DIGITALISATION, CHANGING DEMAND FOR SKILLS AND THE GENDER WAGE GAP

Anna Matysiak

in collaboration with Wojciech Hardy and Lucas van der Velde

Interdisciplinary Center for Labour Market and Family Dynamics (LabFam), University of Warsaw

Dynamics of Inequality Across the Life-course Final Conference

AUTOMATION

Changing demand for skills

- decline in routine jobs (deroutinisation)
- Increasing demand for cognitive skills (analytical, social / interpersonal)

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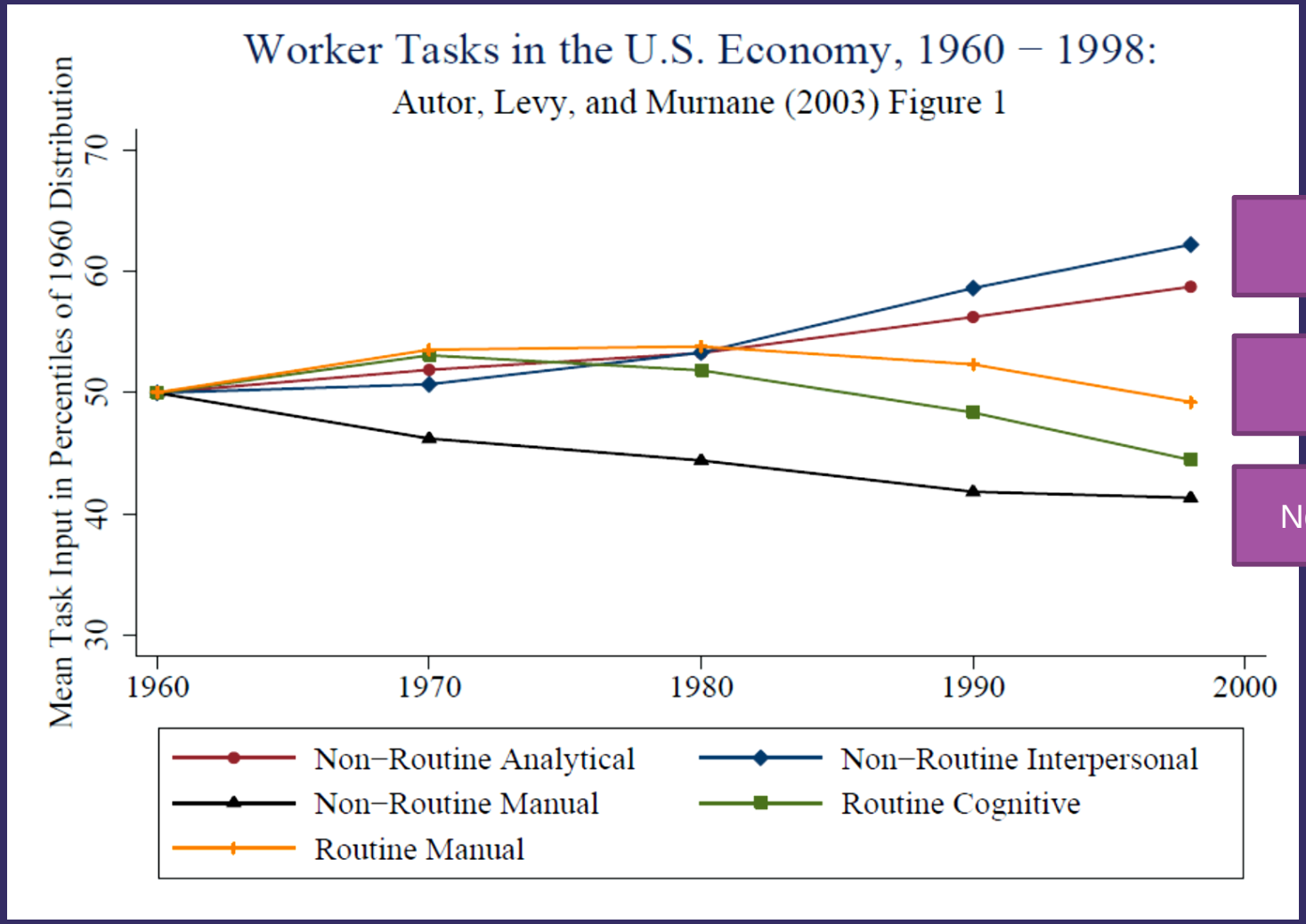
Changing demand for skills



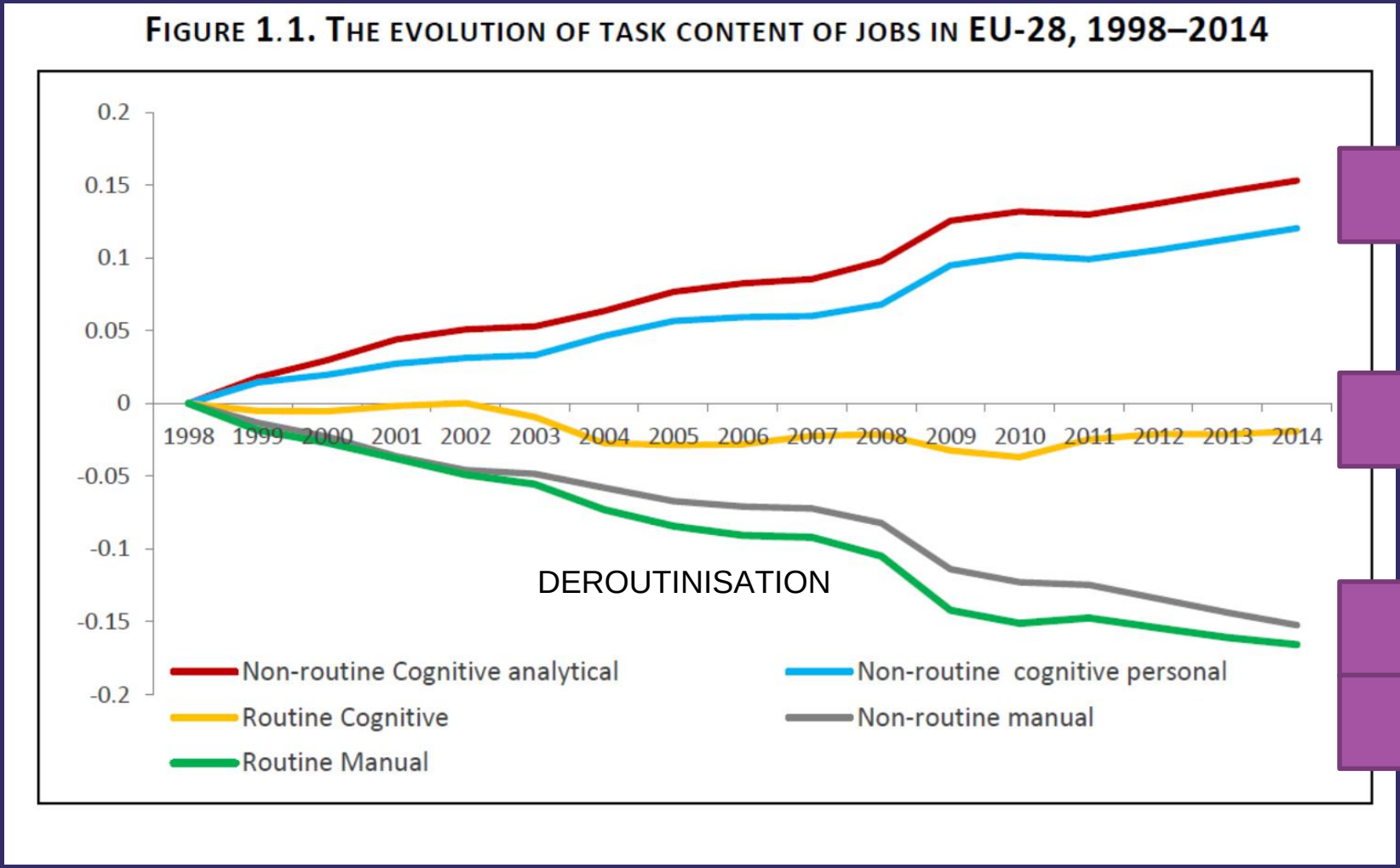
Non-routine cognitive (abstract) tasks

Routine tasks

Non-routine manual tasks

Source: Autor and Price (2013)

Changing demand for skills



Non-routine cognitive (abstract)

Routine cognitive

Non-routine manual

Routine manual

Source: Górka, S., Hardy, W., Lewandowski, P. (2017)

AUTOMATION

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Changing demand for skills

- decline in routine jobs (deroutinisation)
- Increasing demand for cognitive skills (analytical, social / interpersonal)

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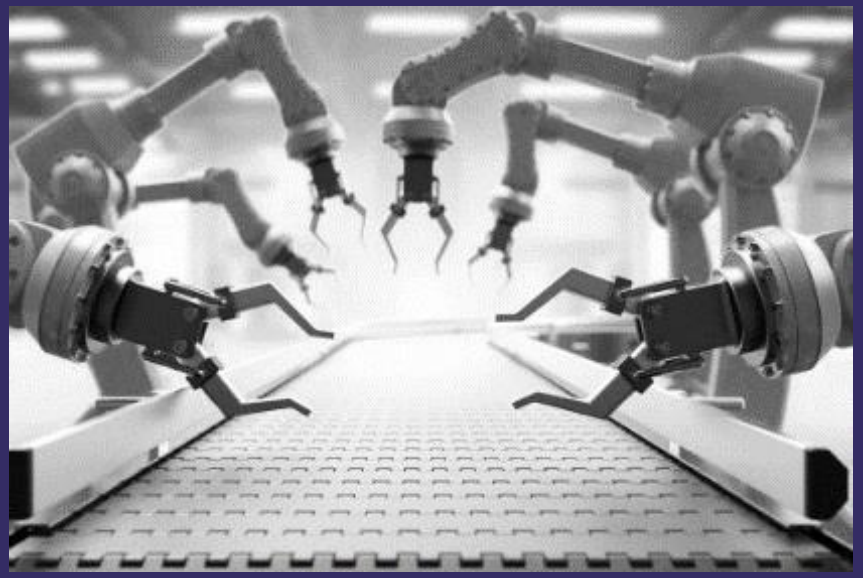
Decline in routine jobs

AUTOMATION

High risk of automation (>70% job tasks)

- 9 % of jobs [Arntz et al. 2017]
- 14% of jobs at high risk, 32% jobs at medium risk (50-70% of tasks automatable) [Nedelkoska and Quinitini 2018]

INDUSTRIAL ROBOTS



- US: One robot per 1,000 workers reduces the employment rate by 0.2 percentage points and wages by 0.42% [Acemoglu and Restrepo 2020]
- Europe: No effects on total employment, but negative effects for the low educated [Graetz and Michaels 2018]

Decline in routine jobs

AUTOMATION

Evidence for women fragmented and conflicting

- Brussevich et al. (2019): 11 % of women vs 9% men at high risk of automation
- Nedelkoska and Quintini (2018): higher risk of automation for women
- Country-specific studies:
  - Germany, Portugal, US: women moved from routine jobs more quickly than men [Black and Spitz-Oener 2006, Cortes et al. 2020)

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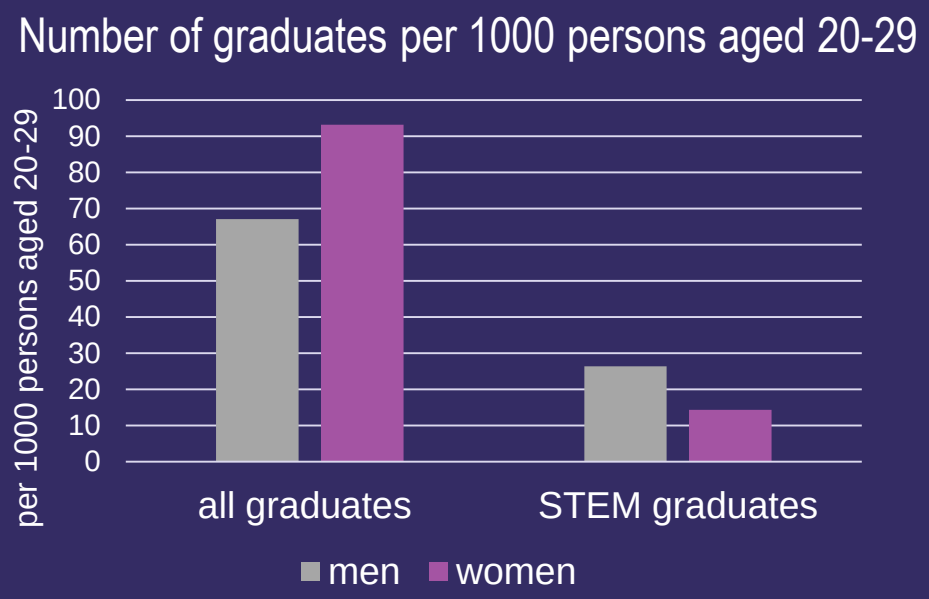
Increasing demand for cognitive skills (analytical and social)

- Women outdistance men among tertiary education graduates, but they are twice less likely to graduate from STEM than men
- % of women among scientists and engineers:

  41% in 2019

  32% in 2008

- Gender gap in math test scores is negligible at school entry but widens with age
- It varies across countries and depends on the gender of the math teacher, mother's occupation, family role models [Kahn and Ginther 2017]



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Increasing demand for cognitive skills
(analytical and social)

The New York Times

Why What You Learned in Preschool Is Crucial at Work

The Journalist's Resource
Informing the news

ECONOMICS

Social skills are increasingly valuable in the jobs market

Pew Research Center

WOMEN MAKE GAINS IN THE WORKPLACE AMID A RISING DEMAND FOR SKILLED WORKERS

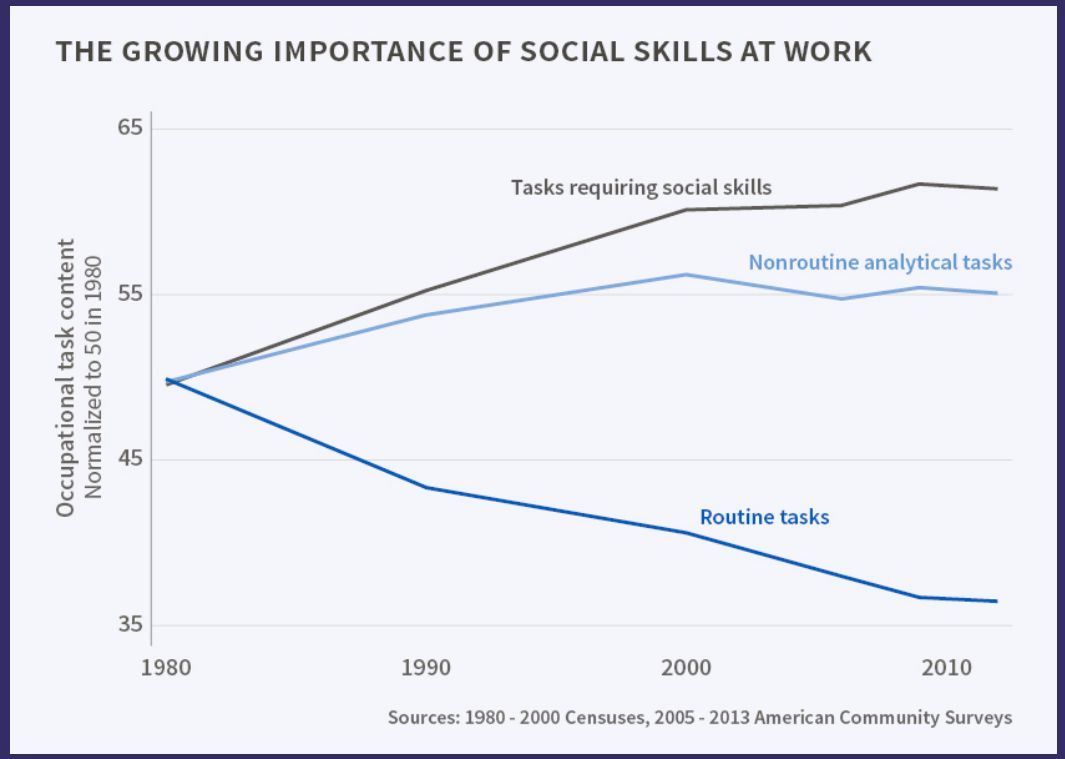
3. In a technology-driven era, social and fundamental skills still reign supreme within occupations

Increasing demand for cognitive skills (analytical and social)

Evidence from the US:

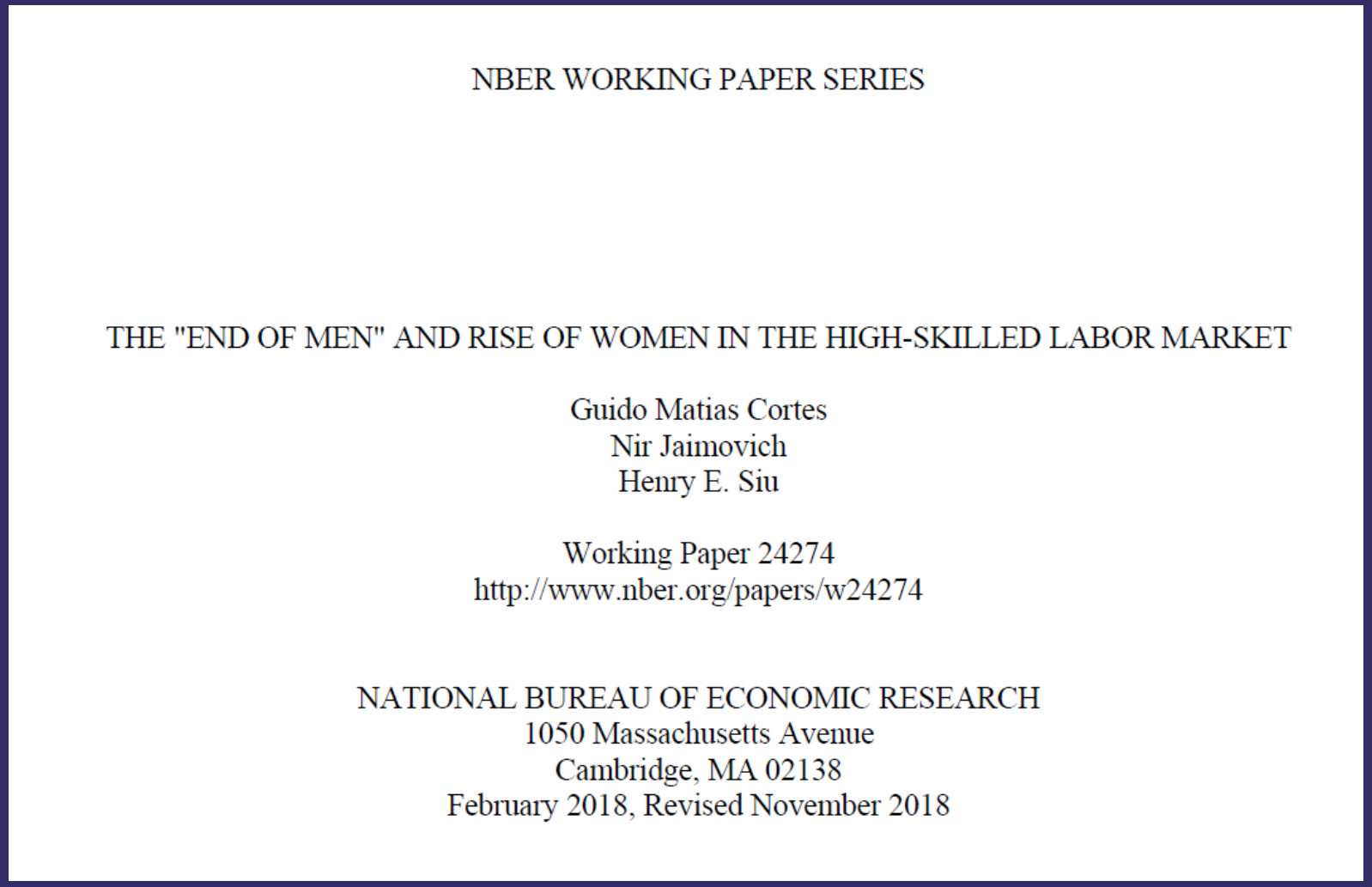
- Slowdown in the growth of STEM jobs after 2000 (engineering, physical scientists, but not computer scientists)
- Jobs requiring social skills continued to grow
- Fastest growth among jobs which require high math & high social skills

Source: Deming (2017)



Source: World Economic Forum after Deming (2017)

Increasing demand for cognitive skills (analytical and social)



NBER WORKING PAPER SERIES

THE "END OF MEN" AND RISE OF WOMEN IN THE HIGH-SKILLED LABOR MARKET

Guido Matias Cortes
Nir Jaimovich
Henry E. Siu

Working Paper 24274
http://www.nber.org/papers/w24274

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
February 2018, Revised November 2018

Our study

How is automation affecting women and men in the European labour markets?

- Are women more / less affected by deroutinisation?
- Will women benefit from the increasing demand for social and analytical skills?

Data and Method

ESCO - European Skills/Competences, Qualifications and Occupations

(13 485 skills/competences for 2492 occupations)

Indicators of occupational skill requirements

(ISCO-08 3-digit level, continuous variables)

- Cognitive analytical
- Cognitive social
- Cognitive artistic / creative
- Routine
- Manual

Data and Method

ESCO - European Skills/Competences, Qualifications and Occupations

(13 485 skills/competences for 2492 occupations)

Microdata from the Structure of Earnings Survey (SES), 2018

- Large sample survey of enterprises with at least 10 employees
- Countries: BG, CZ, DK, EE, FR, GR, IT, LT, LV, NO, PL, SK, UK

Indicators of occupational skill requirements

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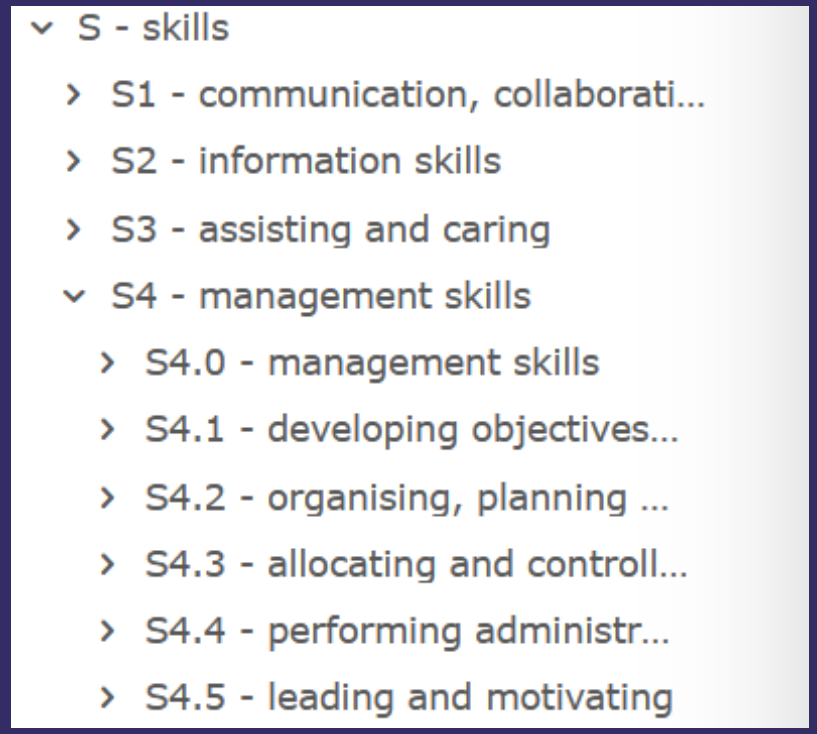


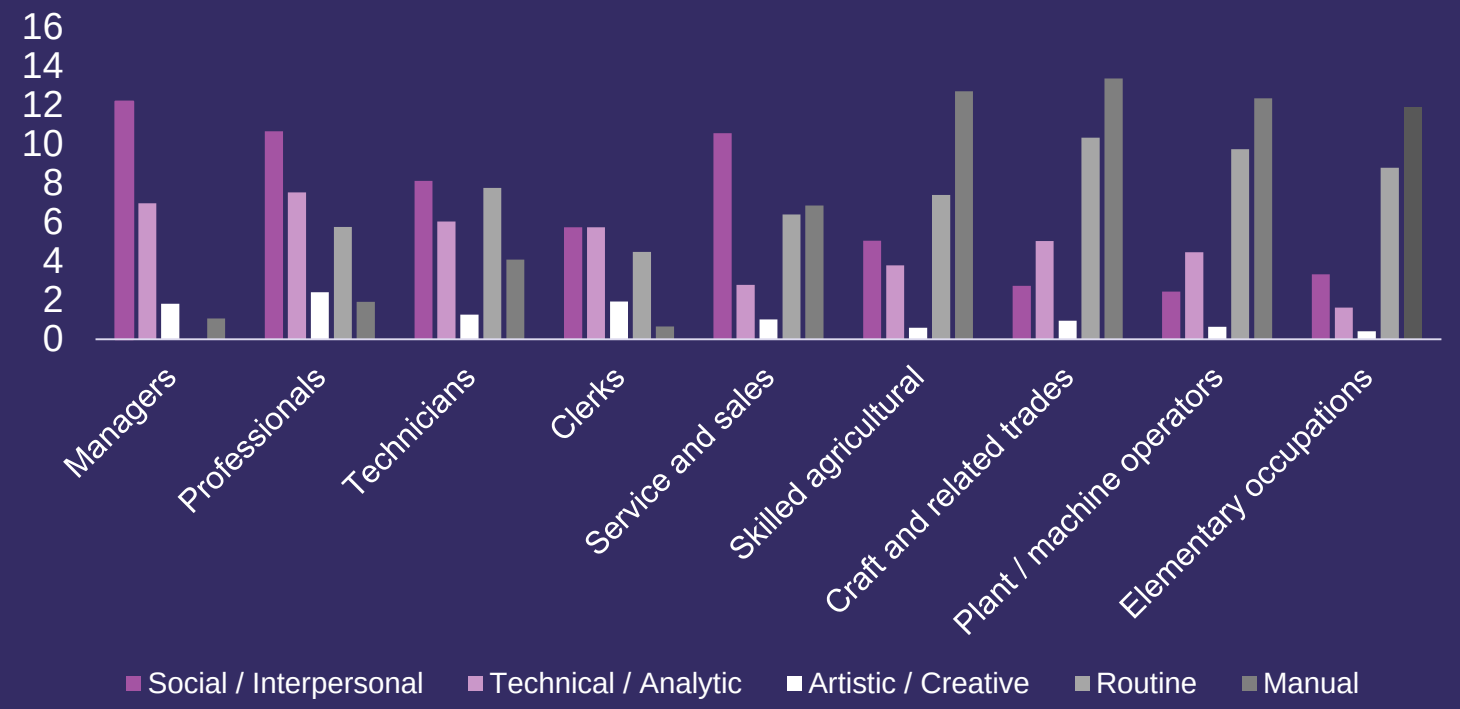
- each skill yes / no
- classified into one of the five groups
- the required skills per occupation were summed up into indicators of skill requirements
- standardization

Data and Method

Indicators of occupational skill requirements

(ISCO-08 3-digit level, continuous variables)

- **Cognitive social:** communication, networking, teaching, caring
- **Cognitive analytical:** processing information, designing systems, conducting investigations
- **Cognitive artistic / creative:** solving problems, creating artistic materials, performing and entertaining
- **Routine:** documenting and recording, verifying identities and documents, **no** organising, **no** planning, **no** making decisions.
- **Manual:** moving, cleaning, building



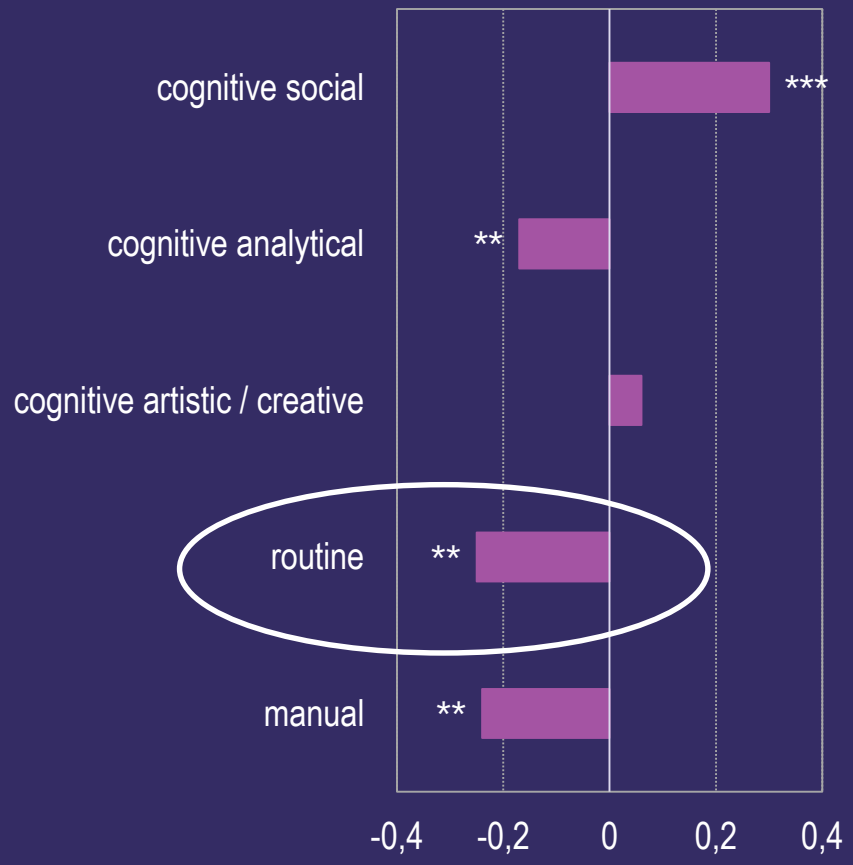
Data and Method

Structure of Earnings Survey (SES), 2018

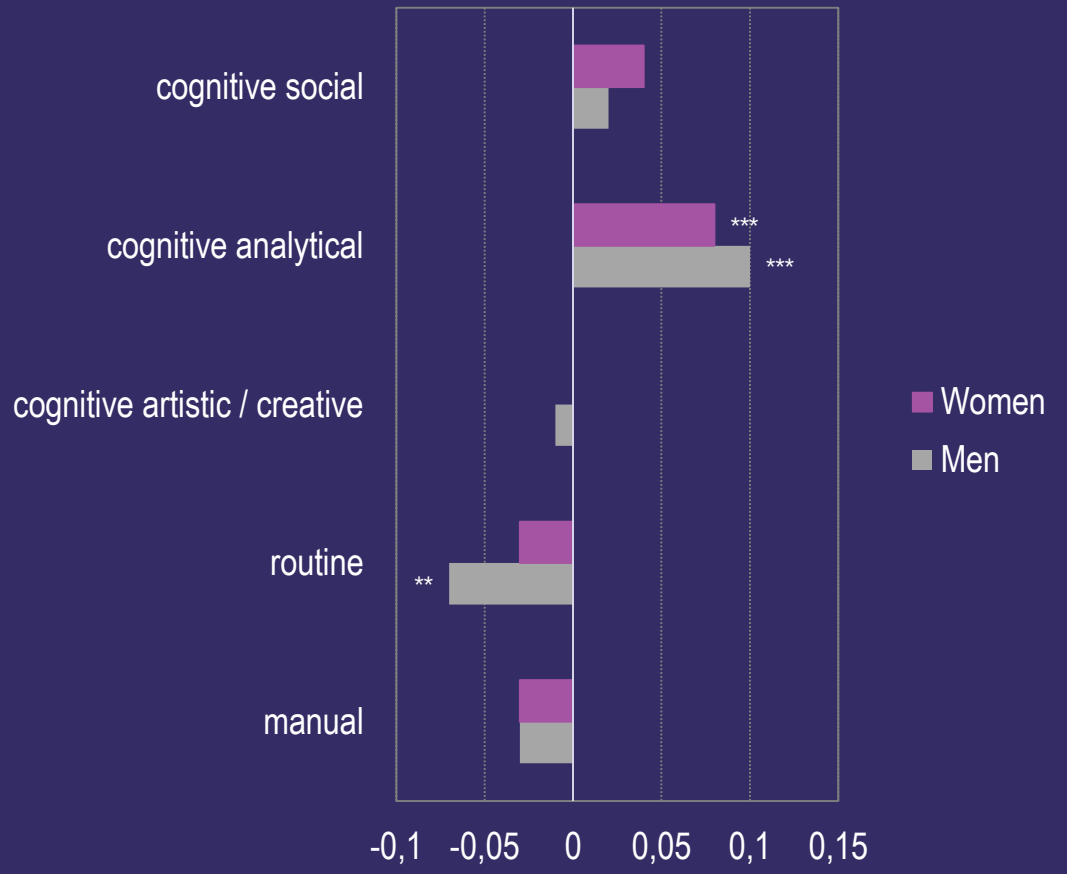
- Selection into occupations by skill requirements
  - Skill indicators regressed against sex, age, education, tenure, contract type, sector, firm size, country
- Wage returns
  - Log hourly wage regressed against skill inidcators, sex, age, education, tenure, contract type, sector, firm size, country

Results (pooled model)

Relative presence of women in occupations which require certain skills



Wage returns to occupations which require certain skills



Note: pooled sample of 13 countries: BG, CZ, DK, EE, FR, GR, IT, LT, LV, NO, PL, SK, UK

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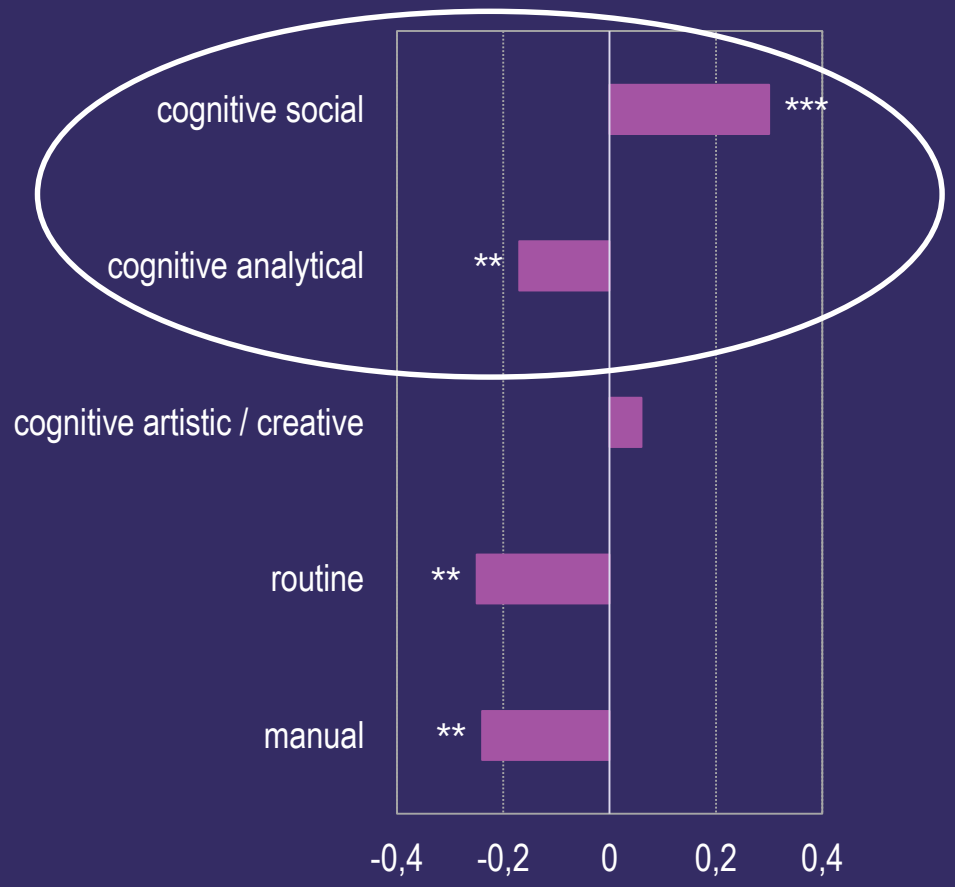

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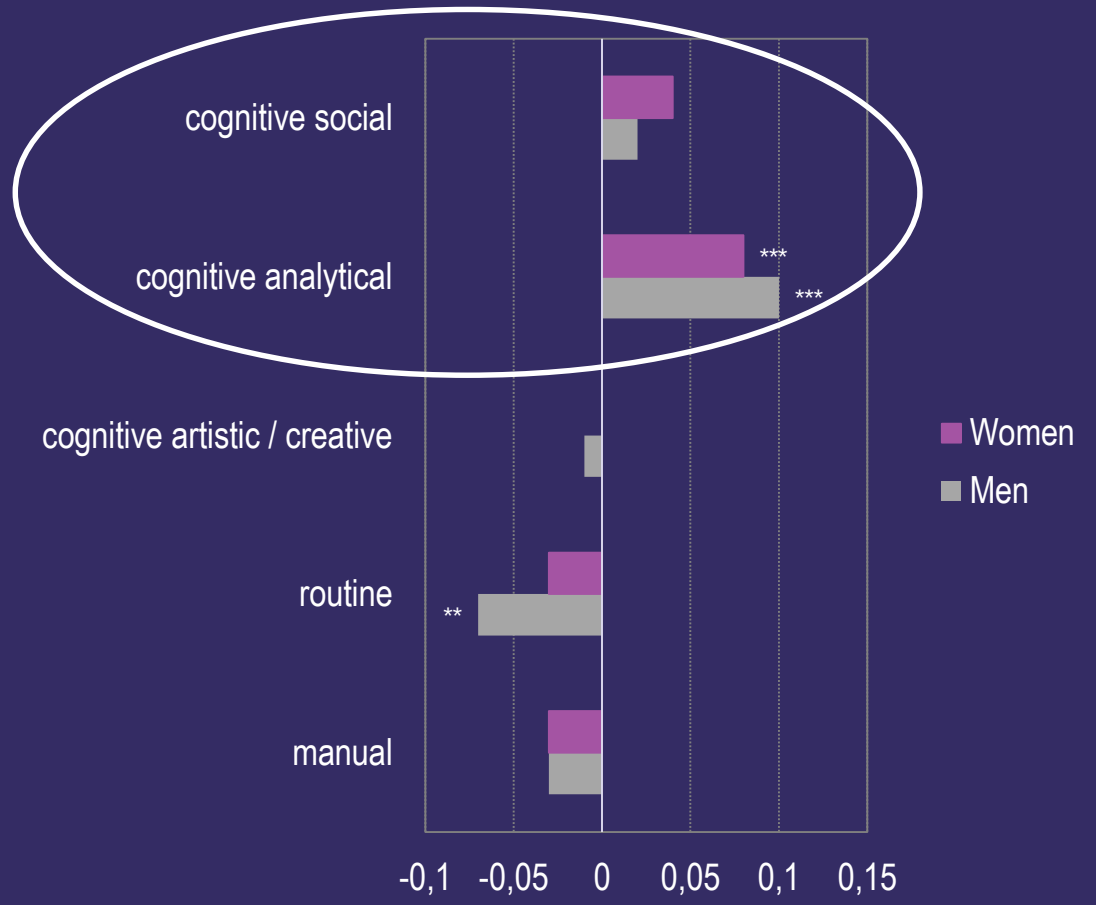

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Results

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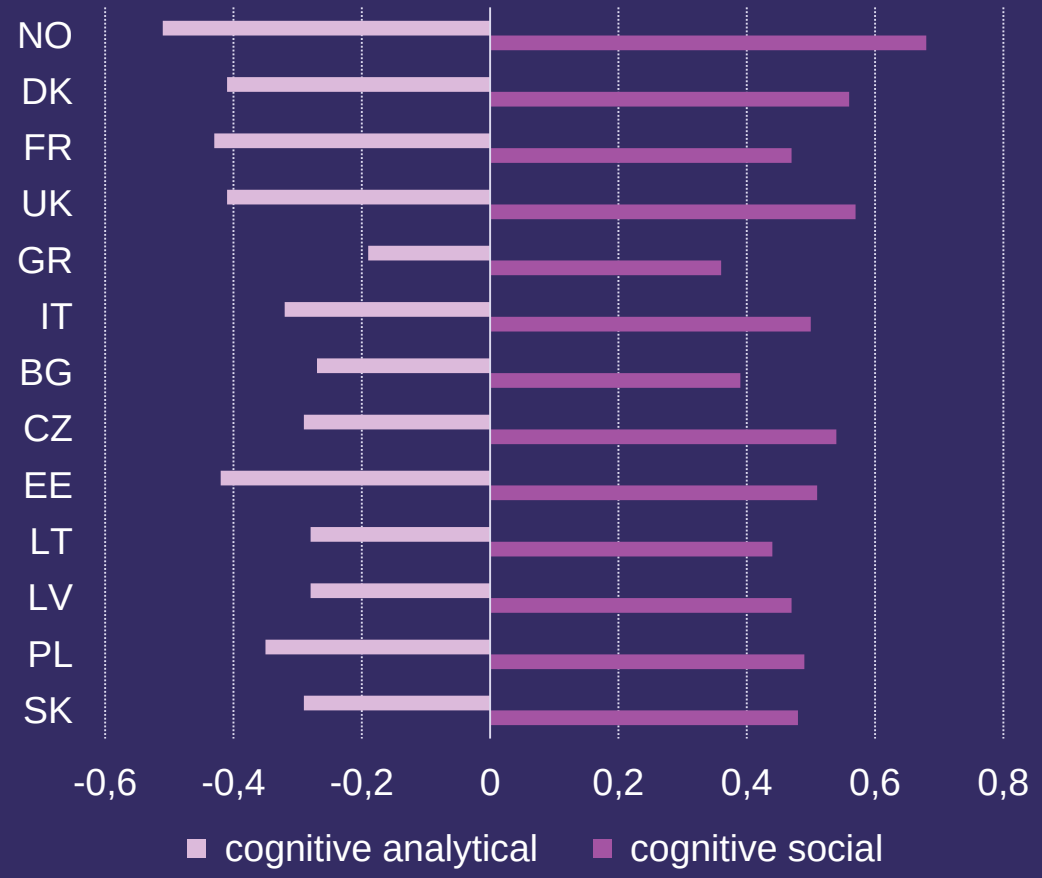

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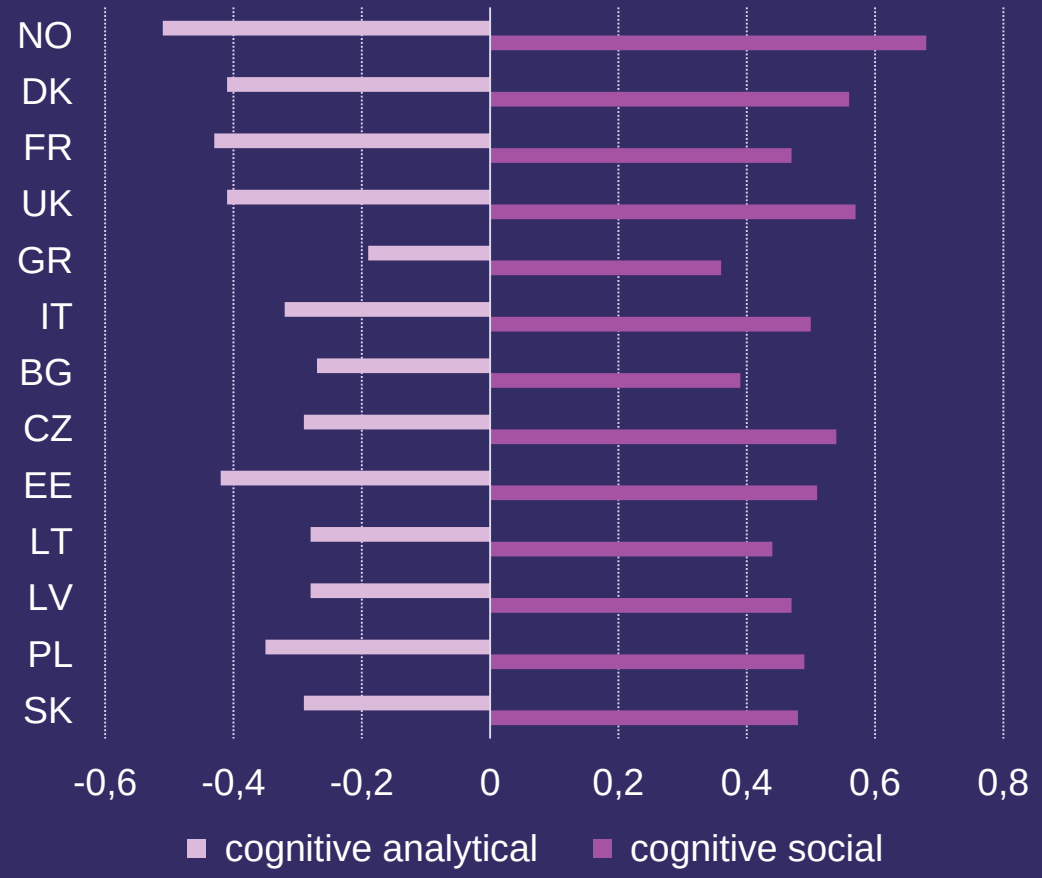
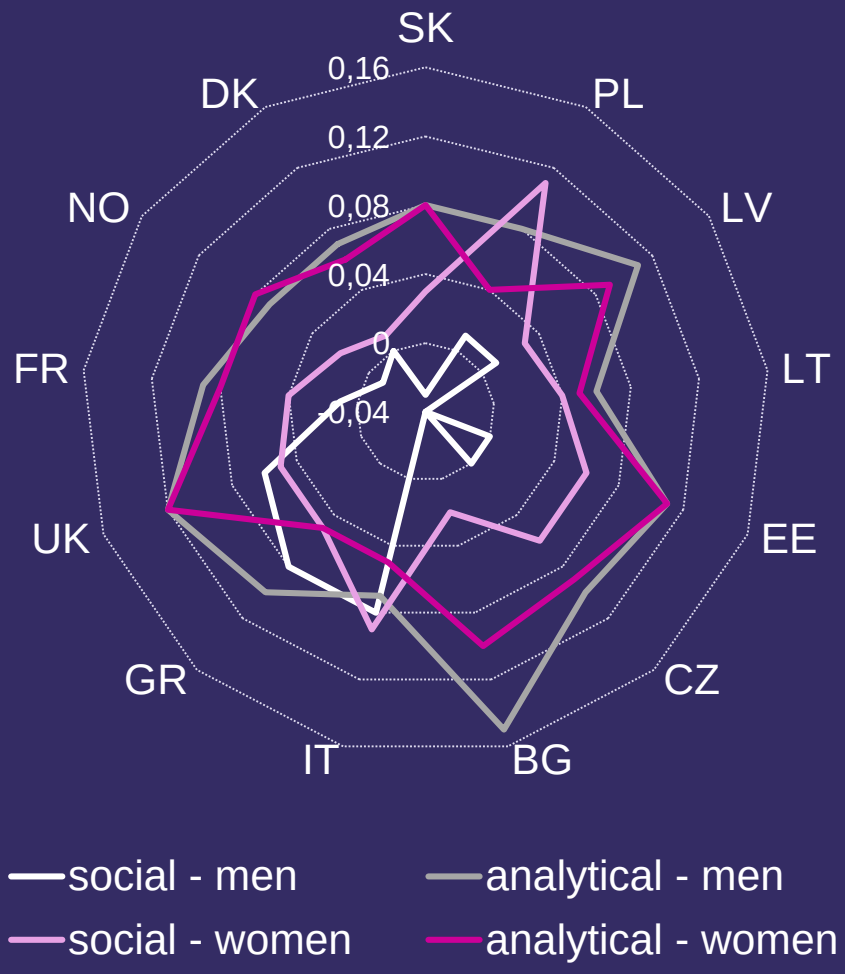


Wage returns to occupations which require cognitive skills



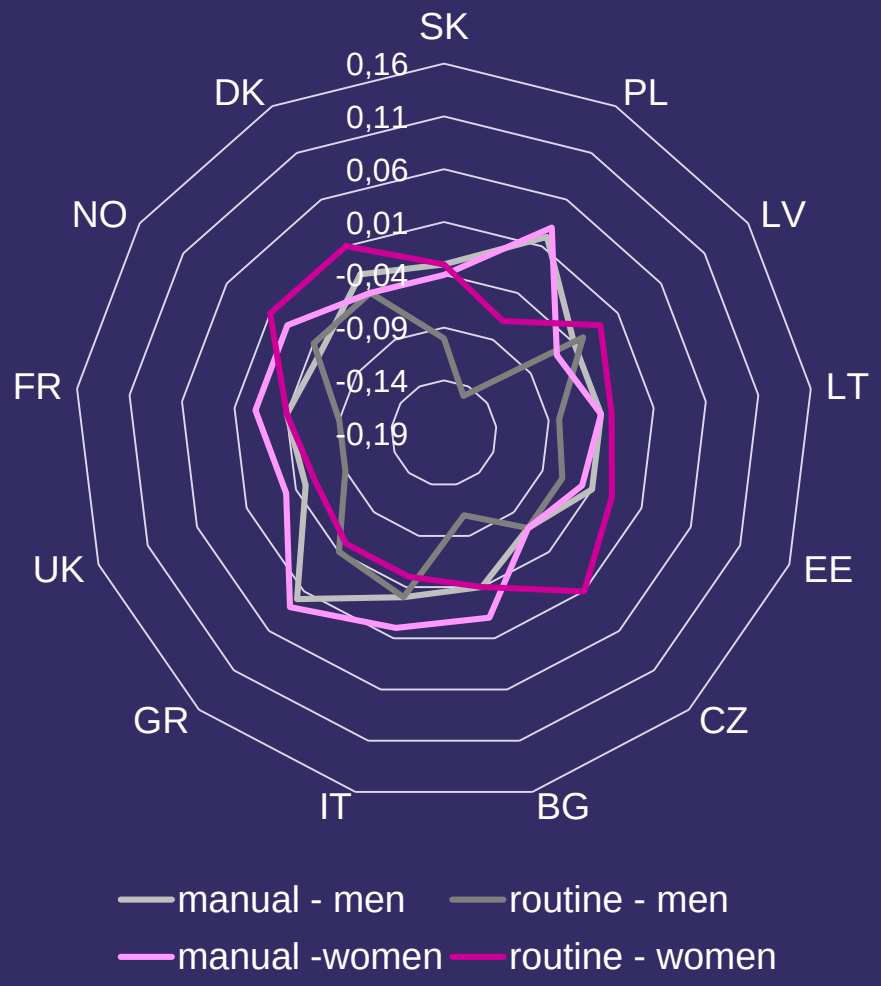
Results

Relative presence of women in occupations which require routine / manual skills

Results

Relative presence of women in occupations which require routine / manual skills

Wage returns to occupations which require routine / manual skills



Future plans

- Differentiate caring from other interpersonal skills
- Comparisons across time
- Robustness checks on our indicators of skill requirements

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Will women benefit from the changing demand for skills?

- The gender inequalities in earnings should decline as women move from routine occupations to those requiring social skills
- But at individual level highly qualified women will still earn less than similarly educated men due to the differences in wage returns to social versus analytical skills
- Women will benefit if:
  - They undertake jobs in STEM and make use of their social skills
  - Wage returns to social skills increase

Will women benefit from the changing demand for skills?

- Technogical change creates new opportunities in the labour market but also new challenges
- Skills in which women have comparative advantage may gain on importance
- But dynamic changes in the labour market will require constant adjustments from workers (skill upgrading, retraining)
- Gender inequalities in the labour market will persist if:
  - Female skills continue to be devalued
  - Women continue to do the larger share of childcare

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NAWA NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

POLSKIE POWROTY
POLISH RETURNS

Horizon 2020
European Union funding
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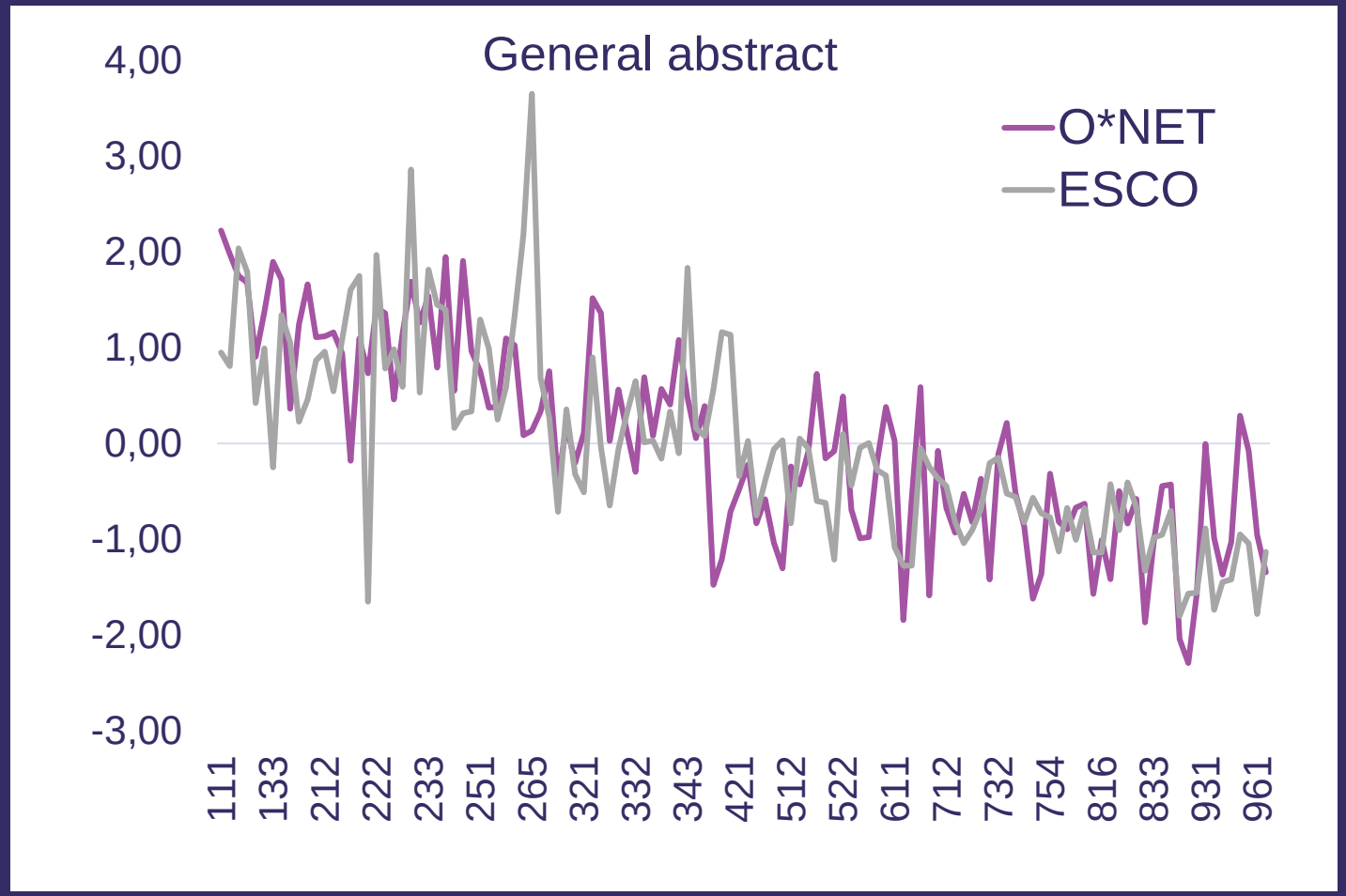
ESCO-based measures strongly correlated with O*NET based



ESCO and ONET measures correlation	
Abstract (aggregate)	0.64
Abstract social / interpersonal	0.59
Abstract technical / analytic	0.55
Abstract creative / artistic	-
Routine	0.49
Manual	0.75

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