

- ΔS_j is the change in share of occupation *j*, *j* = 1,…,8
- *C* denotes continuing establishments, *N* the entrants, *D* the exiting establishments
- ΔS_{ij}^C is the change of employment share of occupation *j* in continuing establishment *i* from year *t-1* to *t*
- $\bar{S}_{ij}^C$ is the average employment share of occupation *j* in continuing establishment *i* in years *t* and *t-1*
- S_{jt}^N and S_{jt}^C are the shares of occupation *j* among new and continuing establishments in year *t*
- $S_{j,t-1}^C$ and $S_{j,t-1}^D$ are the shares of occupation j among exiting and continuing establishments in year *t-1*
- $\bar{W}_i^C$ is the average employment share of continuing establishment *i* in years *t* and *t-1*
- ΔW_i^C is the change of employment share of continuing establishment *i* from year *t-1* to *t*
- W^N and W^D are the employment shares of entering establishments in years *t* and exiting establishments in year *t-1*, respectivley

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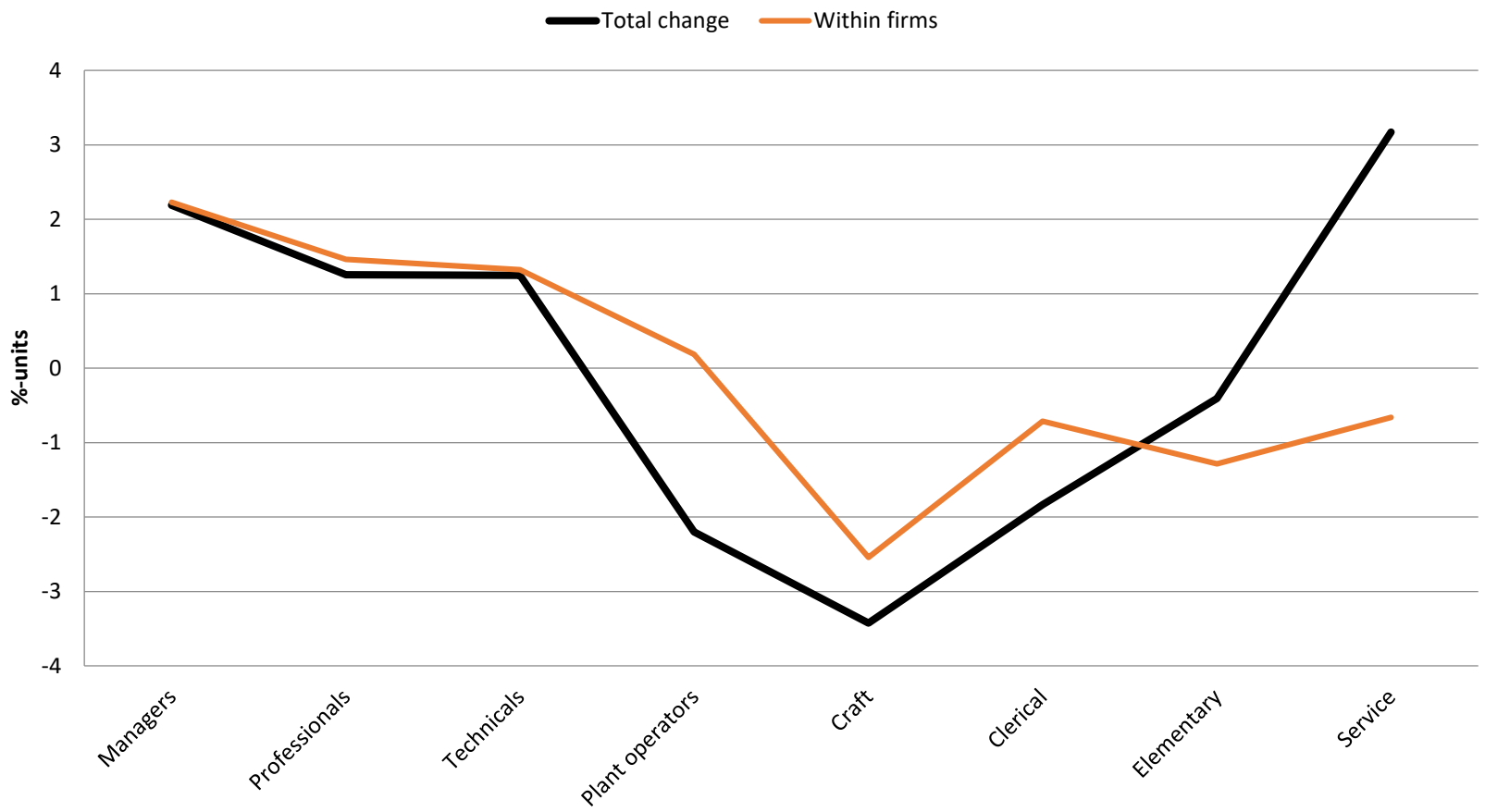

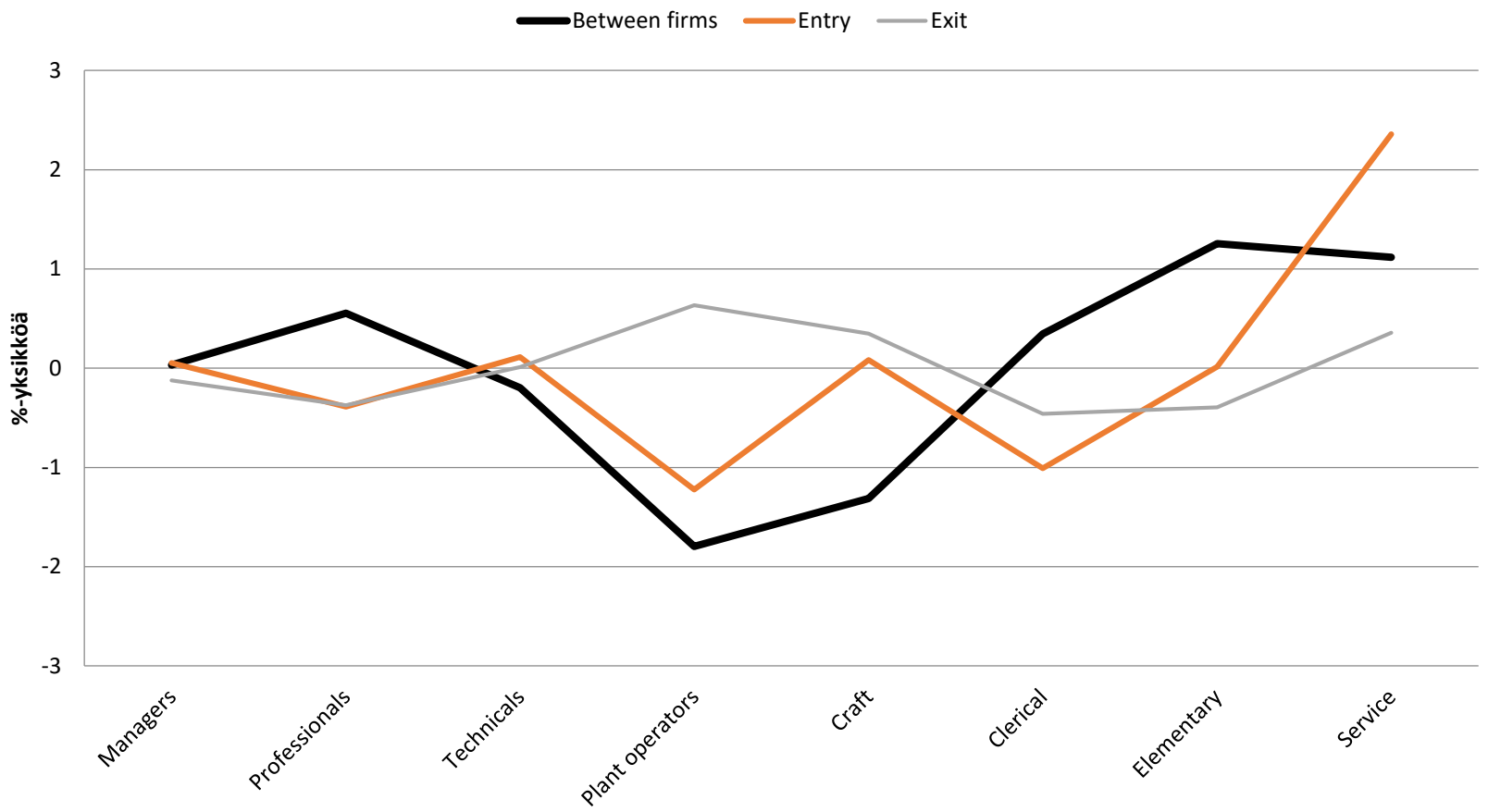
Between firms
Entry
Exit
%-yksikköä
3
2
1
0
-1
-2
-3
Managers
Professionals
Technicals
Plant operators
Craft
Clerical
Elementary
Service

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Decompositions of employment share change by occupation group (2000 and 2009)

Occupational group	Δ Emp. share	Within	Between	Entry	Exit
Abstract	0.053	0.062	0.005	-0.013	-0.001
Routine	-0.086	-0.045	-0.031	-0.010	-0.000
Services	0.037	-0.002	0.029	0.012	-0.002
Elementary	-0.003	-0.015	-0.003	0.012	0.003

Abstract: managerial, professional & technical
Routine: clerks, plant operators & craft workers

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The role of globalization and technology

- Group occupations into:
  - 1: manager, professional & technical pers.
  - 2: plant operators, craft & clerical occup.
  - 3: service occupations
  - 4: elementary occupations
- Are occupation share changes (2000-2009) related to:
  - Δ(goods exports), Δ(service exports)
  - Δ(goods imports), Δ(service imports)
  - Outsourcing/Offshoring, and initial level of %ICT Use and R&D

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Dealing with Endogeneity

- Firm level decisions to outsource and to import /export are likely endogenous

- IV approach (Hummels et al., AER 2013)
  - Firm-product-country level measure of exposure to increased world supply

  - Shocks in trading environment (e.g. China WTO in 2001) have firm-specific impact depending on how engaged the firm is in trade within a specific affected goods category

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Instruments

- $IV_{it}^{I} = \sum S_{ick} WES_{ckt}$ for import
- $IV_{it}^{E} = \sum S_{ick} WID_{ckt}$ for export
- IV_{it}^{I} and IV_{it}^{E} for outsourcing

WES_{ckt} is the country *c*'s total supply of product *k* to the world market in year *t*, excluding the supply to Finland. WID_{ckt} is the country *c*'s total purchases of product *k* from the world market, excluding any demand from Finland. These are weighted by the each c-k combination with its share in firm's imports/exports

- We use the 2000-2009 change in the IV_{it}^{I}/IV_{it}^{E} as our instrumental variable for import and export, and 1999-2002 changes for outsourcing

- Creating WID_{ckt} and WES_{ckt} we use Comtrade data

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Explanatory variable		*Dependent Variable: Change in the Occupation Group Share* Group 1: Man, Pro & Tech	Group 2: Pri, Craf & Cler	Group 3: Service	Group 4: Elementary
Panel C: Include Import and Export Variables in the Same Regression					
Change in export of goods	OLS	-0.0113	0.0076	0.0004	0.0033
		(.0005)	(.0004)	(.0002)	(.0003)
Change in import of goods		-0.0048	-0.0019	0.0004	0.0068
		(.0004)	(.0004)	(.0002)	(.0003)
Change in export of goods	2SLS	-0.0092	0.0116	0.0002	-0.0027
		(.0029)	(.0028)	(.0024)	(.0025)
Change in import of goods		0.0040	-0.0108	0.0037	0.0031
		(.0044)	(.0043)	(.0016)	(.0034)
First-Stage Regression Statistics					
Change in export of goods	iv_exp	-0.6052			
	iv_imp	0.0314			
	1st Stage F-stat	32.84			
Change in import of goods	iv_exp	-0.1521			
	iv_imp	-0.7542			
	1st Stage F-stat	14.54			
Number of Firms		7,091	7,091	7,091	7,091

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Explanatory variable		*Firms with at Least 10 Employees in 2000 & 2009* Group 1: Man, Pro & Tech	Group 2: Pri, Craf & Cler	Group 3: Service	Group 4: Elementary
Panel A: Add Basic Firm Level Controls					
Outsourcing / Offshoring	2SLS	-0.0512	0.2742	0.0032	-0.2262
		(.0985)	(.1199)	(0.0333)	(.1078)
	iv_exp	-0.0830			
	iv_imp	0.0865			
	1st Stage F-stat	5.23			
Panel C: Outsourcing in Finland, Abroad versus Planned (Include Basic Controls)					
Outsourcing in Finland	2SLS	-0.0456	0.2077	0.0028	-0.1649
		(.0736)	(.0786)	(.0252)	(.0751)
	iv_exp	-0.1105			
	iv_imp	0.0988			
	1st Stage F-stat	8.82			
Outsourcing Abroad	2SLS	-0.0481	-0.1625	0.0019	0.2087
		(.0709)	(.0673)	(.0238)	(.0705)
	iv_exp	0.0793			
	iv_imp	-0.2944			
	1st Stage F-stat	8.60			
Plan to Oursource 2007-	2SLS	0.0149	0.1754	-0.0003	-0.1900
		(.0666)	(.0635)	(.0227)	(.0607)
	iv_exp	-0.1025			
	iv_imp	0.2481			
	1st Stage F-stat	16.38			

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Direction of the relation between different factors and change in occupation share (2000 and 2009)

Factor	Abstract	Routine	Service	Elementary
IV-results				
Δ(Export of goods)	-	+		
Δ(Import of goods)		-	+	
Outsource, domestic		(+)		(-)
Outsource, foreign		(-)		(+)
Plan to outsource		+		-
OLS results:				
Δ(Export of services)		+		-
Δ(Import of services)		+	-	-
ICT use		-		
R&D		-	+	+

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Results, summary

- The share of high-level occupations increases largely within continuing firms
- Routine jobs are being destroyed both among continuing firms and at the entry-exit margin
- New firms tend to hire more service workers, but the service jobs are increasing also via estbalishment level restructuring among continuing firms
- R&D and ICT are related to a decrease in routine occupations in continuing firms. R&D is also related to an increase in service jobs
- International trade affects the restructuring of occupations