

# The Gender Pay Gap: Micro Sources and Macro Consequences

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# Introduction

# Introduction

- Literature on gender pay gaps across countries: USA: Blau and Kahn (2017), Denmark: Kleven, Landais, and Sogaard (2019)
- Does the observed gender pay gap reflect
  - gender-specific preferences over jobs or
  - barriers in the labor market?
- Worker side:
  - Higher WTP for jobs with amenities by women (Wiswall and Zafar, 2019)
  - Ability heterogeneity (Kleven, Landais, and Sogaard, 2017)
- Firm side:
  - Gender-specific value added (taste-based discrimination) (Becker, 1971)
  - Gender-specific comparative advantages (statistical discrimination) (Arrow, 1971)
  - Productivity heterogeneity (Burdett and Mortensen, 1998)

## Contribution

- **This paper:** provides a tractable GE model with
  - Employer productivity differences (Burdett and Mortensen, 1998)
  - Gender-specific compensating differentials (Goldin, 2014)
  - Statistical discrimination based on expected employment transitions (Arrow, 1971)
  - Taste-based discrimination (Becker, 1971)
- **Provides:**
  - Equilibrium wage equation with log-decomposition of worker component + gender-specific employer component
  - Recovered employers' preferences over gender
  - Dispersion in amenities between men and women
- **Counterfactual analysis:**
  - Compensating differentials explain 18% of gender pay gap.
  - Output and welfare gains of 3% in gender-neutral world.

# Model

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# Model

Need the following ingredients:

- Some employees prefer works that do not pay higher.
  - Workers value amenities in addition to pay. Lamadon, Mogstad, and Setzler (2019)
- Differences in pay and amenities across employers.
  - Frictional labor market with job search. Sebastian and Porzio (2019)
- Gender differences in pay, preference for amenities, and employment within a firm.
  - Gender-specific wages, amenities, and job vacancies.

## Worker: Job Search

- While employed, workers receive the following flow utility:

$$x = \underbrace{w}_{\text{wage}} + \underbrace{\pi}_{\text{amenity}}$$

- Workers differ by group  $g \in \{M, F\}$  with different
  - Ability  $a \in [\underline{a}, \bar{a}]$  with measure  $\mu_{a,g}$
  - Flow utilities while unemployed  $b_{a,g}$
  - Job arrival rates  $\lambda_{a,g}^U$  (unemployed),  $\lambda_{a,g}^E$  (employed)
  - Mandatory job offer arrival rates  $\lambda_{a,g}^G$  for both states
  - Unemployment rates  $\delta_{a,g}$
  - Job offers  $F_{a,g}(x)$ , endogenously determined by firms

## Worker: Value Functions

- The value of an employed worker of type  $(a, g)$  in a job with flow utility  $x$  and discount rate  $\rho$  is then:

$$\begin{aligned}\rho S_{a,g}(x) = & x + \lambda_{a,g}^E \int_{x' \geq x} [S_{a,g}(x') - S_{a,g}(x)] dF_{a,g}(x') \\ & + \lambda_{a,g}^G \int_{x'} [S_{a,g}(x') - S_{a,g}(x)] dF_{a,g}(x') \\ & + \delta_{a,g} [W_{a,g} - S_{a,g}(x)].\end{aligned}$$

- Likewise, the value of an unemployed worker is:

$$\begin{aligned}\rho W_{a,g} = & b_{a,g} + \\ & \left( \lambda_{a,g}^U + \lambda_{a,g}^G \right) \int_{x'} \max \{ S_{a,g}(x') - W_{a,g}, 0 \} dF_{a,g}(x').\end{aligned}$$



## Firm: Profits

- Firms deliver value to workers by  $w_{a,g}$  and  $\pi_{a,g}$ 
  - Assume the cost of producing amenities differs:  $c_{a,g}^\pi(\pi_{a,g})$
  - The cost of posting job vacancy also differs:  $c_{a,g}^v(v_{a,g})$

- Production technology is linear:

$$\left(p, \{l_{a,g}\}_{a,g}\right) = p \sum_{g=M,F} \int_a a l_{a,g} da.$$

- Allow gender wedge (Becker, 1971):  $z_{a,g} = \mathbf{1}[g = F]z_a$
- Hence the value for firm  $\theta = (p, \{z_a\}_a, \{c_{a,g}^{v,0}\}_{a,g}, \{c_{a,g}^{\pi,0}\}_{a,g})$  is

$$\rho\Pi(\theta) = \max_{\{w,\pi,v\}} \sum_{g=M,F} \int_a \underbrace{[pa - w_{a,g} - c_{a,g}^\pi(\pi_{a,g})]}_{\text{per-worker profit}} - \underbrace{z_{a,g}}_{\text{gender wedge}} \underbrace{l_{a,g}}_{\text{job post cost}}(w_{a,g}, \pi_{a,g}, v_{a,g}) da$$

## Matching

- Cobb-Douglas matching function:

$$M(u_{g,a}, V_{g,a}) = \chi_{a,g} \underbrace{\left[ \mu_{a,g} \left[ u_{a,g} + s_{a,g}^E (1 - u_{a,g}) + s_{a,g}^G \right] \right]}_{\text{job searchers}}^{1-\alpha} \underbrace{V_{g,a}^\alpha}_{\text{vacancies}}$$

- Firm job-filling rates:

$$q_{a,g} = \chi \left( \frac{\mu_{a,g} \left[ u_{a,g} + s_{a,g} (1 - u_{a,g}) + s_{a,g}^G \right]}{V_{a,g}} \right)^{1-\alpha}$$

- Worker job-finding rates:

$$\lambda_{a,g}^U = \chi \left[ V_{a,g} / \left( u_{a,g} + s_{a,g} (1 - u_{a,g}) + s_{a,g}^G \right)^\alpha \right]$$

$$\lambda_{a,g}^E = s_{a,g}^E \lambda_{a,g}^U, \lambda_{a,g}^G = s_{a,g}^G \lambda_{a,g}^U$$

- $s_{a,g}^E, s_{a,g}^G$ : relative hazards of regular/mandatory on-the-job offers.

# Equilibrium and Counterfactuals

# Data

- *Relação Anual de Informações Sociais (RAIS)*
  - Establishment-level linked employer-employee data for all tax-registered firms
  - Data from 2007 to 2014 (due to recession in 2014)
  - Contains details on reasons/lengths of worker absences
- Focus on formal sectors with at least 10 employees
- Workers between the ages of 18 and 54, at least 1 hr/wk

## Equilibrium Wage

- Equilibrium wages can be written as

$$\ln w_{a,g} = \underbrace{\log a}_{\text{"worker FE"}} + \underbrace{\log(p - z_g - \text{constant}_g)}_{\text{"gender-firm FE"}},$$

- where  $\text{constant}_g$  depends on gender-specific amenity cost
- Discrimination ( $z$ ) & prod. differences ( $a$ ) survive with frictions.
- Even if  $z_g = 0$ , may pay women less due to compensating differential for amenities

# Sources of the Gender Wage Gap

Table 11. Equilibrium decomposition of gender pay gap

	Baseline	Counterfactuals			
	(0)	(1)	(2)	(3)	(4)
Gender differences in...					
...amenities	✓		✓	✓	
...employer wedges	✓	✓		✓	
...vacancy posting costs	✓	✓	✓		
Gender pay gap...	0.074	0.061	0.020	0.018	0.000
...between employers	0.055	0.056	0.047	0.016	0.000
...within employers	0.018	0.005	-0.026	0.002	0.000
Output	1.000	1.001	1.012	1.033	1.035
Worker welfare...	0.000	0.004	0.015	-0.004	0.027
...from payroll for women	0.000	0.010	0.026	0.019	0.029
...from amenity value for women	0.000	-0.006	-0.010	-0.022	-0.002
Payroll-equivalent welfare change	0.000	0.005	0.019	-0.004	0.033
Employer welfare...	1.000	0.997	1.011	0.986	1.039
...from profits	1.004	1.002	1.011	1.039	1.039
...from wedges	-0.004	-0.006	0.000	-0.053	0.000
Total employment for men	0.757	0.757	0.757	0.757	0.757
Total employment for women	0.760	0.759	0.762	0.760	0.757

## Sources of the Gender Wage Gap

- Roles of amenities, employer wedges, recruiting costs.
- Amenities explain 18% (1.3 log points) of gender pay gap.
- Both output and welfare gains from gender-neutral world

## Employer-Level Equal-Pay Policy

	Baseline	Equal-pay policy	Equal-hiring policy	Equal-amenity policy
	(0)	(1)	(2)	(3)
Gender pay gap...	0.074	0.057	0.049	0.125
between employers	0.055	0.057	0.002	0.138
within employers	0.018	0.000	0.047	-0.013
Output	1.000	1.000	0.979	1.000
Worker welfare	0.000	0.001	-0.038	0.000

- Equal-pay policy: constrain firms to set  $w_{a,M} = w_{a,F}$
- Equal-hiring policy is most distortionary.



# Takeaways

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A tractable GE model with gender-specific compensating differentials and search from linked employee-employer data.

- Compensating differentials explain 18% of gender pay gap.
- Output & welfare gains of 3 – 4% in gender-neutral world.
- Equal-pay (/ -hiring/ -amenities) policies mostly ineffective by GE forces, once worker abilities are taken into account.