Task profiles and Gender Wage-Gaps within Occupations

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Motivation

- Gender wage-gap directly related to occupational segregation:
  - Sorensen (1989): wage penalty for women due to occupational segregation
  - Groshen (1991): gender gaps within job cells are negligible, majority of gap explained by occupational segregation

- However… Recent finding: majority of the gender wage-gap is found within very narrowly defined occupations
  - True for US (Goldin 2014)
  - Germany (Fedorets 2014)
  - Australia (Cobb-Clark & Tan 2011)

Why?

- Long and inflexible working hours command a wage premium (Goldin 2014)
  - within certain occupations like law and consulting there are sharp gender differences in hours worked (men work more hours than women)
- Relative prices of non-routine cognitive tasks (Fedorets 2014)
  - men & women can expect different returns to non-routine cognitive tasks
  - the gap has been decreasing over time, however.

This paper: use task segregation to account for the within-occupational gender gap

- Closest to Fedorets 2014 approach
  - look at effect task segregation within occupation instead of returns of routinisable/non-routinisable tasks
- Why use male/female task profiles?
  - Using US data Autor & Handel (2013) find that there exists variation in job tasks among workers *within* occupations.
  - Such variation is *systematically related to race and gender*.
- I use Autor & Handel (2013) as my starting point.

Related literature: tasks & gender gaps (& technology)

- Black & Spitz-Oener (2010): how the decline in routine tasks explains the decreasing male-female wage gap.
  - mechanism: robitization/computerisation of routine tasks (technology)
- Beaudry & Lewis (2014): decline in male/female wage gap in response to the adoption of PCs in the workplace
  - mechanism: technology effect on the demand for routinizable tasks.

Related literature: business & management

- Women do most of the office 'house work'.
  - Moss Kanter (1993): women do most office administrative tasks that help but don't pay off
  - Williams (2014): women plan the office Christmas party, bring the cupcakes, stay on late to help others etc…
  - Recent overview NYT article by psychologist Adam Grant and Sheryl Sandberg.
  - It is perhaps telling that task-based datasets (PIAAC, PDII, IAB, O*NET) completely ignore these type of 'house work' activities…

Contribution to literature

- Illustrate that female-male task segregation exists even within narrowly defined occupations.

- Show that task segregation can account for within-occupational gender wage-gaps.

- Show that task segregation accounts for the gap through men doing more high-premium tasks (but *not* women doing more low-premium tasks).

- Use an old inequality index in a new way.

Data

- Programme for International Assessment of Adult Competencies 2011.

- 9 European countries: Belgium, Czech, Denmark, Spain, France, Italy, Netherlands, Poland, Slovakia.

- Cross section

Starting point

- For these EU countries
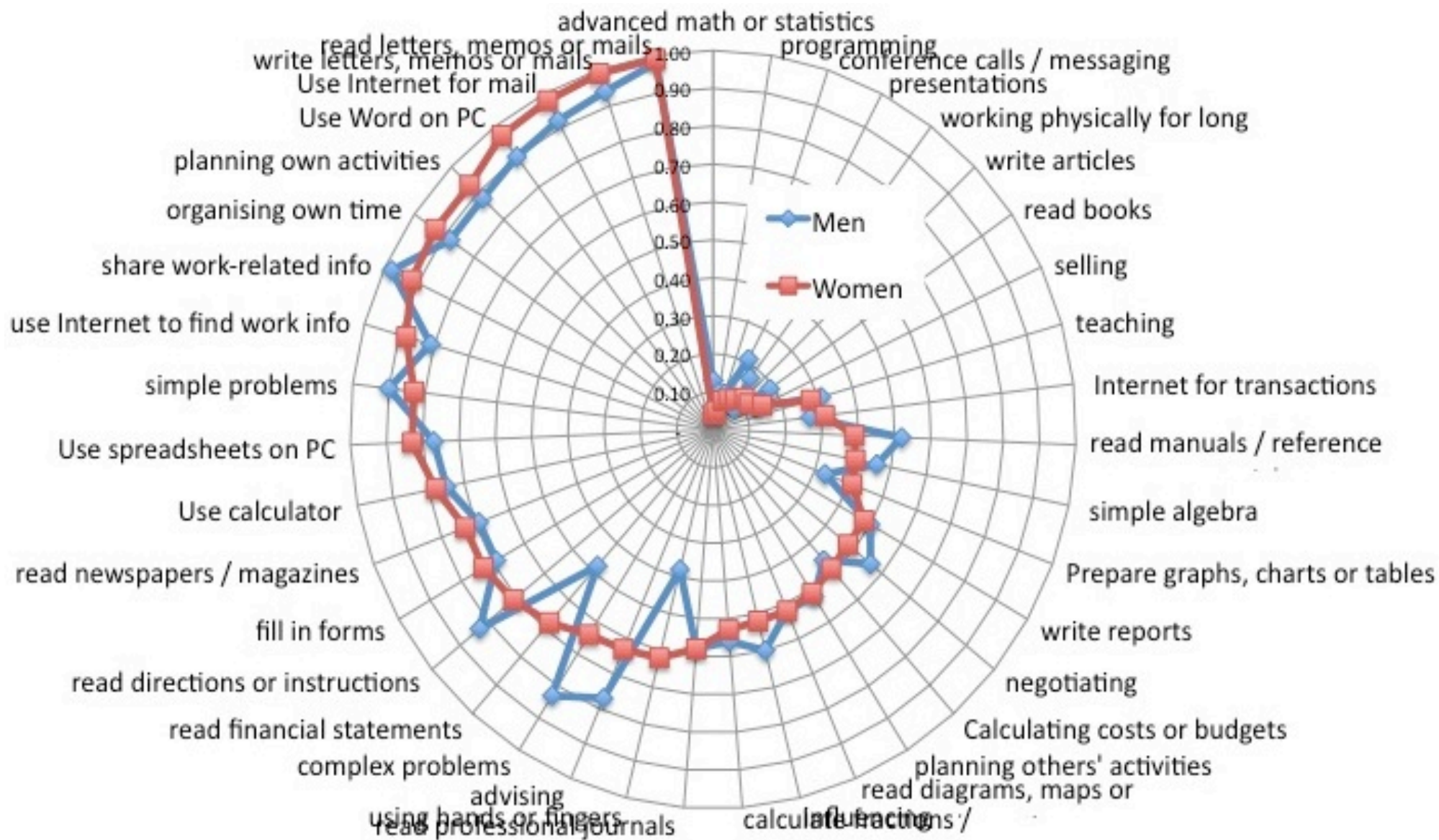 - is the majority of the wage gap within occupations? YES

Majority of gender wage-gap within occupations
(BEL, CZE, DNK,ESP, FRA, ITA, NLD, POL, SVK)

Sample	Variables	Coefficient on female	Standard Error
Full-time	Basic	-.211177	.007657
Full-time	Basic,hours	-.182233	.007732
Full-time	Basic, hours, education	-.232798	.007343
Full-time	Basic, hours, education, occupation	-.179904	.008519
Full-time	Basic, hours, education, occupation, tasks	-.138170	.009718
All	Basic	-.345860	.007750
All	Basic,hours	-.172822	.007384
All	Basic, hours, education	-.212330	.007064
All	Basic, hours, education, occupation	-.152139	.008163
All	Basic, hours, education, occupation, tasks	-.121119	.009350

Starting point

- For these EU countries
  - is the majority of the wage gap within occupations? YES
  - do men and women do different tasks even within the same narrowly defined occupation? YES

Executive Secretaries

Starting point

- For these EU countries
  - is the majority of the wage gap within occupations? YES
  - do men and women do different tasks even within the same narrowly defined occupation? YES
- The starting facts are similar to
  - Goldin (2014) and Autor & Handel (2013) for the US
  - Cobb-Clark & Tan (2011) for Australia

Measuring task segregation

- Each occupation is characterised by up to 39 tasks
- Task variation is at the individual level.
  - thus two people who do the same occupation do not necessarily have the same activities.
  - however, note that tasks are not mutually exclusive
- We want to get an idea of men and women's task profiles: are they different?

Examples of tasks

| Literacy tasks	Numeracy tasks
read directions or instructions	calculating costs or budgets
read letters, memos or e-mails	use or calculate fractions or percentages
read newspapers or magazines	use a calculator
read professional journals or publications	prepare graphs, charts or tables
read books	use simple algebra or formulas
read manuals or reference materials	use advanced math or statistics
read financial statements	
read diagrams, maps or schematics	
write letters	
write articles	
write reports	
fill in forms	

Table 1: Literacy and Numeracy Tasks

Index of Task Segregation by Gender (D-index)

$$D_i = \frac{1}{2} \sum_{t=1}^{39} \left| \left(\frac{f_{it}}{F_i} - \frac{m_{it}}{M_i} \right) \right|$$

range of index? 0 to 39/2

Executive Secretaries
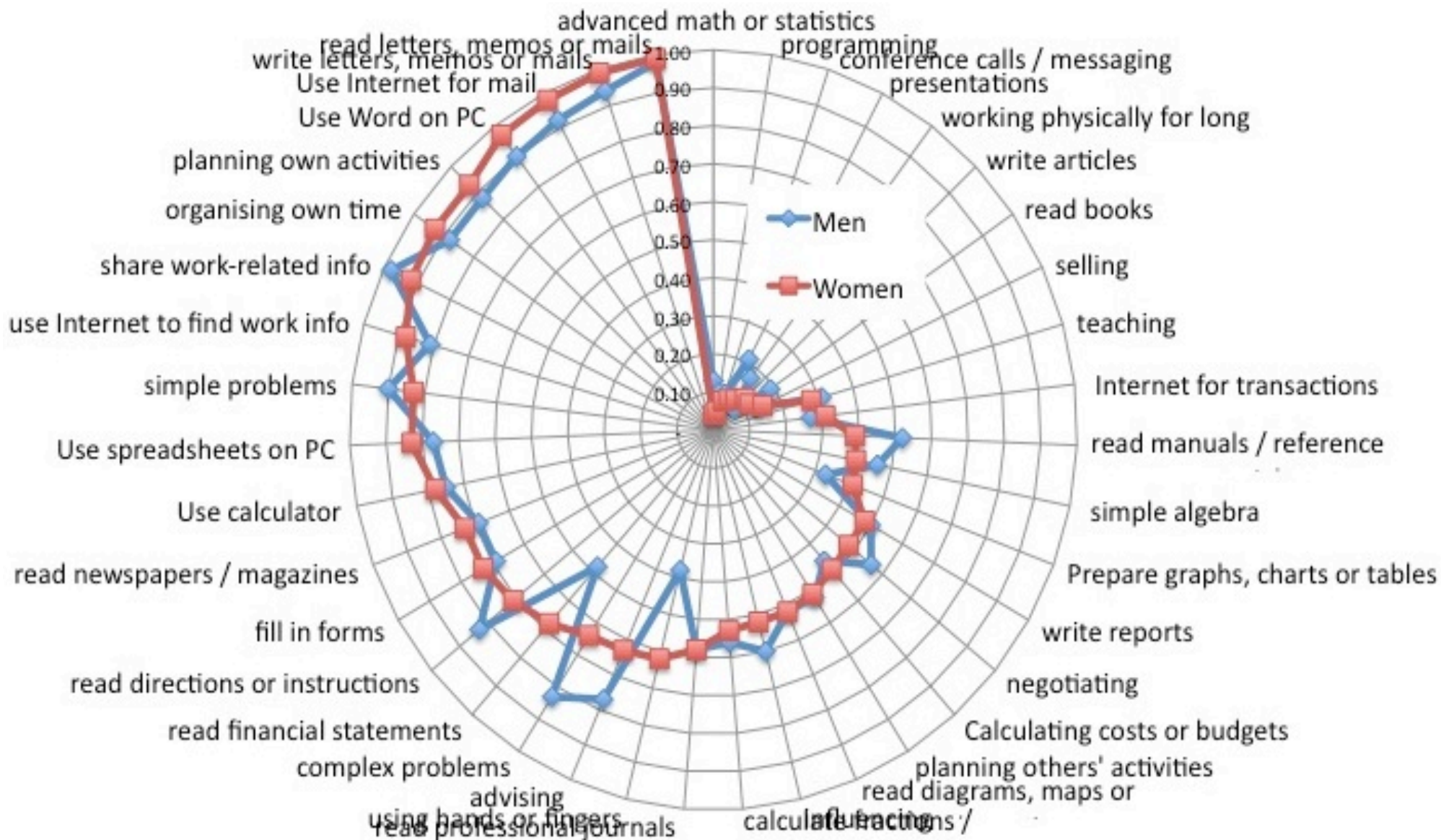
Econometric model (based on Baker & Fortin (2001))

$$\ln w_i = X_i\beta + \boxed{\alpha_k} OCCUP + u_i \qquad (1)$$

$$\boxed{\widehat{\alpha}_k} = \delta + \gamma D_k + \varpi_k \qquad (2)$$

Substitute (2) into (1):

$$\ln w_i = \delta + X_i\beta + \gamma D_k + (\varpi_k + u_i) \qquad (3)$$

Include multiplicative term:

$$\ln w_i = \delta + X_i\beta + \gamma D_k + \zeta D_k * female_i + (\varpi_k + u_i) \quad (4)$$

Econometric model + problem

$$\ln w_i = \delta + X_i \beta + \gamma D_k + \zeta D_k * female_i + (\varpi_k + u_i)$$

i.i.d

is i.i.d a good assumption?

Controls: *female, age, age squared, native, hours worked, education dummies, firm size, country dummies, 1 digit occupational dummies*

ω_κ varies only between occupations, but u_i varies for each obs. → observations within same occupation likely correlated! How to solve?

How to fix the problem?

- Baker & Fortin (2001) suggest approaching the issue as omitted variable bias.

- Include a set of controls that vary at the occupational level to capture the correlation of u_i within occupations.

- What to include? Average education within occupation, average occupational characteristics, rate of femaleness of an occupation

Baker & Fortin (2001)

Include a set of occupational controls (that vary at the occupational level):

$$\ln w_i = \delta + \gamma D_k + \zeta D_k * female_i + \lambda G_k$$
$$+ \mu C_k + X_i \beta + (\psi_k + u_i)$$

- G: average human capital within 4-digit occupation
- C: occupation-specific characteristics unrelated to human capital:
  - rate of femaleness of 4-digit occupation
  - average working conditions

Results

Entire sample

	(1)	(2)	(3)	(4)
Sample: all occupations with at least 20 people, 10 men & 10 women				
D-index	0.055***	0.049**	0.029***	0.026**
	(0.010)	(0.010)	(0.010)	(0.011)
Female	-0.110***	-0.069***	-0.067***	-0.073***
	(0.023)	(0.023)	(0.022)	(0.022)
D-index*Female	-0.027**	-0.027*	-0.028**	-0.024*
	(0.013)	(0.013)	(0.013)	(0.013)
Female Rate	-	-0.167***	-0.132***	-0.106***
	-	(0.015)	(0.016)	(0.017)
Occupational Characteristics	-	-	YES	YES
1-digit OCC	-	-	-	YES
Country	YES	YES	YES	YES

Restricted sample

	(4)	(5)	(6)	(7)
Sample: occupations with 100+ people				
D-index	0.077***	0.082***	0.073***	-0.074***
	(0.014)	(0.014)	(0.013)	(0.014)
Female	-0.018	0.022	0.001	-0.033
	(0.028)	(0.028)	(0.028)	(0.028)
D-index*Female	-0.090***	-0.092***	-0.079***	-0.057***
	(0.017)	(0.017)	(0.017)	(0.017)
Female Rate	-	-0.176***	-0.143***	-0.150***
Occupational				
Characteristics	-	-	YES	YES
1-digit OCC	-	-	-	YES
Country	YES	YES	YES	YES

Interpretation

- Task segregation (D-index)
  - is positively and significantly correlated with male wages
  - is negatively and significantly correlated with female wages.
- Task segregation can account for up to 50% of the unexplained within-occupational gap across all occupations
  - … and up to 100% of within occupational gap for very popular occupations (100+ people in sample)

Do some tasks in particular 'drive' this result?

- Do women do more of the low-paying tasks compared to the men?

- Do men do more of the high-paying tasks compared to the women?

- Is it a combination of the above?

- Are some particular tasks driving the correlation?

Who does the 'low-paying' tasks?

	Femal	lnw
selling	0.001	-0.022***
working physically for long	-0.011**	-0.022***
using hands or fingers	0.007***	-0.009**
read books	0.006*	-0.020***
read manuals/reference material	-0.003	-0.013**
calculating costs/budgets	-0.003	-0.015***
use internet to find work-related info	-0.003	-0.017***
use programming language	-0.017***	-0.018***
Rest of tasks	*YES*	*YES*
Occup & country dummies	*YES*	*YES*

Who does the 'high-paying' tasks?

	Female	lnw
sharing work-related info	0.010***	0.061***
teaching people	-0.004	0.013***
presentations	-0.017***	0.031***
planning own activities	0.007*	0.019***
planning others' activities	-0.006**	0.022***
influencing people	-0.004	0.008*
negotiating	-0.009***	0.009**
solving simple problems	-0.002	0.010*
solving complex problems	-0.005	0.026***
read letters/memos/mails	0.009**	0.023***

more in next slide…

continued

	Female	lnw
read newspapers/mags	-0.008**	0.012**
read journals/publications	-0.012**	0.028***
read diagrams/maps	-0.033***	0.018***
write letters/memos/mails	0.008**	0.016**
write articles	0.004	0.025***
write reports	-0.002	0.009*
use fractions/ percentages	-0.022**	0.009*
use calculator	0.010***	0.008*
use computer for email	-0.004	0.030***
use spreadsheets	-0.012***	0.012**
Rest of tasks	YES	YES
Occup & Country dummies	YES	YES

Which tasks are done more by women?

	Female	lnw
sharing work-related info	0.010***	0.061***
planning own activities	0.007*	0.019***
using hands or fingers	0.007*	-0.009**
read letters/memos/mails	0.009*	0.023***
read books	0.006*	-0.020***
write letters/memos/mails	0.008*	0.016**
use calculator	0.010***	0.008*
use word processor	0.021***	0.002
Rest of tasks	YES	YES
occupation & country dummies	YES	YES

wage premium

wage penalty

Which tasks are done more by men?

	Female	lnw
presentations	-0.017***	0.031***
planning others' activities	-0.006**	0.022***
negotiating	-0.009**	0.009**
working physically for long	-0.011***	-0.022***
read newspapers	-0.008**	0.012**
read professional journals	-0.012***	0.028***
read diagrams/maps	-0.033***	0.018***
use/calculate fractions	-0.022***	0.009*
use advanced math/stats	-0.014***	-0.005
use spreadsheets	-0.012***	0.012**
use programming language	-0.17***	-0.018***
Rest of tasks	YES	YES
Occup & country dummies	YES	YES

Perspective matters

- On average, male tasks tend to be high-premium
  - yet female tasks are not low premium
  - and high premium tasks are not dominated by men

What tasks are 'driving' the result?

Regressions with 4-digit occupational dummies		
	Female	Wage
Sharing work-info	.011***	.053***
Presentations	-.015***	.031***
Read diagrams, maps or schematics	-.035***	.037***
Use or calculate fractions and percentages	-.024***	.036***
Use advanced maths or statistics	-.017***	.022***
Use spreadsheets	-.012***	.015***
Occupation dummies 4-digit	YES	YES
Remaining tasks	YES	YES
Observations	23,475	20,603

Next questions

- Why do we observe these patterns?
  - Hypothesis 1: men self-select into high-paying activities and women don't (preferences)
  - Hypothesis 2: managers assign the men to high-paying tasks more than women, knowingly or not (discrimination/ unconscious bias)
  - Hypothesis 3: Survey design is biased towards male-type tasks and ignores female-type tasks (ie. we still don't have the complete picture)
  - Hypothesis 4: more men than women have statistics/ maths etc type skills (non-substitutability of genders)

Thank you!