Routine and ageing?
The intergenerational divide in deroutinisation of jobs in Europe

Wojciech Hardy
(IBS, University of Warsaw)
Piotr Lewandowski
Roma Keister
Szymon Górka
What do we know already?

- Deroutinisation = a shift away from routine and towards non-routine tasks/jobs

- Commonly found in developed countries (Autor et al. 2003, Acemoglu & Autor, 2011, Goos et al. 2010, 2014)

- Routine-replacing technical change, off-shoring, educational upgrading are believed to be driving it

- Only few papers look at sub-groups of workers (Autor & Dorn 2009, Cortes 2016)
We focus on age

- Older workers (55-64) more likely to have low problem-solving and numeracy skills, and less likely to use information-processing skills at work than workers aged 25-54 (PIAAC)

- Older workers exhibit lower between-occupation mobility than younger workers (Tempest & Coupland, 2016)

- Automation may reduce hiring and employment of young workers (Dauth et al. 2017)
How do we measure the task content of jobs?

EU-LFS data for 12 EU countries in 1998-2015, 3-digit ISCO occupations
How do we measure the task content of jobs?

EU-LFS data for 12 EU countries in 1998-2015, 3-digit ISCO occupations

O*NET data – editions 2003 and 2014
How do we measure the task content of jobs?

- EU-LFS data for 12 EU countries in 1998-2015, 3-digit ISCO occupations
- O*NET data – editions 2003 and 2014
- 5 annual country-level task content measures (Autor & Acemoglu, 2011)
Non-routine cognitive tasks increased in all European countries.

Change in the task content intensity by country, 1998-2015
Routine cognitive tasks declined in the Western European countries but increased in several CEE countries.

Change in the task content intensity by country, 1998-2015
Manual tasks, especially the routine ones, shrank in all European countries.

Change in the task content intensity by country, 1998-2015
Deroutinisation was much faster among prime-age workers than among older/younger workers.

Task intensity changes by age groups - panel estimates of linear time-trend coefficients, 12 EU countries in 1998-2015.
From here on I will use the routine task intensity (RTI, Autor & Dorn, 2009)

- RTI $\uparrow$ with relative importance of routine tasks,
  $\downarrow$ with relative importance of non-routine tasks

$$\forall i \in \text{occupations} RTI_i = \ln(RC_i + RM_i) - \ln(NRCA_i + NRCP_i)$$

- For each country we estimate regressions of the form:

$$y_{i,c} = \beta_{0,c} + \beta_{1,c}RTI_i + \beta_{2,c}\Delta\text{occupation}_i\text{share}$$

Where $y_{i,c} \in \{\Delta\text{mean.age}_{i,c}; \Delta\text{age.group.share}_{i,c}\}$
European workforce was ageing more quickly in occupations that were initially more routine-intensive.

The estimated effect of the initial (1998 RTI) routine task intensity of occupations on changes in mean age by 2010.


*** p<0.01, ** p<0.05, * p<0.1.
As the share of young workers in the more routine-intensive occupations was declining.

The estimated effect of the initial routine task intensity of occupations in 1998 on changes in age structures by 2010.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
And the share of the oldest workers was increasing.

The estimated effect of the initial routine task intensity of occupations in 1998 on changes in age structures by 2010.

*** p<0.01, ** p<0.05, * p<0.1.
Deroutinisation may increase the risk of unemployment among routine workers.

- Are the routine workers more likely to be unemployed?

- Are there differences by age and over time?

- Country-specific logit models for the probability of being unemployed (accounting for changes over time, individual, workplace and regional variables)
Higher routine intensity was associated with higher risk of unemployment.

The estimated effect of the routine task intensity on unemployment risk – odds ratios from country-specific models.

Logit regressions at individual level. Standard errors clustered at occupation level. All effects significant at 0.01.
Also when we add personal and workplace characteristics, regional controls and labour demand shocks

The estimated effect of the routine task intensity on unemployment risk – odds ratios from country-specific models

Logit regressions at individual level. Standard errors clustered at occupation level. All effects significant at 0.01.
In several countries, the relationship between routine task intensity and unemployment probability is declining with age.

The marginal effects of the routine task intensity (RTI) on the unemployment risk, by age.

Logit regressions at individual level. Standard errors clustered at occupation level.
How much of the change in unemployment rates can be attributed to the RTI?

- We decompose the change in the predicted unemployment rate between 1998-2000 and 2013-2015 into:
  - the contribution of change in the distribution of RTI,
  - the contribution of change in the distributions of other explanatory variables,
  - the contribution of change in the coefficient expressing the effect of RTI on unemployment risk.
The change of unemployment rates was largely attributable to changes in the coefficient of RTI and much less to changes in RTI distribution.

Decompositions of the predicted changes of unemployment rates

Belgium

Germany

Denmark

Poland

Spain

United Kingdom

- effect of RTI coefficient
- effect of other variables' distributions
- effect of RTI distribution
- change in unemployment rate
What tasks tell us about intergenerational differences in jobs in Europe

- Widespread shift from manual to cognitive work and routine cognitive tasks decline in richer (EU15) countries

- Prime-aged groups experience this change more strongly than older and younger groups

- Routine-intensive occupations:
  - Age faster because of declining shares of youngest and increasing of oldest workers
  - Create higher unemployment risk for the young and prime-aged
Thanks for listening

Wojciech Hardy
Wojciech.hardy@ibs.org.pl
www.ibs.org.pl
@ibs_warsaw