

Digitalization, changing demand for skills and the gender wage gap

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After the pandemic conference series

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Motivation – changing demand for skills is not gender neutral

Decline in demand for routine tasks → ↘ jobs intensive in routine tasks

- High risk of automation: (70% of job tasks) ~ 9 % to 14 % of jobs
(Arntz et al 2017, Nedelkoska and Quintini, 2018)

Heterogeneous effects by gender likely, but with mixed evidence.

- Country specific studies: women left routine jobs faster than men
(Black and Spitz-Oener, 2006; Cortes et al 2020)
- A larger share of women's jobs expected to automate (Brussevich et al 2019;
Nedelkoska and Quintini, 2018)
- What is the role of social tasks?
(Autor et al, 2003; Acemoglu and Autor, 2011; Deming, 2017 ; Lordan and Pischke, 2022; Gelblach, 2020)

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Analyze *sorting* of women to tasks and *differential returns* to tasks

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Analyze *sorting* of women to tasks and *differential returns* to tasks

- We leverage a new database on task content designed for Europe
- We break down social tasks
 - Internal-dimension, e.g. *work in teams*
 - External-dimension, e.g. *teaching*
- Study selection into tasks in Europe and returns to these tasks

European Skill / Competences, qualifications and Occupations

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- Contains 2k+ occupations based on ISCO
- Contains around 13k+ tasks
 - Essential (our main focus) and optional

Recovering the task content of jobs

- 1 Manually classify tasks into *one* of 5 types 
 - Social (internal or external), analytic, routine, manual
(similar to Gelblach, 2020)
- 2 Sum number of (essential) tasks in each detailed occupation
 - (routine: also subtract desc. related to non-routine env.)
(Bisello and Fernandez-Macias, 2021)
- 3 Aggregate to the ISCO-08 3-digit level  Descriptives  Correlation
- 4 Standardize indicators using LFS weights (2018 - yearly)
 - Better coverage than SES. Complemented with national LFS if needed

Structure of Earnings Survey

- Admin quality employee-employer database
- Distributed by Eurostat every four years → we use 2018
- Rich set of control variables
 - *Personal*: gender, age (grouped), education, tenure
 - *Job*: industry, size of establishment, full-time position
 - *Income*: hourly wages in 2018 Euros (exc. premia and bonuses)
- ISCO-08 (3 digits) for a subset of countries:
 - CEE: BG, CZ, EE, LT, LV, PL, SK,
 - Western: CY, DK, EL, FR, IT, LU, MT, NO, UK (2014)
- We use *federal* weights

Do men and women perform same tasks?

$$task_{i,j} = \beta Women_{i,j} + x'_{i,j} \gamma + \nu_j + \epsilon_{i,j}$$

	Social	External	Internal	Analytical	Routine	Manual
Woman	0.350** [0.11]	0.388** [0.12]	0.154 [0.09]	-0.064 [0.10]	0.069 [0.12]	-0.231* [0.09]
R-squared	0.278	0.252	0.225	0.164	0.168	0.308
Observations	~ 10 million					

Notes: SE clustered at ISCO 3 digits in parentheses. *, **, *** indicate p-values smaller than 0.1, 0.05 and 0.01.

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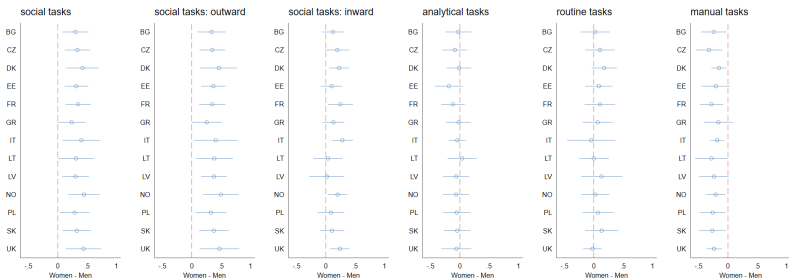
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Results consistent with Gelbach (2020) & Lordan and Pischke (2022)

Difference between General office clerks (code 411) and Secretaries (code 412) ~ 0.35

Are results driven by specific countries? Not much

Selection of tasks in different countries



Notes: SE clustered at ISCO 3 digits. Regressions run separately for each country

Women perform more social inward tasks than men in Western Europe (DK, FR, IT, NO, UK)

Are men and women paid evenly

We estimate the following equation 

$$\ln(\text{wage}_{i,j}) = \beta \text{Women}_{i,j} + \sum_{t=1}^T \tau_t \text{task}_{t,i,j} + \sum_{t=1}^T \tau_{t,fem} \text{task}_{t,i,j} \times \text{Women}_{i,j} + x'_{i,j} \gamma + \nu_j + \epsilon_{i,j}$$

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	(1)	(2)	(3)	(4)

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Woman	-0.148***	-0.149***	-0.143***	-0.143***
Social tasks	-0.026	-0.052*		
... × Woman		0.041**		

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	Social (together)		Social (divided)	
	(1)	(2)	(3)	(4)
Woman	-0.148***	-0.149***	-0.143***	-0.143***
Social tasks: inward ... × Woman			0.038*	0.036 0.010
Social tasks: outward ... × Woman			-0.048***	-0.089*** 0.055**

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	Social (together)		Social (divided)	
	(1)	(2)	(3)	(4)
Woman	-0.148***	-0.149***	-0.143***	-0.143***
Analytic tasks ... × Woman	0.051**	0.070*** -0.048**	0.050*	0.069*** -0.051***

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	Social (together)		Social (divided)	
	(1)	(2)	(3)	(4)
Woman	-0.148***	-0.149***	-0.143***	-0.143***
Routine tasks ... × Woman	-0.069***	-0.095*** 0.043***	-0.060***	-0.076*** 0.028*

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	Social (together)		Social (divided)	
	(1)	(2)	(3)	(4)
Woman	-0.148***	-0.149***	-0.143***	-0.143***
Manual tasks ... × Woman	-0.062***	-0.048* -0.034*	-0.055**	-0.045* -0.038*
R-squared	0.783	0.784	0.785	0.786

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- Women receive on average 15% lower wages
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- Returns are less negative, not positive!

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- Returns are less negative, not positive!
- Results are common across countries [▶ Graph](#)

Evolution over time

Changes between two years: 2002 - 2018 and 2010 - 2018

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- Selection of tasks has not changed over time
 - Differences in levels for men and women + constant gap
- Relative returns to tasks changed
 - ↑ returns to social external
 - ↑ returns to abstract
 - Differences when comparing 2018 to 2002

Conclusions

- Are women in a position to benefit from trends? → mixed results
- Women perform more social tasks than men
 - But mostly *external* → relatively worse paid
- Little evidence of convergence over time
 - Not at all in selection, only weak for returns.
- Results are robust to...
 - ... estimations using tasks at ISCO 2D level
 - ... including additional countries
 - ... including all tasks (as opposed to essential)

Questions or suggestions?
Thank you!

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Task classification in ESCO

- Task group # S3.6.3 : *caring for children*
- Task group # S4.5 : *leading and motivating*
- Task group # S1.11 : *designing systems and products*
- Task group # S3.3.3 : *complying with legal [...] guidelines*
- Task group # S6.2 : *moving and lifting*

▶ back

Task classification in ESCO

- Task group # S3.6.3 : *caring for children* → Social – external
- Task group # S4.5 : *leading and motivating* → Social – internal
- Task group # S1.11 : *designing systems and products* → Analytic
- Task group # S3.3.3 : *complying with legal [...] guidelines* → Routine
- Task group # S6.2 : *moving and lifting* → Manual

▶ back

Task values

Task content before standardization (3-digit ISCO codes)

	Mean	SD	Share zeroes
Social tasks	4.01	4.51	0.024
Social tasks: external	2.448	3.33	0.104
Social tasks: internal	1.478	1.6	0.064
Analytic tasks	3.362	2.01	0.024
Routine tasks	0.727	2.11	0.032
Manual tasks	3.361	3.7	0.104
Observations	125		

▶ back

Correlation with O*NET classification

ESCO name	ONET name	Pearson	Pearson (w)	Spearman
Abstract (all)	NR cognitive	0.64	0.66	0.67
- Analytic	- NR cognitive analytic	0.57	0.61	0.58
- Social	- NR cognitive personal	0.54	0.52	0.60
Routine	Routine ¹	0.47	0.57	0.52
Manual	NR manual	0.71	0.72	0.81

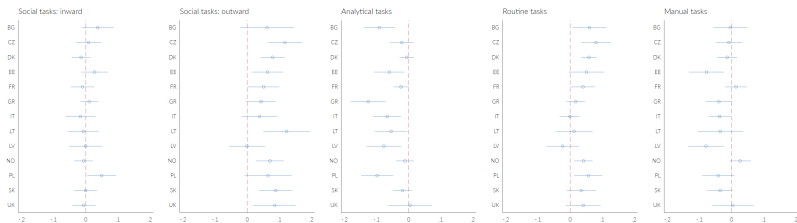
Notes: (w) denotes use of occupation size as weights. NR stands for non-routine.

¹ is an average of Routine manual and Routine cognitive.

▶ back

Cross-country heterogeneity in returns to tasks

Differences in returns to tasks by countries (and 95% CI)



Notes: SE clustered at ISCO 3 digits. Regressions run separately for each country

There are differences across countries, but not systematic

▶ back