Gender Differences in Skill Content of Jobs

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Motivation

- The gender gap dropped dramatically in the last century but did not disappear even today.
  - The gender convergence was driven by decreasing segregation of women (Blau et al 2010)
  - Now, the gender gap is larger within occupation than between occupation (Cobb-Clark et al. 2011)
  - The within gender wage gap can be attributed to differences in actual skill use (Black et al. 2011)
- **Research Question**: Why do women use their cognitive skills less than men having the same occupation?
  - Occupational categories are defined by a list of tasks worker should do at their job (ISCO, 2008)

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Overview of the results

We use a the **PIAAC data** to estimate the gender gap in cognitive skill use

- information on **self-reported skill use measures** and **cognitive test scores**
- the conditional **gender gap in skill use** equals $\approx$ **4 years of schooling**

We match time use information from the **ISSP survey**

- the **main predictors** of skill use at work are the **activities at leisure time**
- working hours, hours spent on housework, skill use in leisure time fully explain the gender gap in skill use

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How to interpret the results?

Self-fulfilling equilibrium where activities at the workplace and at home are jointly determined

- individual effort is capacity constrained and unobservable
- **Prejudice of the employer:** women are more willing to make effort at home than at the workplace
- women observe discrimination at the workplace and increase effort in home production

Roadmap

1. Introduction
2. Related Literature
3. Data
   - Data
   - Empirical Methodology
4. Results
5. Proposed mechanism
   - Alternative explanations
6. Summary

Related literature

Measurement of cognitive skill use at work

- official task descriptions+ administrative data (Acemoglu, Author 2011, Author, Dorn 2013)
- surveys on self reported skill use (Spitz-Oener 2006, Author-Handel 2013, Stinebrickner et al. 2017)
- This paper: investigates the causes of within occupation gender differences

Non-cognitive skill content of jobs

- None-cognitive skills have an increasing impact on wages (Deming 2017, Cortes et al. 2018)
- This paper: women use non-cognitve skills less often

PIAAC

Programme for the International Assessment of Adult Competencies (PIAAC)

- detailed information on the individuals (labor market status, education, social background, occupation, social activities etc.)
- self reported skill use indices based on categorical questions:
  - e.g. how often do you use spreadsheets, fill in forms?
  - we use three aggregate skill use indices: **Numeracy**, **Literacy** and **ICT**
- The survey measures cognitive skills with **mathematics and literacy tests scores**

PIAAC - descriptive statistics

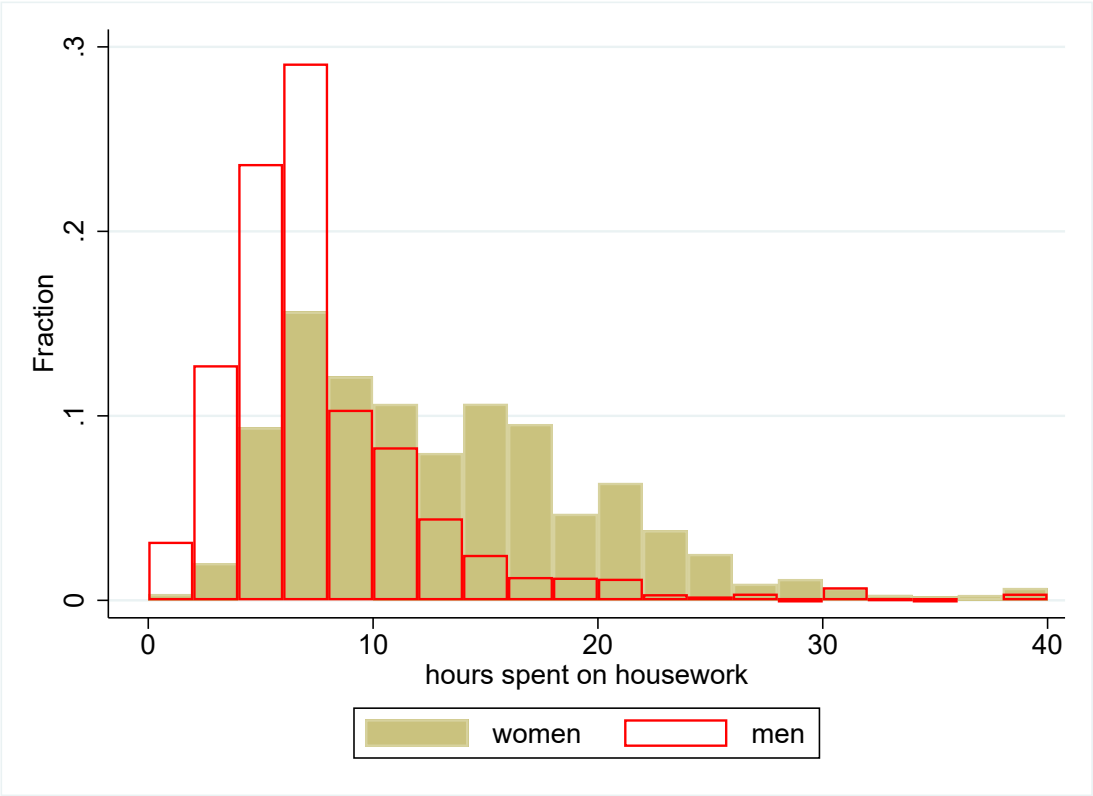
Variable	Male	Female	Difference	t-stat
Experience (year)	19.94	17.73	-2.20	-7.37
	(0.21)	(0.20)		
Years of education	12.67	13.12	0.45	7.90
	(0.04)	(0.04)		
Share of full time workers	0.81	0.66	-0.14	-13.43
	(0.006)	(0.008)		
Share of private organization	0.82	0.69	-0.13	-13.06
	(0.006)	(0.007)		
Share of public & non-profit organization	0.18	0.31	0.13	12.72
	(0.006)	(0.007)		
Average mathematics test score*	0.08	-0.09	-0.17	-7.47
	(0.015)	(0.020)		
Average literacy test score*	-0.02	0.03	0.05	2.14
	(0.017)	(0.021)		
Observations	19,313	17,319		

ISSP

International Social Survey Programme: Family and Changing Gender Roles

- "measure the attitudes toward marriage, child bearing and activities made in leisure time and at the workplace"
- hours spent on housework, childbearing
- match to the PIAAC data using gender, marital status, 1 digit occupational category, educational level and the number of children

ISSP - Hours spent on housework



Estimation strategy

- We *run a Mincerian-type regres*sion to get the gender differences in skill intensity

$$y_i = \alpha_c + \beta * female_i + \gamma * X_i + u_i,$$

- y_i is the skill intensity of the job (numeracy, literacy and ICT skill use at work)
- Controls are
  - family background, education, labor market and firm characteristics
  - cognitive skills measured by **literacy and numeracy test scores**
  - **3 digit ISCO codes** - similarly to Goldin (2014)

Results

	(1)		(2)		(3)	
Panel A: Numeracy skill use at work						
	coeff.	(s.e.)	coeff.	(s.e.)	coeff.	(s.e.)
Gender Gap	-0.32***	(0.02)	-0.27***	(0.02)	-0.17***	(0.02)
Years of education			0.03***	(0.01)	0.02**	(0.01)
Panel A: Literacy skill use at work						
Gender Gap	-0.32***	(0.02)	-0.31***	(0.02)	-0.22***	(0.02)
Years of education			0.07***	(0.01)	0.04***	(0.06)
Panel C: ICT skill use at work						
Gender Gap	-0.27***	(0.02)	-0.25***	(0.02)	-0.14***	(0.02)
Years of education			0.07***	(0.01)	0.03***	(0.01)
test scores			Yes		Yes	
Controls for job char.	No		No		Yes	

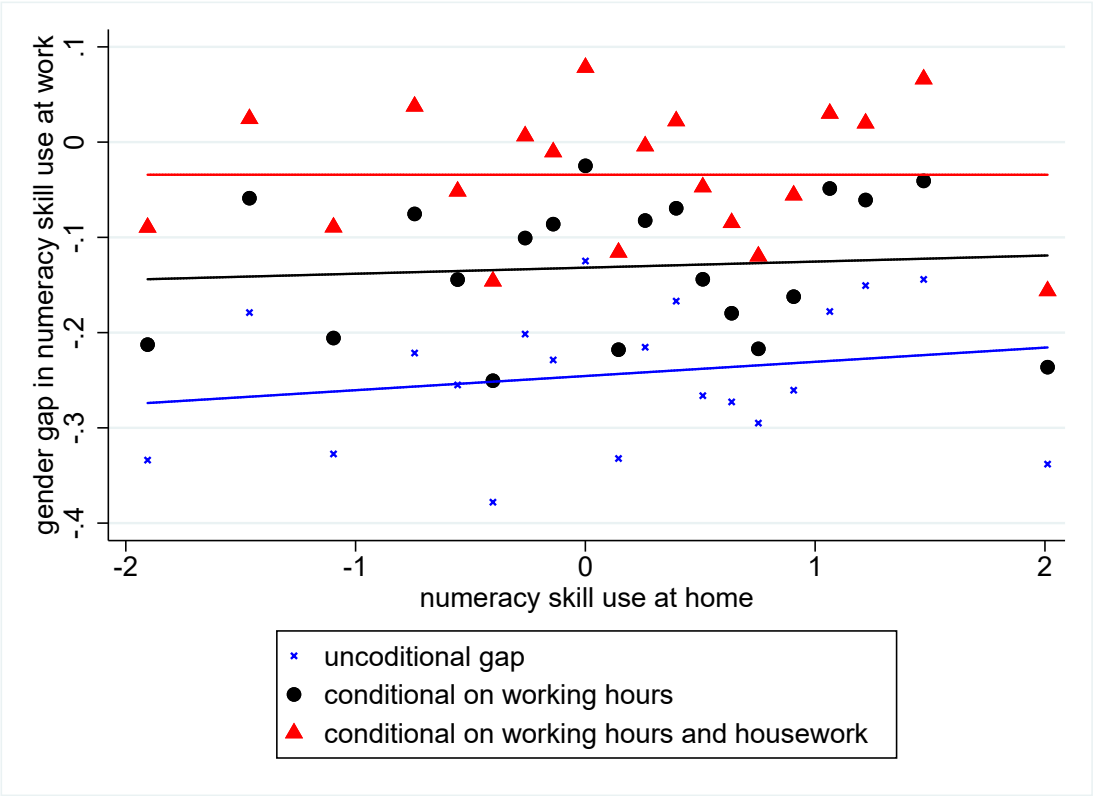
Results - activities at leisure time

	(1)	(2)	(3)
Panel A: Numeracy skill use at work			
Gender gap	-0.127***	-0.109***	-0.028
	(0.021)	(0.027)	(0.023)
Panel B: literacy skill use at work			
Gender gap	-0.162***	-0.138***	-0.033*
	(0.018)	(0.020)	(0.018)
Panel C: ICT skill use at work			
Gender gap	-0.093***	-0.031*	0.068***
	(0.019)	(0.018)	(0.016)
working hours	YES	YES	YES
housework		YES	YES
skill use in leisure time			YES
additional controls	YES	YES	YES

Robustness

- Working from home may be reported as skill use at leisure time
  - Results is the same for blue collar workers
  - Gender gap at work does not depend on skill use in leisure time
- Women may under-report the cognitive skill use
  - Some activities are made more often by women
  - Women use non-cognitive skills less often *(→ link)*
- Results are similar for every country, every occupation group and every educational level

Results - activities at leisure time



Proposed mechanism

Self-fulfilling equilibrium **Albenesi and Olivetti (2009)**

- Workers effort is unobservable and capacity constrained
- Employers assume that women make a larger share of housework/home production, and that they are less willing to make high effort at the workplace
- Women are assigned less skills intensive task

The prejudice is self-enforcing: women have lower incentives to make high effort at the workplace

- If skill use at work and at leisure time are substitutes than workplace discrimination leads to less skill use at leisure time

Alternative explanations (1)

Preferences of using skills

- women may prefer to use skills less often
- BUT: **no difference** in skill use in leisure time **among unemployed** *(→ link)*

Marginal cost of housework differs by gender

- Woman may suffer lower disutlitly from housework
  - Woman make higher effort in home production and they are *not able* to make high effort at the workplace
- BUT: family care make people tired as well *(→ link)*, still does not affect skill use at work *(→ link)*

Alternative explanations (2)

Discrimination based on skills

- Gender gap cannot be explained by differences in cognitive skills
- BUT: **No evidence of employer learning** (Altonji, Pierret, 2001) *(→link)*

Bargaining within households

- Men, who earn more than their spouse require more work at home
- BUT: Main results hold also on **single households** *(→link)*

Discrimination based on birth rate

- Women have lower expected tenure because of maternity leave
- BUT: **birth rate does not predict skill use** *(→link)*

Summary

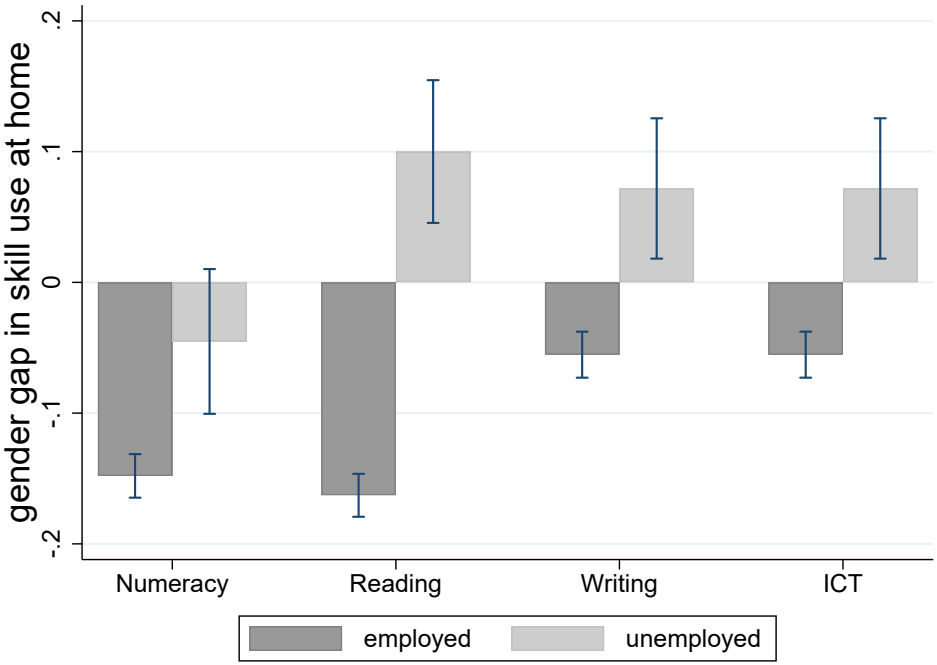
Using the PIAAC and ISSP survey we showed

1. Women use their cognitive skills less than man of the same occupation
2. Differences in cognitive test scores does not explain the gender gap in skill use
3. Activities in leisure time do explain the gender gap at the workplace

The results are in line with a self-fulfilling equilibrium with statistical discrimination

Thank you for attention

Gender gap in skill in leisure time



(→ back)

House work and family care (1)

	„never too tired to function in job"		„never too tired to concentrate"	
family care	*-0.002****	-0.002***	*-0.004****	*-0.004****
	(0.000)	(0.000)	*(0.000)*	*(0.000)*
houseowork	*-0.006****	-0.004***	*-0.002****	*-0.002****
	(0.001)	(0.001)	*(0.001)*	*(0.001)*
Controls		YES		YES

(→ back)

House work and family care (2)

	Numeracy skill use		*Literacy skill use*		*ICT skill use*	
female	*-0.028*	*-0.028*	*-0.033**	*-0.025*	*0.068****	*0.069****
	(0.023)	*(0.025)*	*(0.018)*	*(0.018)*	*(0.016)*	*(0.016)*
house work	*-0.005**	*-0.006***	*-0.004***	*-0.005***	*-0.010****	*-0.010****
	(0.002)	*(0.003)*	*(0.002)*	*(0.002)*	*(0.002)*	*(0.002)*
family care		*0.001*		*0.001*		*0.001*
		(0.001)		*(0.001)*		*(0.001)*
Controls	YES	YES	YES	YES	YES	YES

(→ back)

Discriminative assumption about skills

	Numeracy skill use		*Literacy skill use*		*ICT skill use*	
years of educ.	*0.029****	*0.029****	*0.074****	*0.074****	*0.067****	*0.067****
	(0.005)	*(0.005)*	*(0.005)*	*(0.005)*	*(0.005)*	*(0.005)*
female	*-0.348****	*-0.352****	*-0.288****	*-0.291****	*-0.303****	*-0.310****
	(0.040)	*(0.040)*	*(0.042)*	*(0.044)*	*(0.038)*	*(0.039)*
experience	*0.004***	*0.004***	*-0.000*	*-0.000*	*0.003*	*0.003**
	(0.002)	*(0.002)*	*(0.002)*	*(0.002)*	*(0.002)*	*(0.002)*
*female*exp.*	*-0.001*	*-0.001*	*0.008****	*0.008****	*-0.001*	*-0.001*
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.002)*	*(0.002)*
num. test score	*0.137****	*0.129****	*-0.012*	*-0.025*	*0.007*	*-0.011*
	(0.033)	*(0.045)*	*(0.025)*	*(0.048)*	*(0.034)*	*(0.046)*
*num. score*exp.*		*0.000*		*0.001*		*0.001*
		(0.002)		*(0.002)*		*(0.002)*
literacy score	*-0.053*	*-0.071*	*0.037*	*0.046*	*0.043*	*0.024*
	(0.033)	*(0.052)*	*(0.023)*	*(0.044)*	*(0.029)*	*(0.048)*
*lit. score*exp.*		*0.001*		*-0.001*		*0.001*
(→ back)		*(0.003)*		*(0.002)*		*(0.002)*

Discrimination based on birth rates

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Numeracy skill use		Literacy skill use		ICT skill use	
Gender gap	-0.31***	-0.14***	-0.35***	-0.19***	-0.34***	-0.16***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)
Fertility rate	0.52	1.13***	-1.66***	1.41***	0.1	1.06***
	(0.37)	(0.37)	(0.37)	(0.43)	(0.39)	(0.38)
Fert. rate*woman	-0.19	-0.82**	0.98*	-0.68	1.79***	0.85*
	(0.52)	(0.40)	(0.50)	(0.49)	(0.49)	(0.46)
Controls		YES		YES		YES

Note: fertility rate is 0.03 *(→ back)*

Gender gap in skill use - single households

	(4)	(5)	(6)
Panel A: Numeracy skill use at work			
Gender gap	-0.177***	-0.164***	-0.161***
	(0.034)	(0.033)	(0.033)
Panel B: literacy skill use at work			
Gender gap	-0.206***	-0.198***	-0.090***
	(0.033)	(0.032)	(0.030)
Panel C: ICT skill use at work			
Gender gap	-0.010	0.004	0.098***
	(0.033)	(0.033)	(0.032)
working hours	YES	YES	YES
housework		YES	YES
skill use in leisure time			YES
additional controls	YES	YES	YES

(→ back)

Non-cognitive skill use

	(1)		(2)		(3)	
Panel A: use of planning skills at work						
	coeff.	(s.e.)	coeff.	(s.e.)	coeff.	(s.e.)
Gender Gap	-0.04*	(0.02)	-0.06***	(0.02)	0.035*	(0.02)
Years of education			0.03***	(0.01)	0.01	(0.01)
Panel B: use of influencing skills at work						
Gender Gap	-0.22***	(0.03)	-0.22***	(0.03)	-0.18***	(0.02)
Years of education			0.07***	(0.01)	0.02***	(0.00)
Panel C: use of task discretion at work						
Gender Gap	-0.05**	(0.02)	-0.05**	(0.02)	-0.12***	(0.02)
Years of education			0.05***	(0.01)	0.02***	(0.01)
Panel D: learning at work						
Gender Gap	-0.021	(0.022)	-0.03	(0.02)	-0.06**	(0.02)
Years of education			0.02***	(0.01)	0.01*	(0.01)
test scores			Yes		Yes	
Controls for job char.	No		No		Yes	

(→ back)