The Misallocation of Women's Talent Across Countries

Oriana Bandiera (LSE)

with Nava Ashraf (LSE)

Virginia Minni (LSE)

Víctor Quintas-Martínez (MIT)

July 26, 2021

Women at Work

One of the surest ways to increase national income is to create (..) employment for women outside the home (Lewis 1954)

Women at Work

One of the surest ways to increase national income is to create (..) employment for women outside the home (Lewis 1954)

- most countries are far from gender parity in the allocation of work inside and outside the home
- huge advocacy, if not policy, effort to address this on equity grounds
- low FLFP might be symptomatic of misallocation that hampers growth (Lewis 54, Hsieh et al 19)

Can equality increase national income?

- answer depends on whether the returns to women's talent are higher in work outside relative to work inside the home
- these are unobservable and can produce observationally equivalent levels of FLFP

Can equality increase national income?

- answer depends on whether the returns to women's talent are higher in work outside relative to work inside the home
- these are unobservable and can produce observationally equivalent levels of FLFP
    - returns higher outside the home $\Rightarrow$ positive selection (high talent women work) $\Rightarrow$ increasing FLFP can increase equity and efficiency
    - returns higher at home $\Rightarrow$ negative selection (low talent women work outside the home) $\Rightarrow$ increasing FLFP cannot increase equity and efficiency

This paper

We use observable differences in earnings and FLFP to infer unobservable differences in selection and relative returns

1. We combine personnel data from a large MNE & FLFP data across 100 countries and 4 cohorts to sign selection
   - correlation between wage gap and FLFP informative of selection (Olivetti & Petrongolo 08)
2. We structurally estimate the firm pay policy parameters, back out the ability distribution, and evaluate policy counterfactuals
   - Complements individual countries studies (US: Mulligan and Rubinstein 08, Blau and Khan 06, UK: Blundell et al 08)
3. We use ORBIS data to assess whether the estimates are informative for other firms in the economy

Employees from a MNE

- Universe of white collar, regular employees from a large MNE, local employees only (not expats)
- Homogeneous workforce as standardized educational requirements upon entry (college degree)
- The majority of employees have a degree in business administration (50%) or engineering (20%)
- Typical jobs involve sales, product development, marketing and general managerial activities
- Annual compensation data 2015-2019

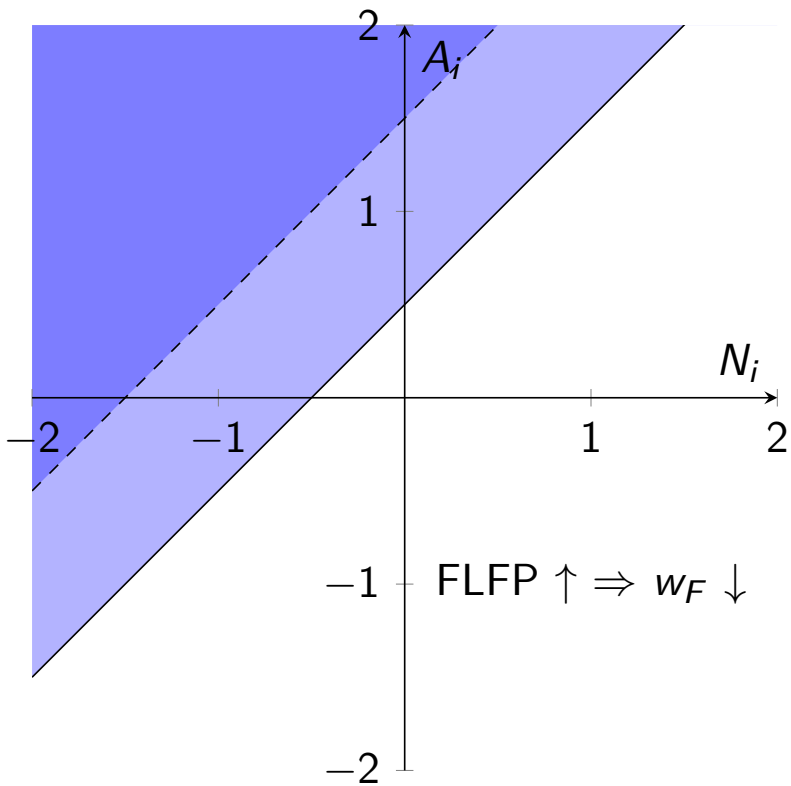
▸ Map

Through the lens of the Roy model

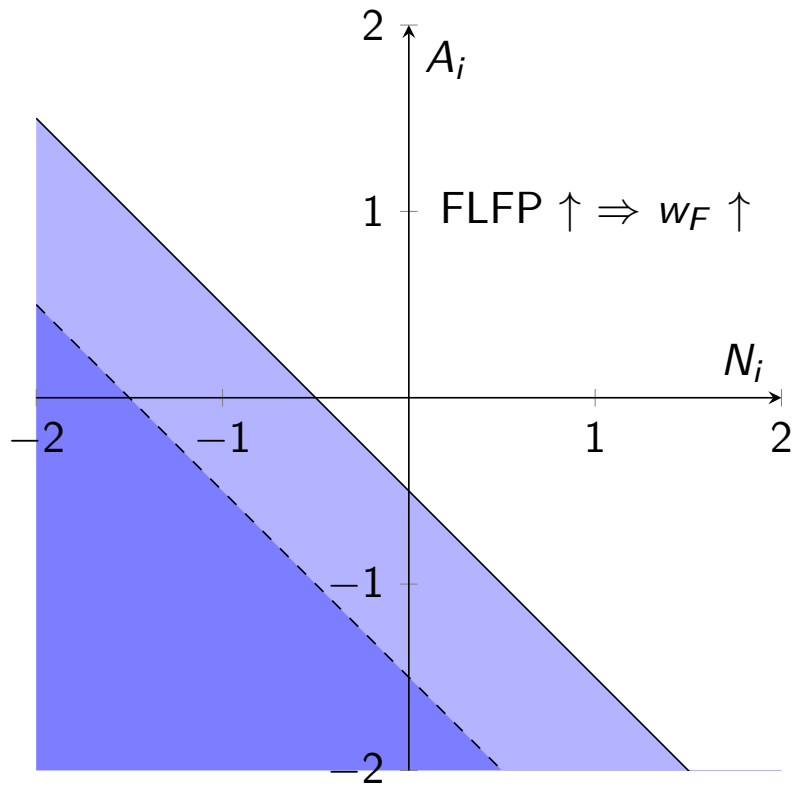
- there are two sectors: home and market
- people differ in skills/taste for the two sectors A_i, N_i, independently distributed N(0,1)
- (log)-wage in the market is $y^1 = \alpha^1 + \beta^1 A_i$ and the value of staying at home is $y^0 = \alpha^0 + \beta^0 A_i + \nu^0 N_i$
- individual i works iff $[(\alpha^1 - \alpha^0) + (\beta^1 - \beta^0)A_i] > \nu^0 N_i$
- positive selection iff $(\beta^1 > \beta^0)$

Selection, Visually

(a) Positive Selection –> as LFP increases the wage decreases



(b) Negative Selection –> as LFP increases the wage increases



Identification, Intuitively

- we know that if selection is positive, wage decreases as LFP increases
- if the converse is true, then the sign of the correlation btw FLFP and the wage gap will allow us to sign selection
- the model makes precise the conditions under which it is true

Identification, Algebraically

$$\mathbb{E}[y_F^1 \,|\, \text{empl'd}] - \mathbb{E}[y_M^1 \,|\, \text{empl'd}] = \overbrace{\alpha_F^1 - \alpha_M^1}^{\text{Differences in fixed pay}}$$

$$+ \overbrace{\beta^1(\beta^1 - \beta^0)/\sigma_\eta}^{\text{selection sign}} \quad \overbrace{[\lambda(\xi_F) - \lambda(\xi_M)]}^{\text{Differences in selection } (\downarrow \text{ in LFPR})}$$

(where $\xi = (\alpha^0 - \alpha^1)/\sigma_\eta$, $\sigma_\eta = \sqrt{(\beta^1 - \beta^0)^2 + (\nu^0)^2}$ and $\lambda(\cdot) = \phi(\cdot)/(1 - \Phi(\cdot))$ is the inverse Mills ratio)

Identifying assmpt: 1. Discrimination and LFP

$$\mathbb{E}[y_F^1 \,|\, \text{empl'd}] - \mathbb{E}[y_M^1 \,|\, \text{empl'd}] = \overbrace{\alpha_F^1 - \alpha_M^1}^{\text{Differences in fixed pay}}$$

$$+ \overbrace{\beta^1(\beta^1 - \beta^0)/\sigma_\eta}^{\text{selection sign}} \times \overbrace{[\lambda(\xi_F) - \lambda(\xi_M)]}^{\text{Differences in selection } (\downarrow \text{ in LFPR})}$$

The correlation btw difference in fixed pay and LFPR is not larger and opposite, e.g. rules out that women are more discriminated on wages in Sweden than in India (see Hyland et al., 2021)

Identifying assmpt: 2. Common returns

$$\mathbb{E}[y_F^1 \,|\, \text{empl'd}] - \mathbb{E}[y_M^1 \,|\, \text{empl'd}] = \overbrace{\alpha_F^1 - \alpha_M^1}^{\text{Differences in fixed pay}}$$

$$+ \overbrace{\beta^1(\beta^1 - \beta^0)/\sigma_\eta}^{\text{selection sign}} \times \overbrace{[\lambda(\xi_F) - \lambda(\xi_M)]}^{\text{Differences in selection } (\downarrow \text{ in LFPR})}$$

Returns are the same across the units used to identify them. Note difference between MNE & aggregate data

Identifying assmpt: 3. Selection and LFP

$$\mathbb{E}[y_F^1 \mid \text{empl'd}] - \mathbb{E}[y_M^1 \mid \text{empl'd}] = \overbrace{\alpha_F^1 - \alpha_M^1}^{\text{Differences in fixed pay}}$$

$$+ \overbrace{\beta^1(\beta^1 - \beta^0)/\sigma_\eta}^{\text{selection sign}} \times \overbrace{[\lambda(\xi_F) - \lambda(\xi_M)]}^{\text{Differences in selection } (\downarrow \text{ in LFPR})}$$

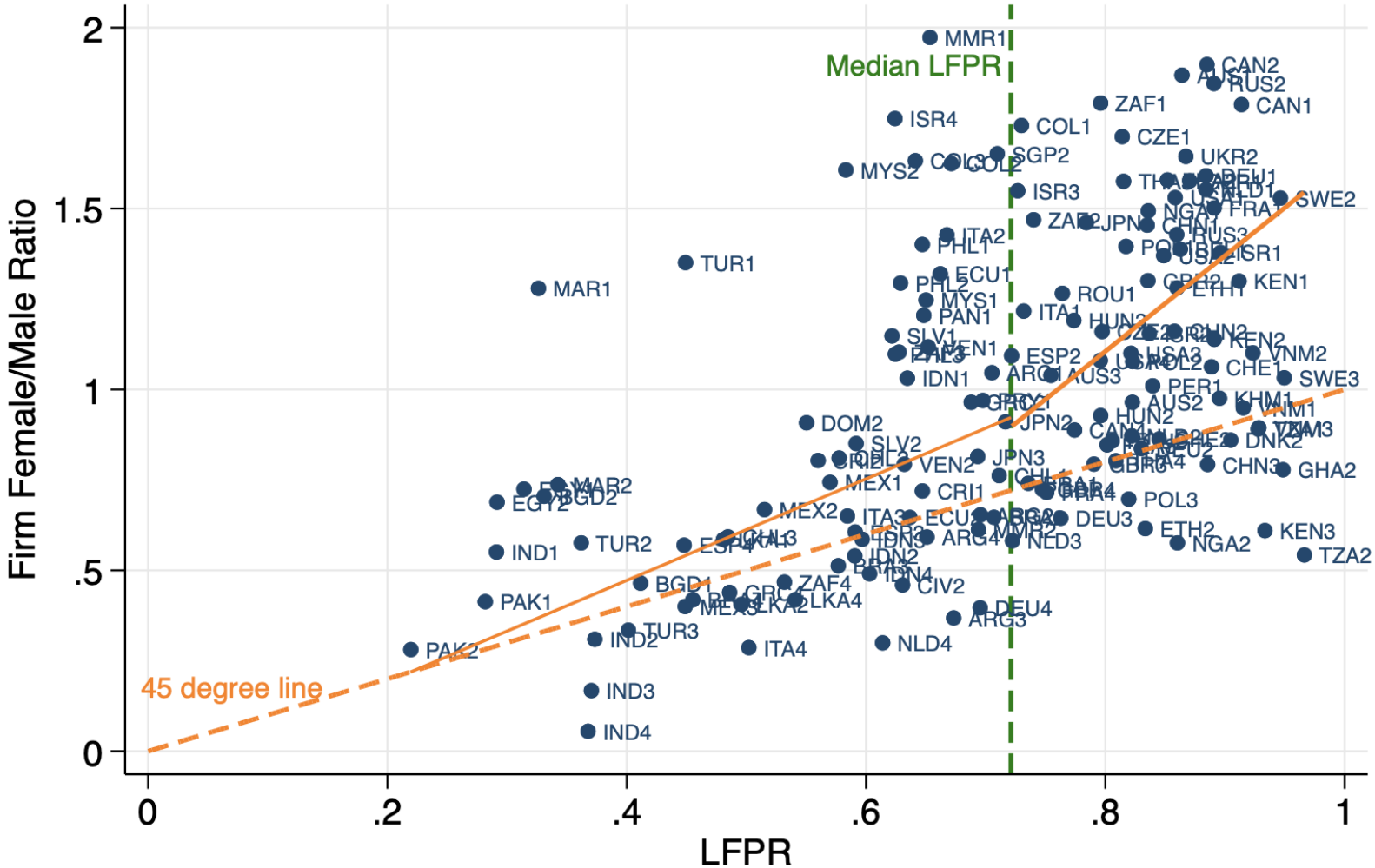
Selection into our firm reflects selection into the labor force at all levels of LFPR, e.g. rules out that women are more discriminated at the point of hiring in Sweden than in India

Selection into the Firm

Selection into firm mirrors selection into labor force if:

1. Men and women weakly prefer our firm to other firms
   - MNEs pay more: Hjort et al., 2020, Manelici et al., 2020 ▸ Wages
   - rules out that high ability individuals of one gender are not observed in the firm because they do not apply
2. The firm hiring policy does not mute variation in LFP
   - rules out that firm's selection policies (e.g. affirmative action) undo or reverse the gender ratio in LFP

Gender ratio in firm mirrors the country's



We cannot reject that the relation between the firm ratio and LFPR varies with the level of LFPR.
Firm F/M Share = a + b Below Median LFPR + c LFPR + d Below Median LFPR * LFPR + e
a= -1.01 (sd=0.86); b = 0.92 (sd=0.89); c = 2.65 (sd=1.04); d = -1.25 (sd=1.11)

Reduced form test

- we estimate

$$w_{iac} = \alpha LFPR_{ac} + \beta F_i + \gamma LFPR_{ac} F_i + \eta_c + \epsilon_{iac}$$

- where $LPFR$ is the ratio of female to male LFP, w is log wage of i in country c for age group a, $F_i = 1$ if i is female
- under H0: $\beta = 0$
- $\beta \geq 0 \implies$ +ve selection $\implies$ returns to talent higher outside
- $\beta \leq 0 \implies$ –ve selection $\implies$ returns to talent higher inside

▸ LHS: wage gap ▸ RHS: LFPR

Data is consistent with positive selection

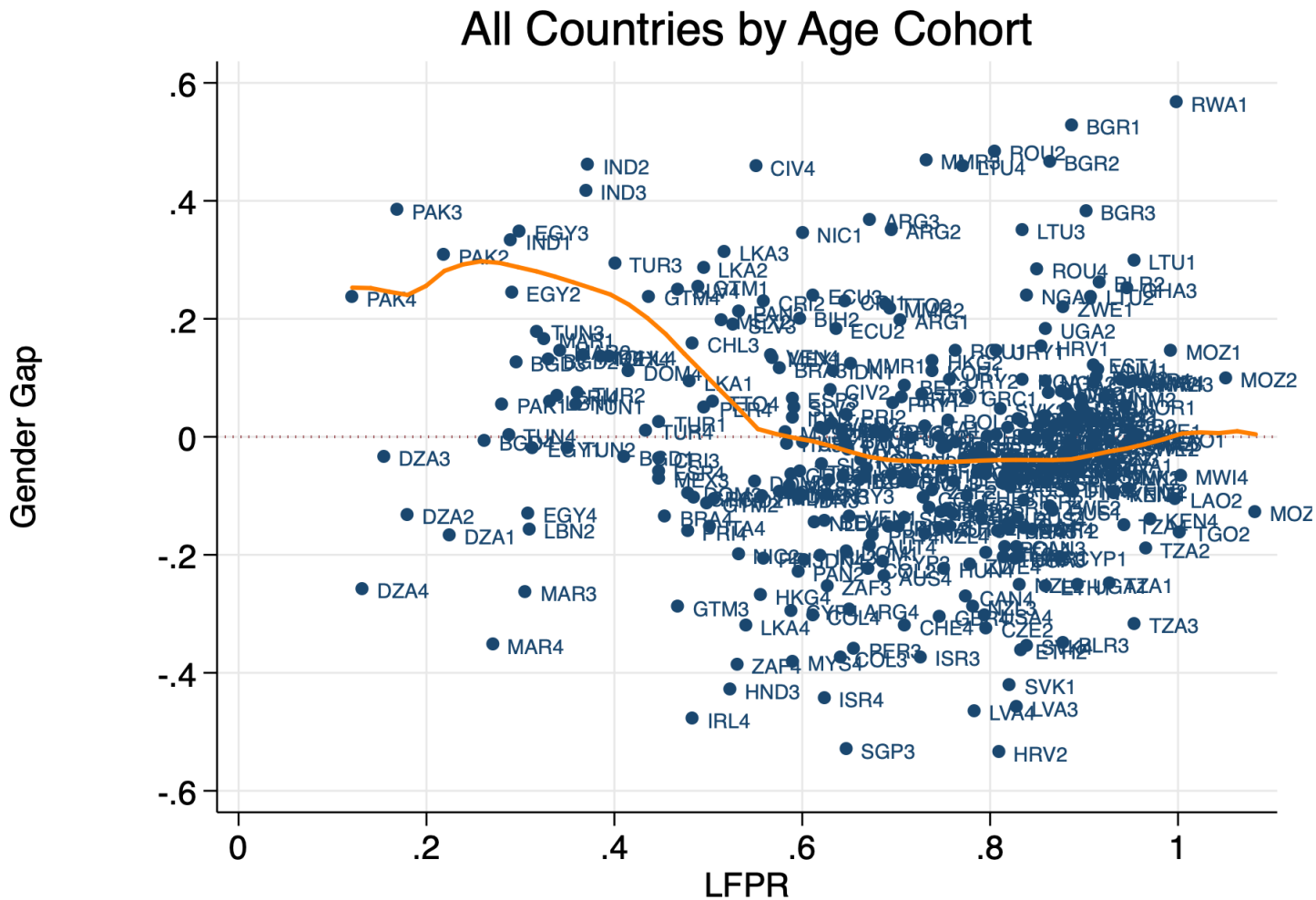


Figure: Gender wage gap and Female/Male LFP

▸ Within cohort ▸ Promotion Gap ▸ Country data (ILO)

Using within and between Country Variation (id.A2)

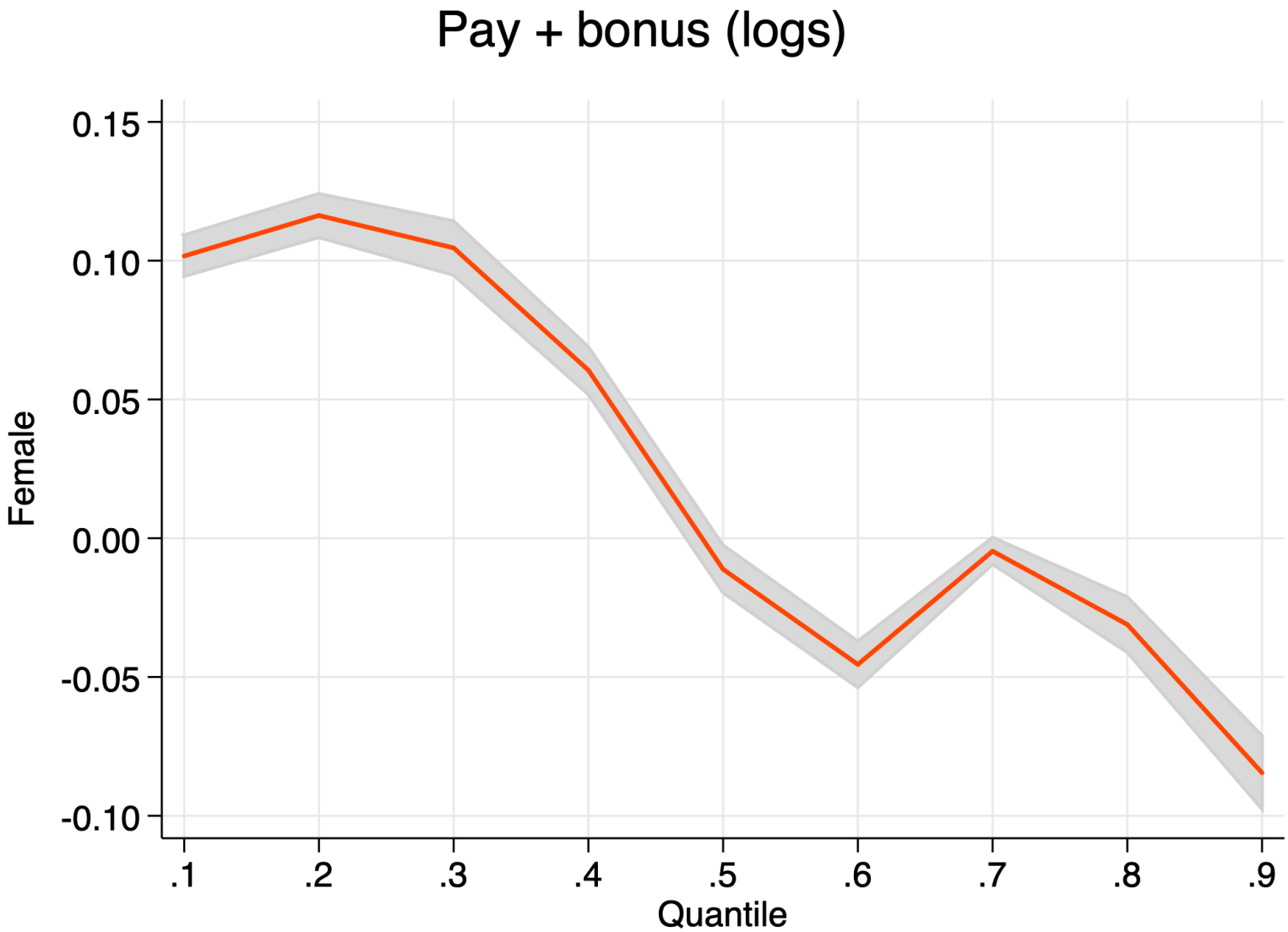
	Full Sample				New Hires
	(1)	(2)	(3)	(4)	(5)
	Pay + Bonus (logs)				
Female	0.377	0.256	0.253	0.197	0.210
	(0.142)	(0.0962)	(0.0941)	(0.0770)	(0.105)
LFPR	1.640	1.641	1.662	0.138	1.651
	(0.282)	(0.212)	(0.204)	(0.235)	(0.228)
Female × LFPR	-0.564	-0.471	-0.451	-0.376	-0.282
	(0.194)	(0.135)	(0.132)	(0.103)	(0.142)
Controls	No	Yes	Yes	Yes	Yes
Cohort FE	No	No	Yes	No	Yes
Country FE	No	No	No	Yes	No
N	303756	303756	303756	303756	63887
R-squared	0.116	0.285	0.307	0.540	0.334

Notes. An observation is a worker-year. Year FE are included in every specification. Controls include: tenure, tenure squared and function FE. The last column reports estimates when restricting the sample to employees with no more than 1 year of tenure. Standard errors clustered at the country-cohort level.

Consistent with individual country evidence (data imputation or selection models)

▸ Base pay only

Differences consistent with "higher bar" (id.A3)



Quantifying Misallocation Costs

- To quantify the cost of misallocation we need to know the counterfactual productivity of women outside the LFP — unobservable by definition

- We use variation in pay and LFP across countries and cohorts to estimate the Roy model and back out
  1. the distribution of men's and women's talent in the workforce
  2. misallocation

Assumptions: Types

- Individuals differ on two dimensions:
- **A1** Ability A_i determines productivity at work, where $A_i \sim \mathcal{N}(0,1)$ for every gender, cohort and country
- **A2** Preferences and homemaking skills, N_i determine their utility at home, $N_i \sim \mathcal{N}(0,1)$ for every gender, cohort and country

- As is standard in the misallocation literature (e.g. Hsieh et al., 2019) and supported by positive selection in the reduced-form evidence we assume that payoffs in market labor and home production are independent ($\beta^0 = 0$)

Assumptions: Wage Policy

A3 The firm's wage policy is (log-)linear in individual i's ability:

$$y^1_{igtac} = \alpha^1_{gtac} + \beta^1_{gtac} A_i$$

- α^1_{gtac} is the average wage for individuals of gender g, tenure level t, age cohort a and country c (so we allow for, e.g., country specific discrimination or differences in absolute advantage)
- β^1_{gtac} is the return to ability, it varies by tenure to allow for on-the-job learning to correlate with ability A_i
- Same structure in every country

Assumptions: Value of Staying at Home

A4 Worker i's value of staying out of the labor force is:

$$y^0_{igtac} = \alpha^0_{gtac} + \nu^0_{gtac} N_i,$$

- α^0_{gtac} captures the average value of staying out of the labor force for individuals in cell *gtac* (e.g. social norms)
- We interpret the gap $y^0_{Ftac} - y^0_{Mtac}$ as the cost of social norms
  - Equivalently, women pay a tax τ_{tac} when entering the labor force, proportional to their value of staying at home
  - Common in the literature to model discrimination as a tax, see Hsieh et al. (2019), Lee (2020)

Calibration

- Normalize $(\beta^1_{gtac})^2 + (\nu^0_{gtac})^2 = 1$
- The empirical equivalent of the following moments provides 3 equations in 3 parameters that can be solved exactly:
  1. LFP (probability of being employed):

$$LFP_{gac} = 1 - \Phi(\xi_{gac})$$

  2. Average observed log-wage (conditional on being employed):

$$\mathbb{E}[y^1_{igtac} \,|\, \text{empl'd }] = \alpha^1_{gtac} + (\beta^1_{gtac})^2 \lambda_{gac}$$

  3. Variance of the observed log-wage (conditional on being employed):

$$\text{Var}(y^1_{igtac} \,|\, \text{empl'd}) = (\beta^1_{gtac})^2 + (\beta^1_{gtac})^4 \left[\xi_{gac}\lambda_{gac} - \lambda^2_{gac}\right]$$

where $\xi_{gac} = \alpha^0_{gtac} - \alpha^1_{gtac}$ and $\lambda_{gac} = \phi(\xi_{gac})/(1 - \Phi(\xi_{gac}))$

▸ Goodness of Fit

Calibration

Parameters recap:

Param.	Interpretation	Empirical Target
α^0_{gtac}	Unconditional average value of staying at home	LFP
α^1_{gtac}	Unconditional average log-wage	Average observed log-wage (controlling for selection)
β^1_{gtac}	Returns to ability in the firm	Variance of the observed log-wage (controlling for selection)
ν^0_{gtac}	Dispersion of the idiosyncratic taste for staying at home	Not identified separately (Normalize $(\beta^1_{gtac})^2 + (\nu^0_{gtac})^2 = 1$)

Data

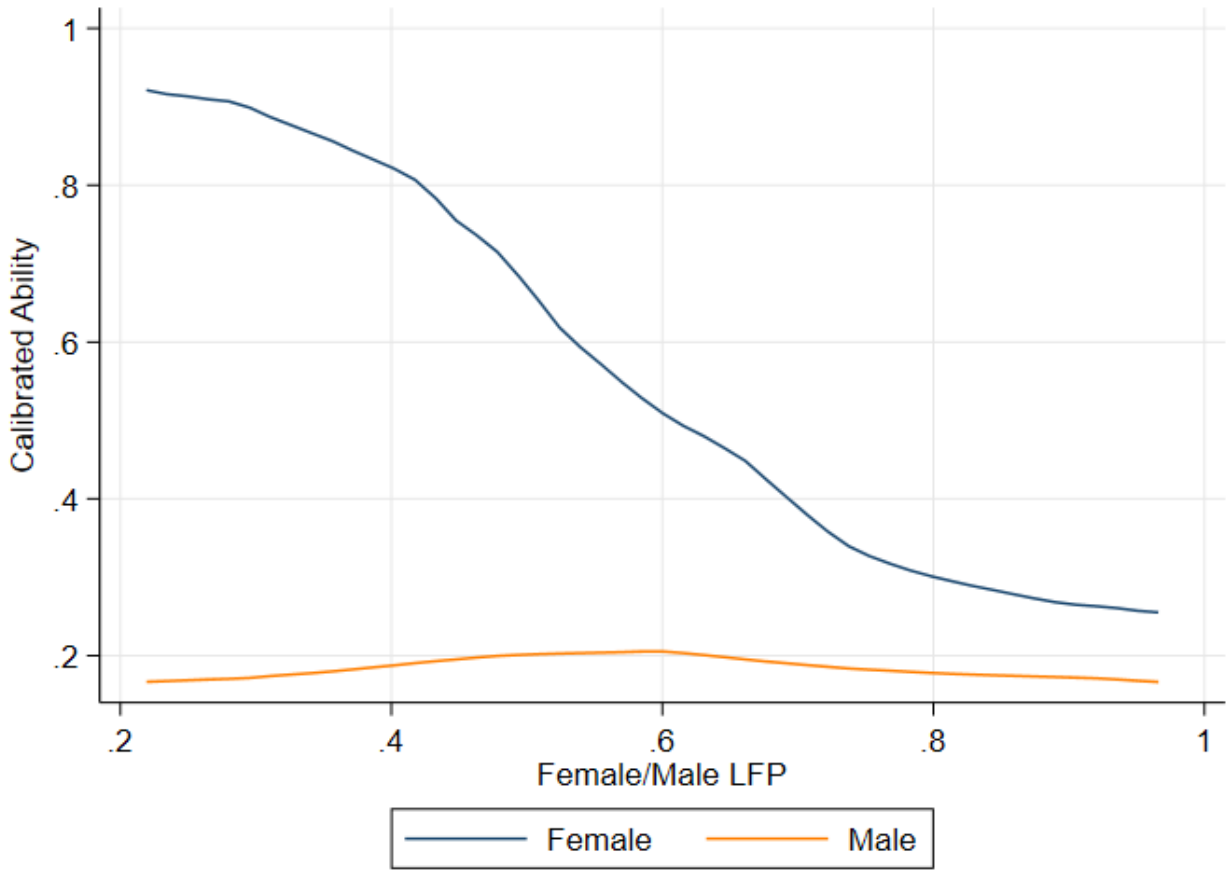
- We restrict the sample to country-cohort-gender-tenure cells with a minimum of 30 observations: 87,145 employees and 58 countries
- y^1_{igtac} is the residuals of a regression of log(pay) on year and function dummies
- We use LFP_{gac} labor force participation for gender g, cohort a, country c when cohort a entered the market (WB)
- Once we have calibrated our parameters, we can retrieve a measure of ability from the wage equation:

$$\widehat{A}_{it} = \frac{y^1_{igtac} - \widehat{\alpha}^1_{gtac}}{\widehat{\beta}^1_{gtac}}$$

- Note: $\widehat{A}_{it}$ also capture peer effects and other correlates of ability and productivity, if any

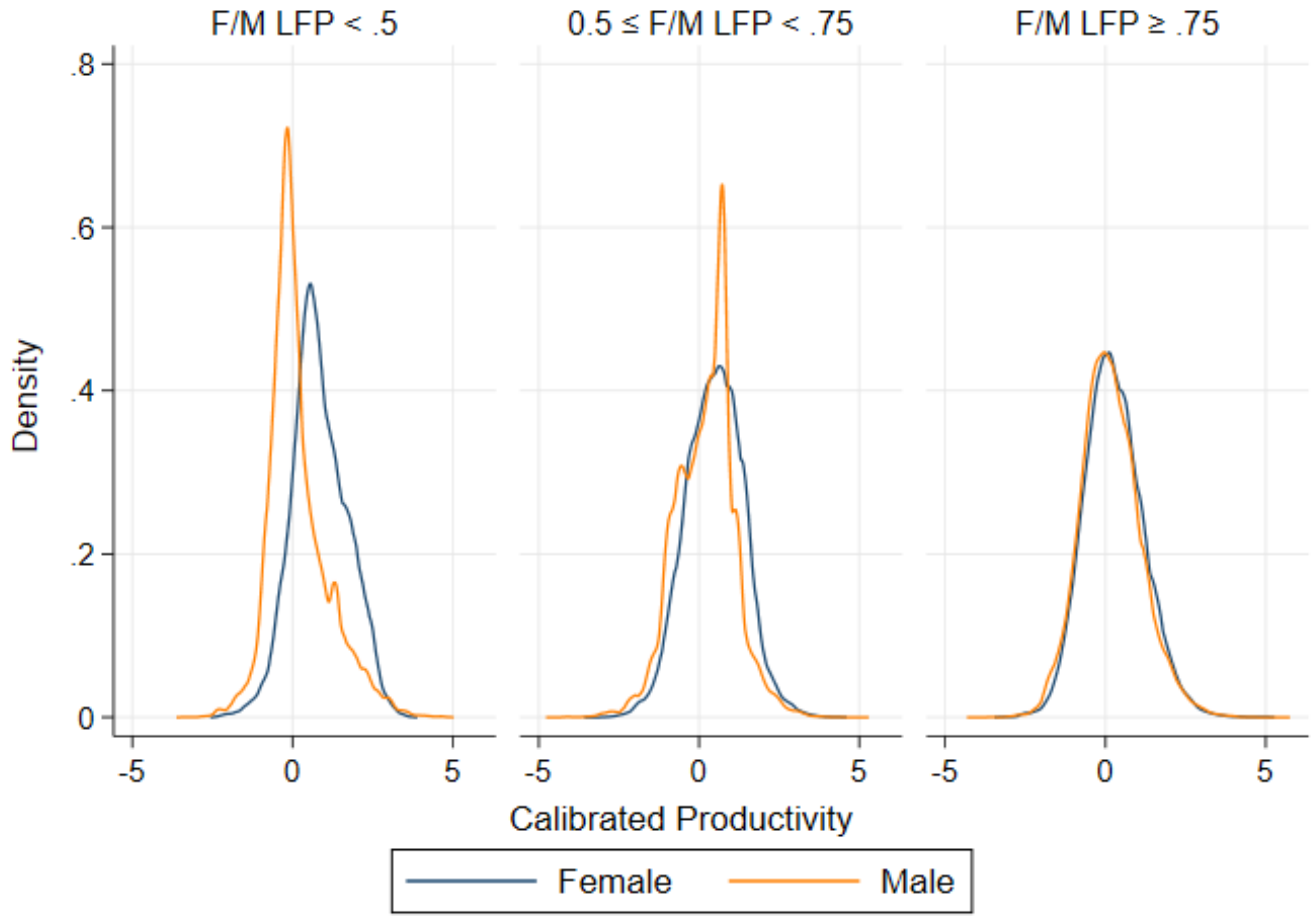
W's Mean Ability is always Higher and the Difference is Decreasing in LFPR

Figure: Calibrated Ability: Local Polynomial



This is Due to a Right Shift of the Entire Distribution but the Right Tail

Figure: Calibrated Ability: Density by LFP Group



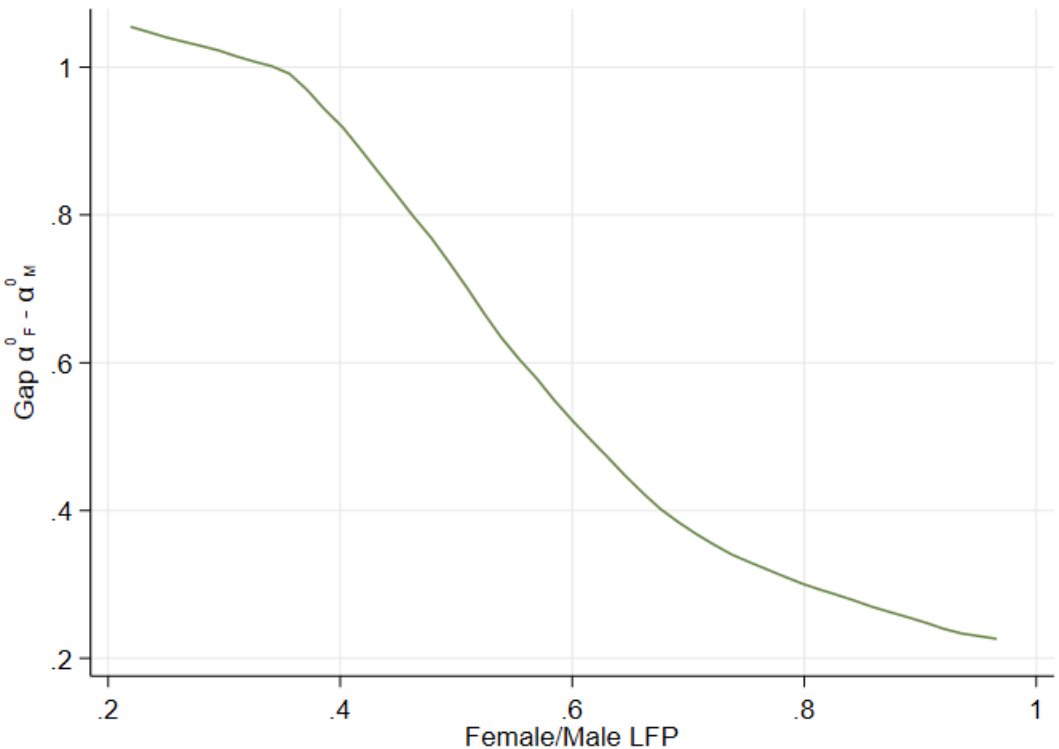
Validation and Implications

- our estimated ability measure correlates with other measures of performance ▸ appraisals ▸ wage growth ▸ sales productivity
- we find little evidence that estimated differences in ability are due to peer effects or the value of diversity per se ▸ peers
- correcting for differences in ability implies that wage gaps are even larger ▸ gap corrected

The Difference in Stay Home Payoff is Always Positive but Decreasing in LFPR

- Note: We interpret the difference $\alpha_F^0 - \alpha_M^0$ as the cost of social norms for the average woman ▸ correlation with norms

Figure: Calibrated $\alpha_F^0 - \alpha_M^0$: Local Polynomial



Could this be explained by differences in preferences?

- Our model assumes that the underlying distribution of A_i and N_i is the same for men and women, so that differences in LFP are due to cost of social norms
- Alternatively, we can ask ourselves how different the population mean N_i would have to be to justify the current LFP gap
- We derive this and show that it would have to be orders of magnitude larger than other estimates of gender differences in preferences (Falk et al 2018) ▸ Counterfactual N Gap

The Cost of Gender Norms

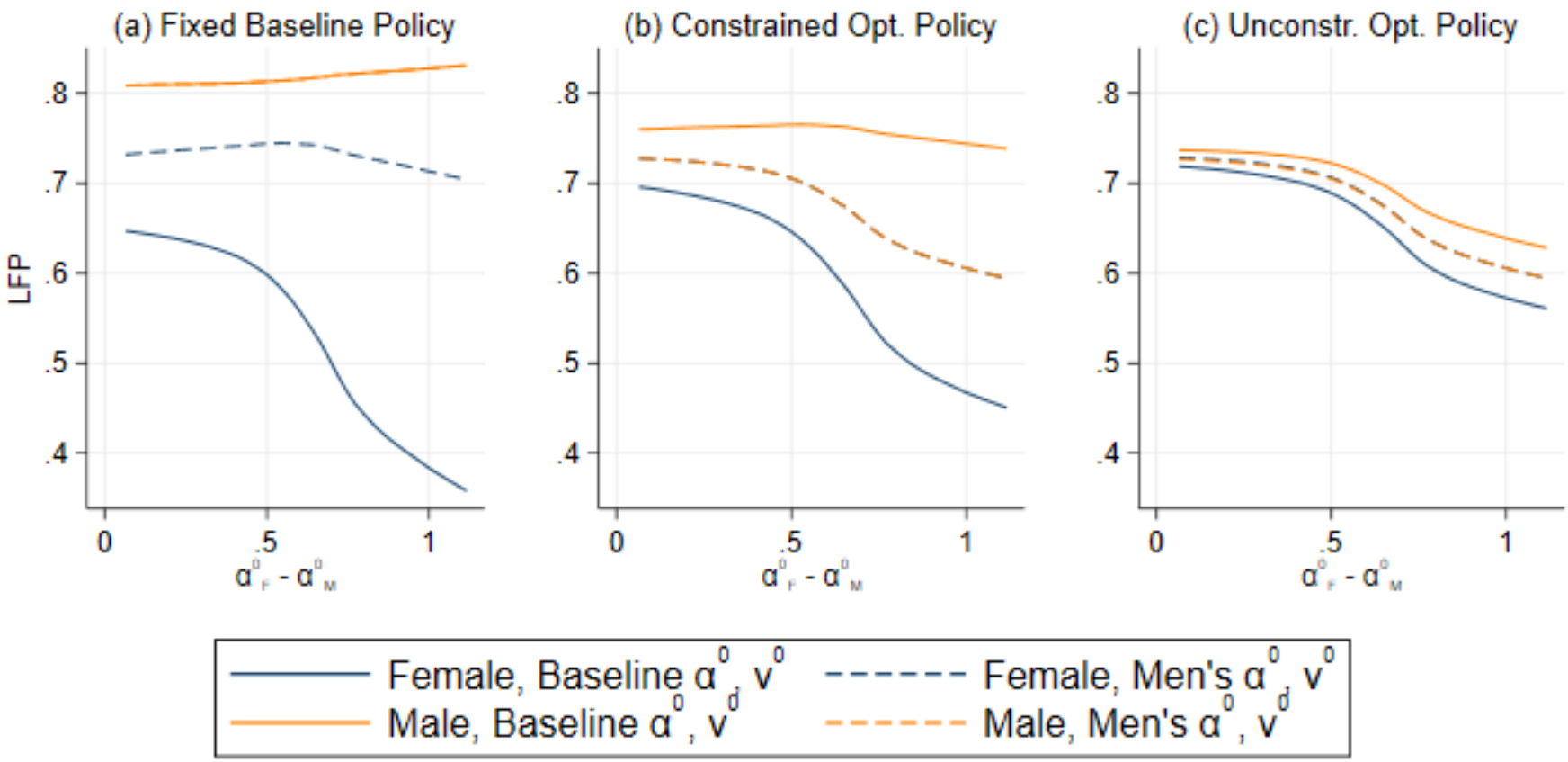
- To quantify the cost of gender norms, we consider a counterfactual in which we equate the parameters of the value of staying at home under three different wage policies at the firm:

Norms:	Consider impact of setting α_0, ν_0 at men's values (or, equivalently, the norm tax $\tau_{gac} = 0$)		
Wage Policy:	(a) Fixed Baseline	(b) Constr. Optimal	(c) Unconstr. Opt.
	Calibrated α^1, β^1	α^1, β^1 that maximize ability subject to: (i) Constant employment (ii) Constant wage bill (iii) Restriction on inequality between men and women	α^1, β^1 that maximize ability subject to: (i) and (ii)

▸ skip

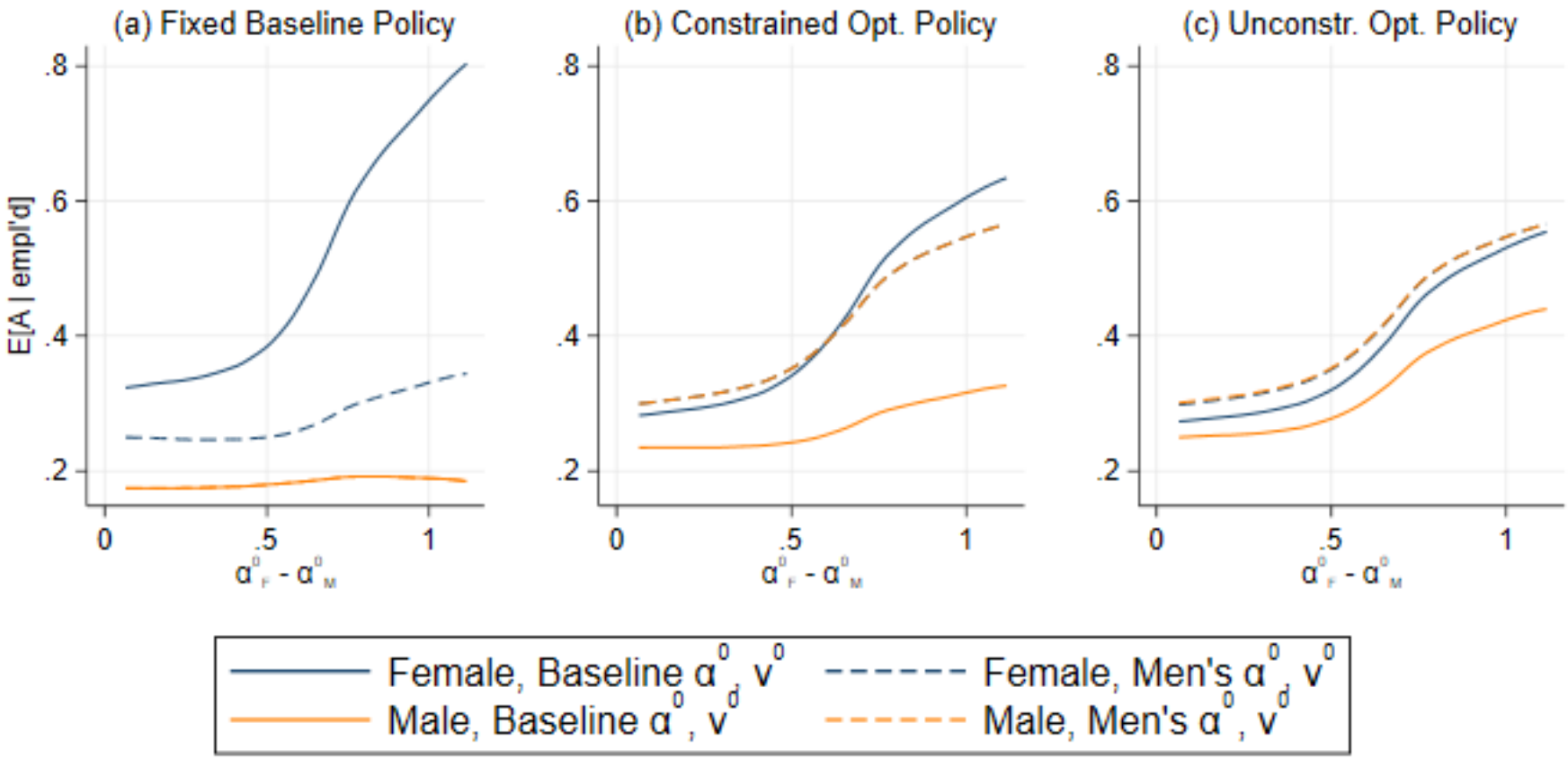
Eliminating gender norms: (1) LFP

Figure: LFP



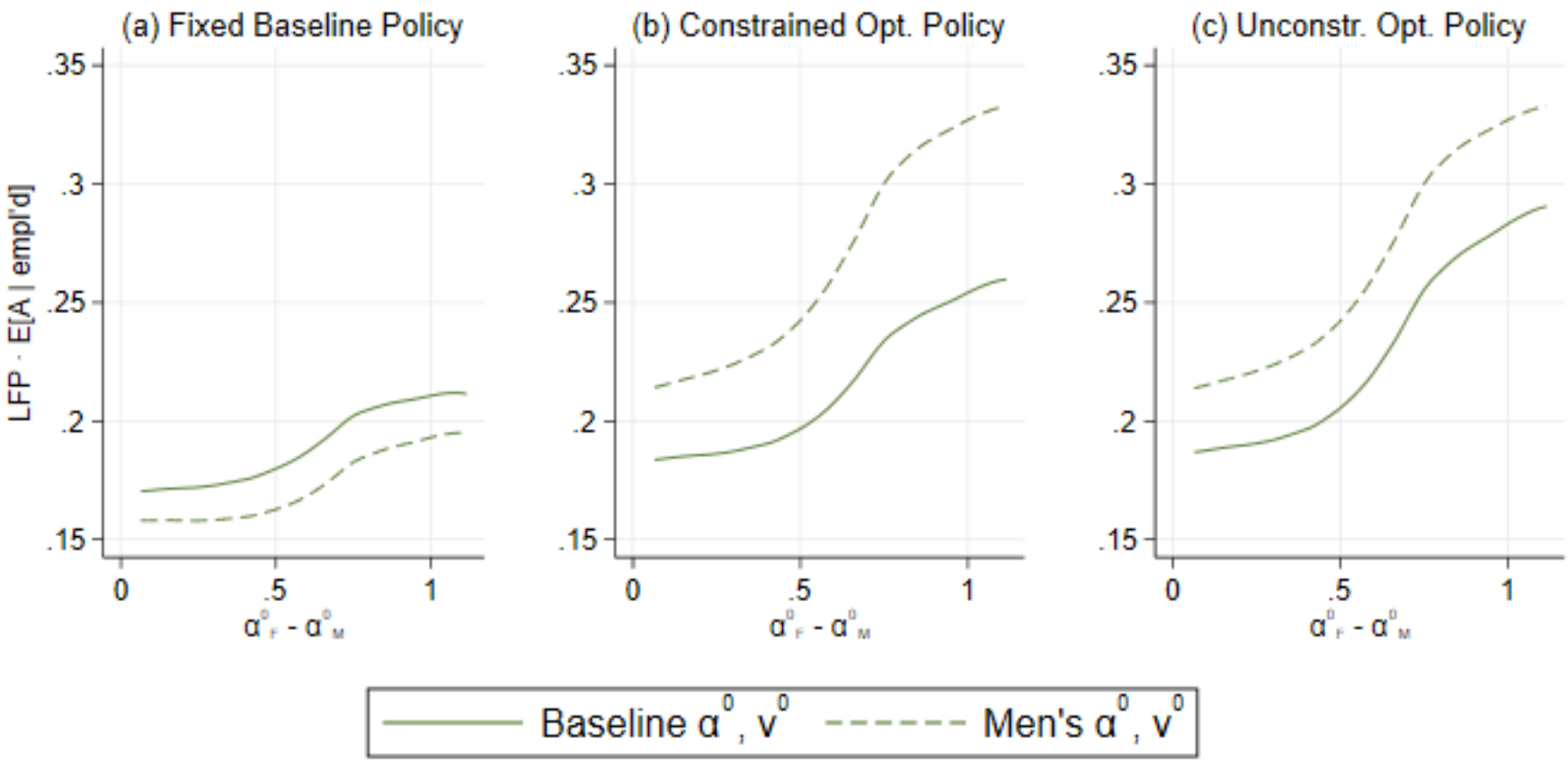
Eliminating gender norms: (2) Ability of the Average Employee

Figure: $\mathbb{E}[A \mid \text{empl'd}]$



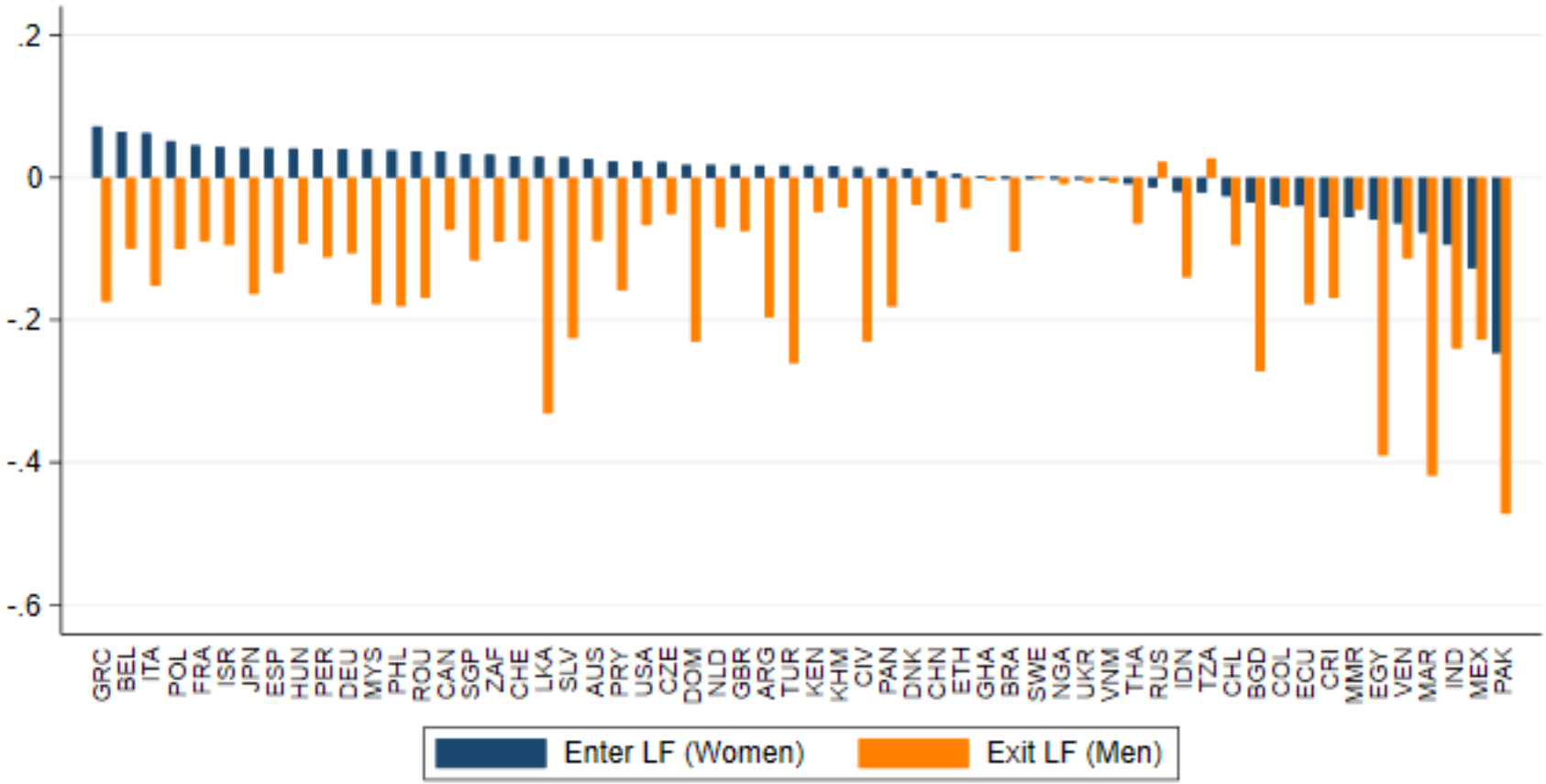
Eliminating gender norms: (3) Average Ability

Figure: $LFP \cdot \mathbb{E}[A \mid \text{empl'd}]$

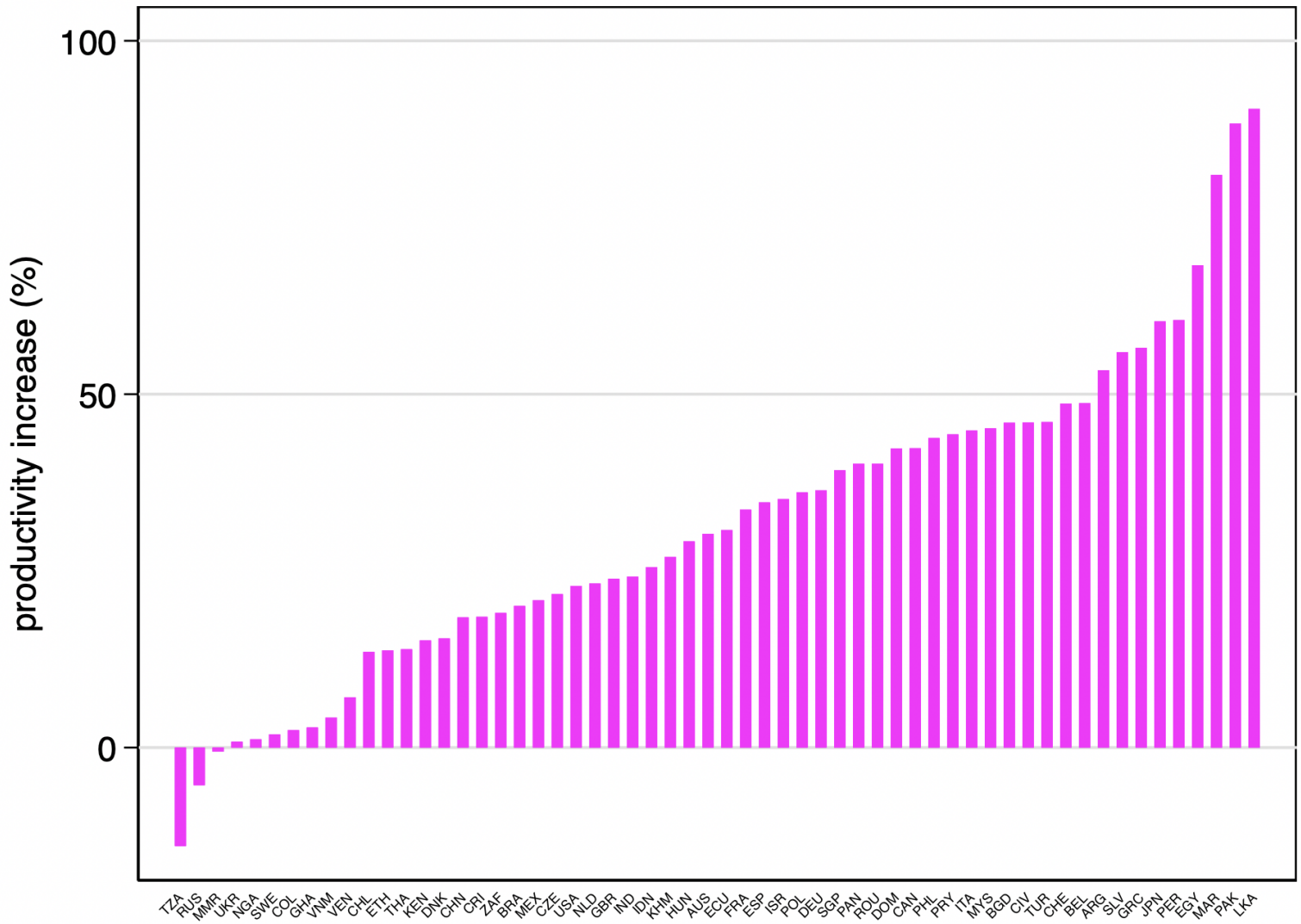


Average Ability of Entrants vs. Exiters

Figure: Average ability of entrants (blue) and exiters (orange)



Productivity gains by country (average 32%)



We use our model to assess the effect of:

- eliminating gender norms on the welfare of men and women

$\Rightarrow$ *types high A/N tend to gain & the extent to which pay parameters are constrained to be equal (more constr'd $\Rightarrow$ more losers)*

- equal pay parameters and labor regulation ▸ Labor laws

$\Rightarrow$ *these limit the firm's ability to reward talent and end up with the unintended effect of hurting the most talented*

▸ skip

Welfare Effects of Eliminating Gender Norms

- There are winners and losers of eliminating social norms
- In short, high ability women gain, low ability men lose. But also high N men gain

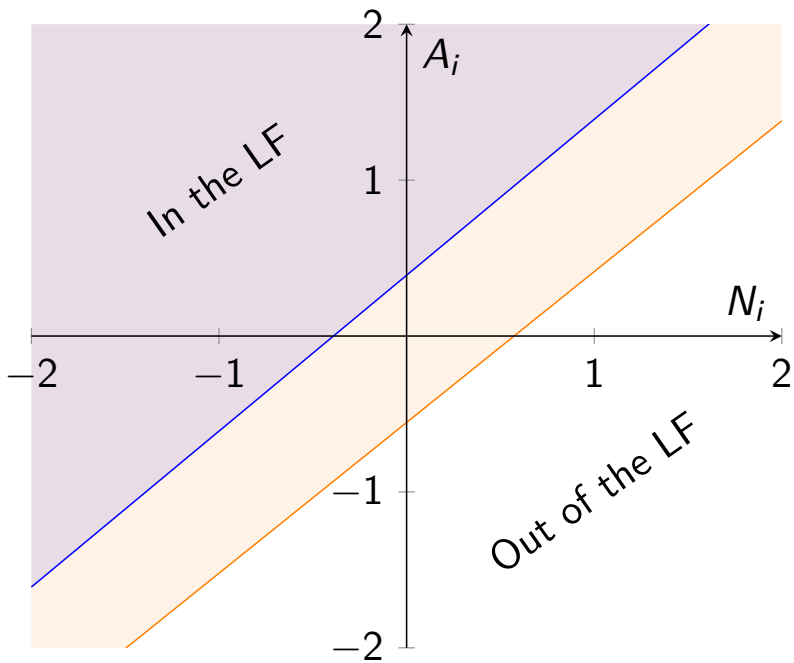
Welfare Effects of Eliminating Gender Norms: India vs. Sweden

- Participation frontier:

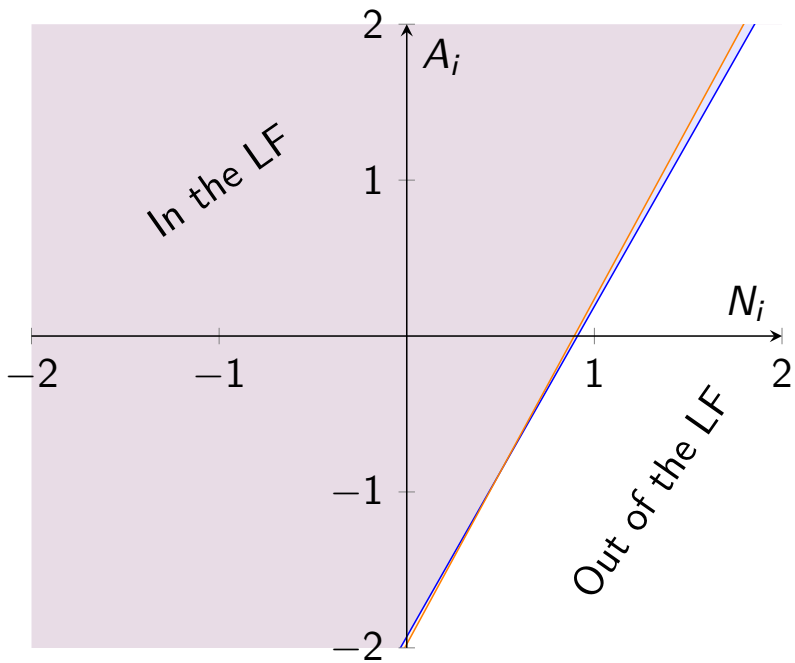
$$\beta^1 A_i - \nu^0 N_i \geq \alpha^0 - \alpha^1$$

- Example: India and Sweden under the constrained optimal policy (blue = Female, orange = Male)

(a) India



(b) Sweden



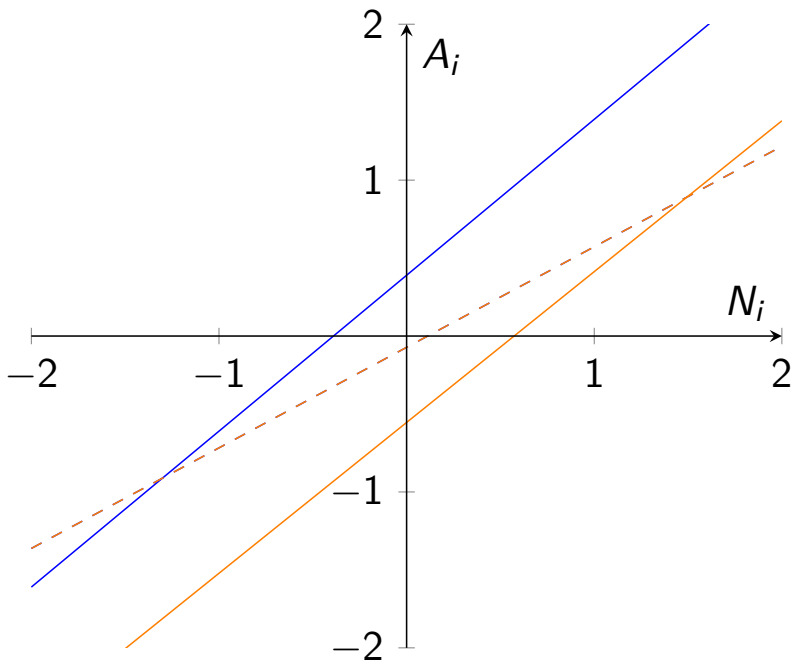
Welfare Effects of Eliminating Gender Norms: India vs. Sweden

- Participation frontier:

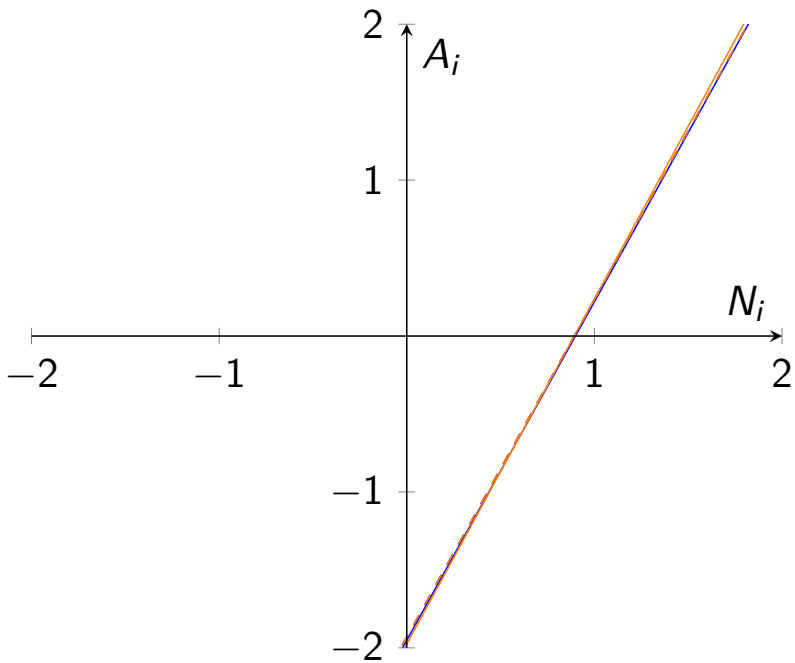
$$\beta^1 A_i - \nu^0 N_i \geq \alpha^0 - \alpha^1$$

- Example: Equating α_0, ν_0 under Constrained Optimal Policy (dashed line = new participation frontier)

(a) India



(b) Sweden



Welfare Effects of Eliminating Gender Norms: India

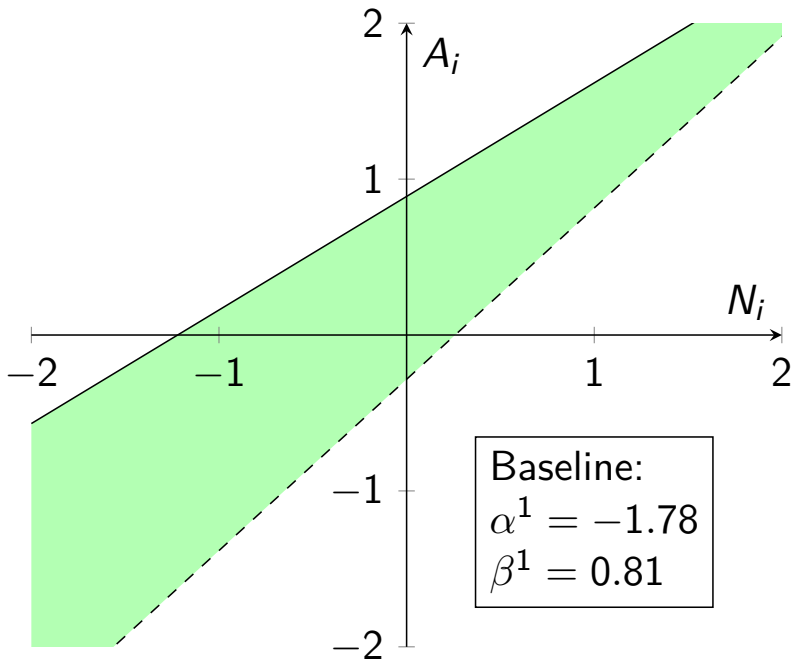
Table: Parameters

Home	$\alpha_F^0 = -1.06, \quad \nu_F^0 = 0.59, \quad \alpha_M^0 = -2.01, \quad \nu_M^0 = 0.89$		
Wage Policy	(a) Fixed Baseline α^1, β^1	(b) Constr. Optimal α^1, β^1	(c) Unconstr. Optimal α^1, β^1
Baseline α^0, ν^0	$\alpha_F^1 = -1.78$ $\beta_F^1 = 0.81$ $\alpha_M^1 = -1.13$ $\beta_M^1 = 0.45$	$\alpha_F^1 = -1.29$ $\beta_F^1 = 0.59$ $\alpha_M^1 = -1.50$ $\beta_M^1 = 0.92$	$\alpha_F^1 = -1.08$ $\beta_F^1 = 0.77$ $\alpha_M^1 = -1.84$ $\beta_M^1 = 0.85$
Men's α^0, ν^0	$\alpha_F^1 = -1.78$ $\beta_F^1 = 0.81$ $\alpha_M^1 = -1.13$ $\beta_M^1 = 1.38$	$\alpha_F^1 = -1.91$ $\beta_F^1 = 1.38$ $\alpha_M^1 = -1.91$ $\beta_M^1 = 1.38$	$\alpha_F^1 = -1.91$ $\beta_F^1 = 1.38$ $\alpha_M^1 = -1.91$ $\beta_M^1 = 1.38$

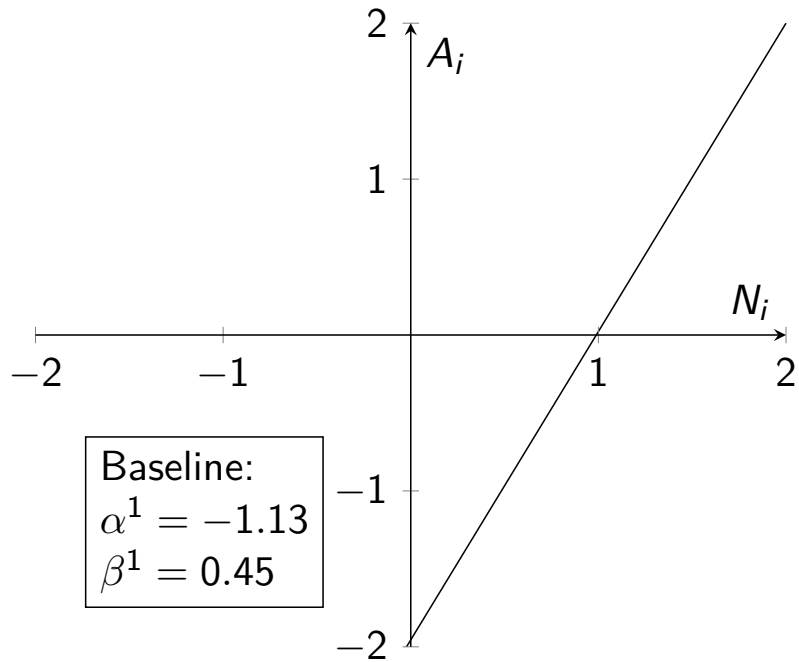
Welfare Effects of Eliminating Gender Norms: India

(a) Equating α^0, ν^0 under Fixed Baseline Policy (dashed line = new participation frontier)

(a) Females



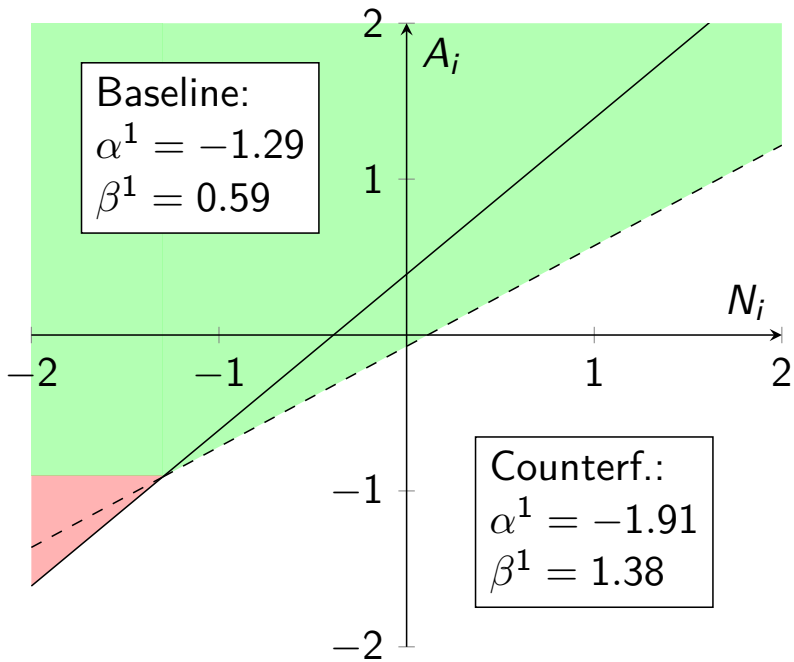
(b) Males



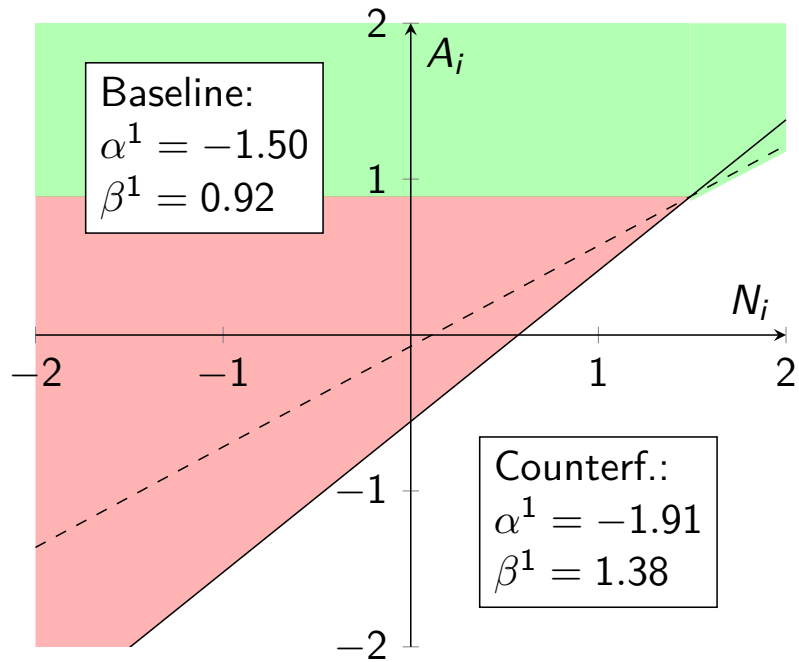
Welfare Effects of Eliminating Gender Norms: India

(b) Equating α^0, ν^0 under Constrained Optimal Policy (dashed line = new participation frontier)

(a) Females



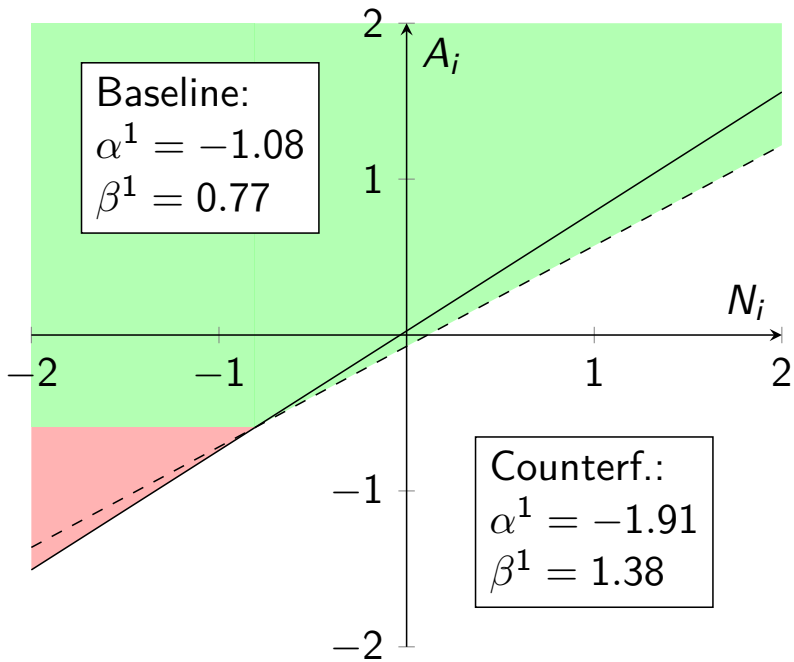
(b) Males



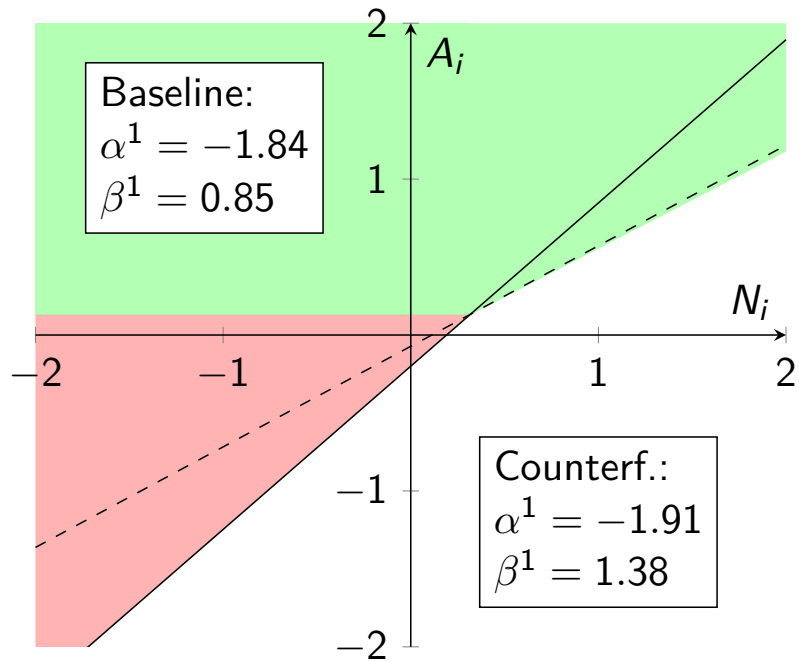
Welfare Effects of Eliminating Gender Norms: India

(c) Equating α^0, ν^0 under Unconstrained Optimal Policy (dashed line = new participation frontier)

(a) Females



(b) Males

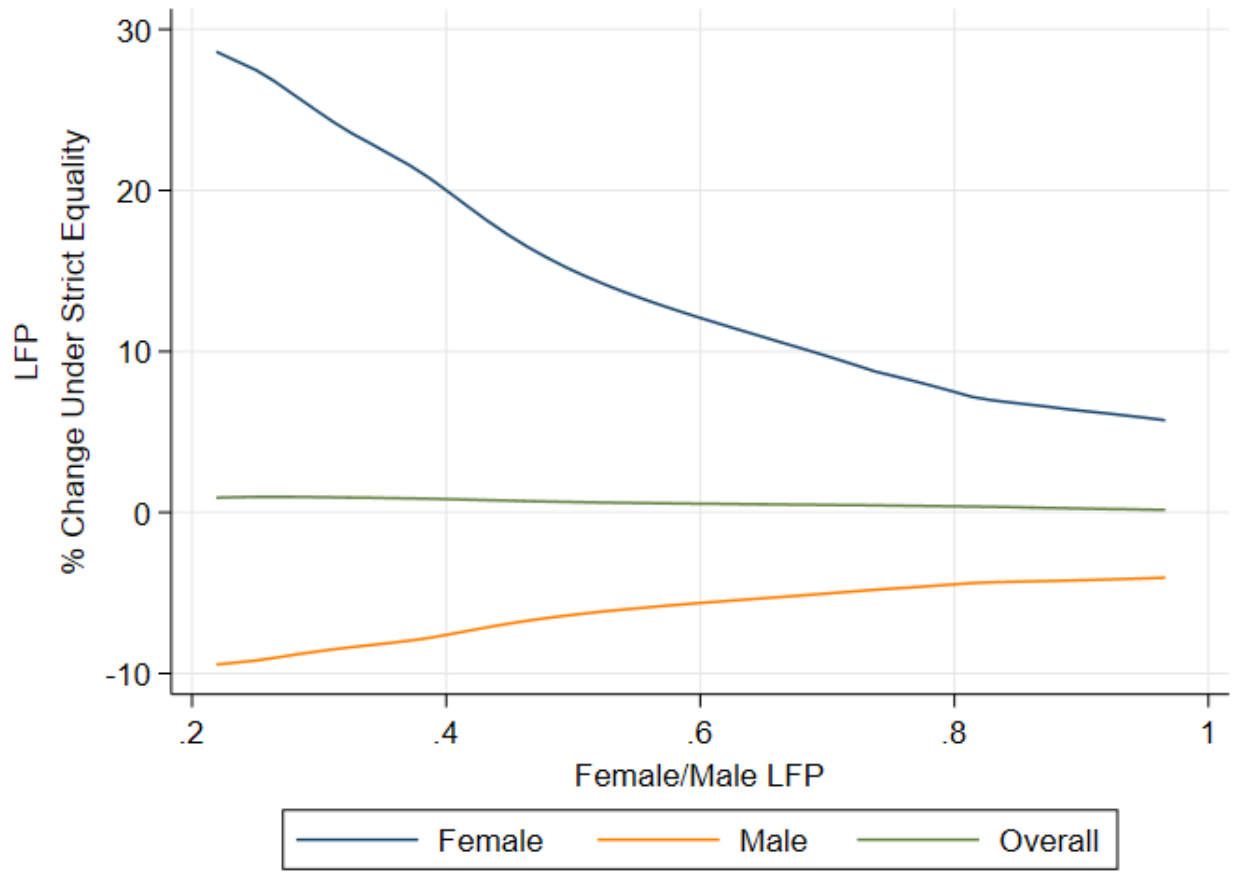


Strict Equality

- Consider the effects of a strict equality policy, where the firm is forced to set $\alpha^1_{Ftac} = \alpha^1_{Mtac}$ and $\beta^1_{Ftac} = \beta^1_{Mtac}$
- We let the firm choose α^1 and β^1 to maximize ability, subject to keeping constant employment and a constant wage bill
- Compare LFP and average ability of men and women to baseline

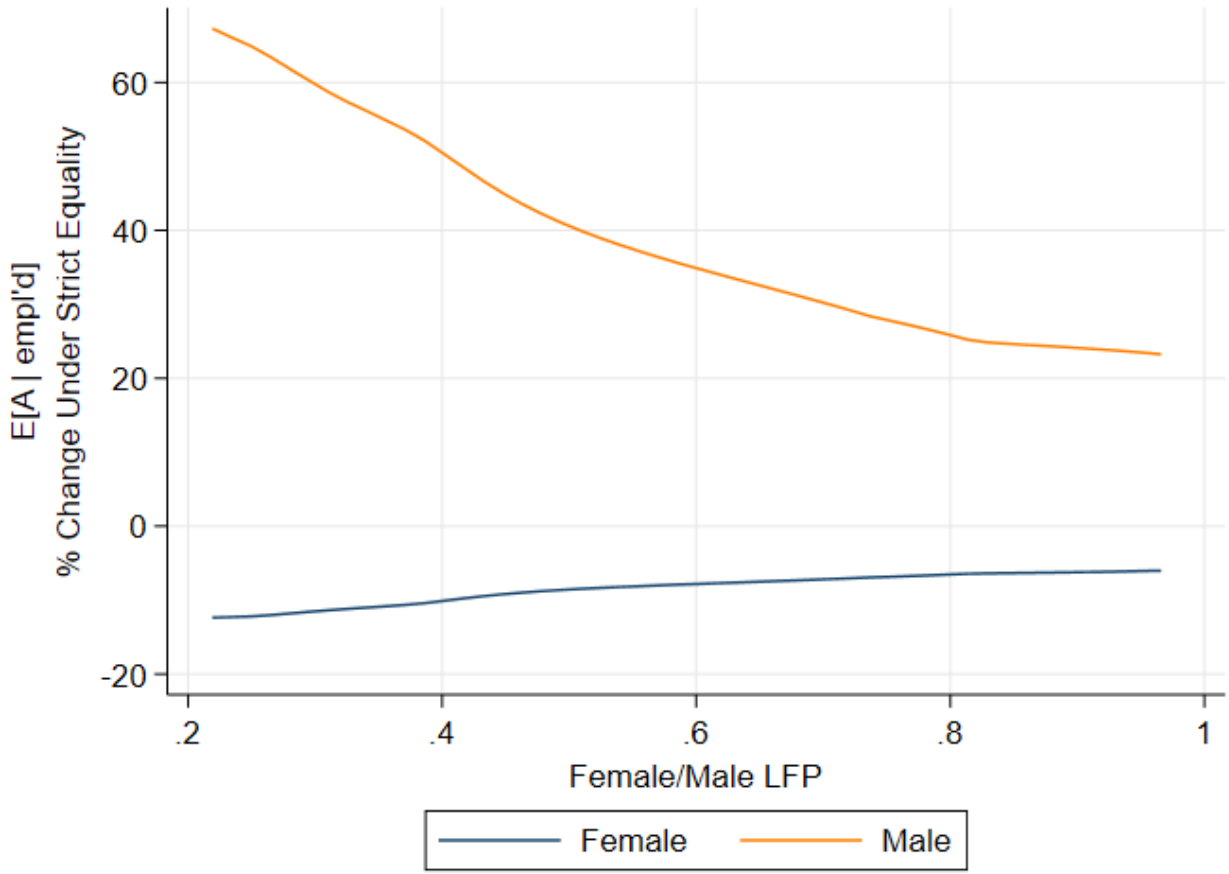
Strict Equality: (1) LFP

Figure: Change in LFP



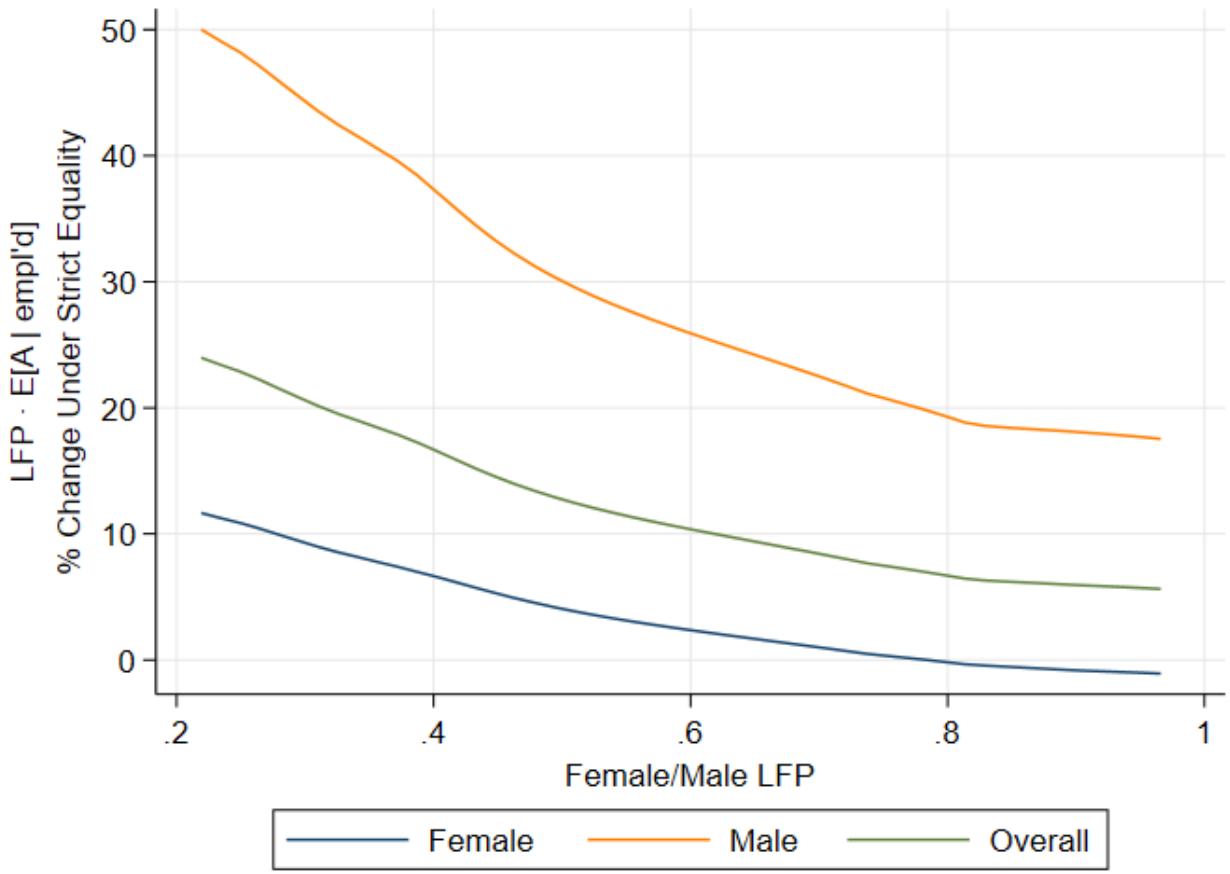
Strict Equality: (2) Ability of the Average Employee

Figure: Change in $\mathbb{E}[A \mid \text{empl'd}]$



Strict Equality: (3) Average Ability

Figure: Change in $LFP \cdot \mathbb{E}[A \mid \text{empl'd}]$

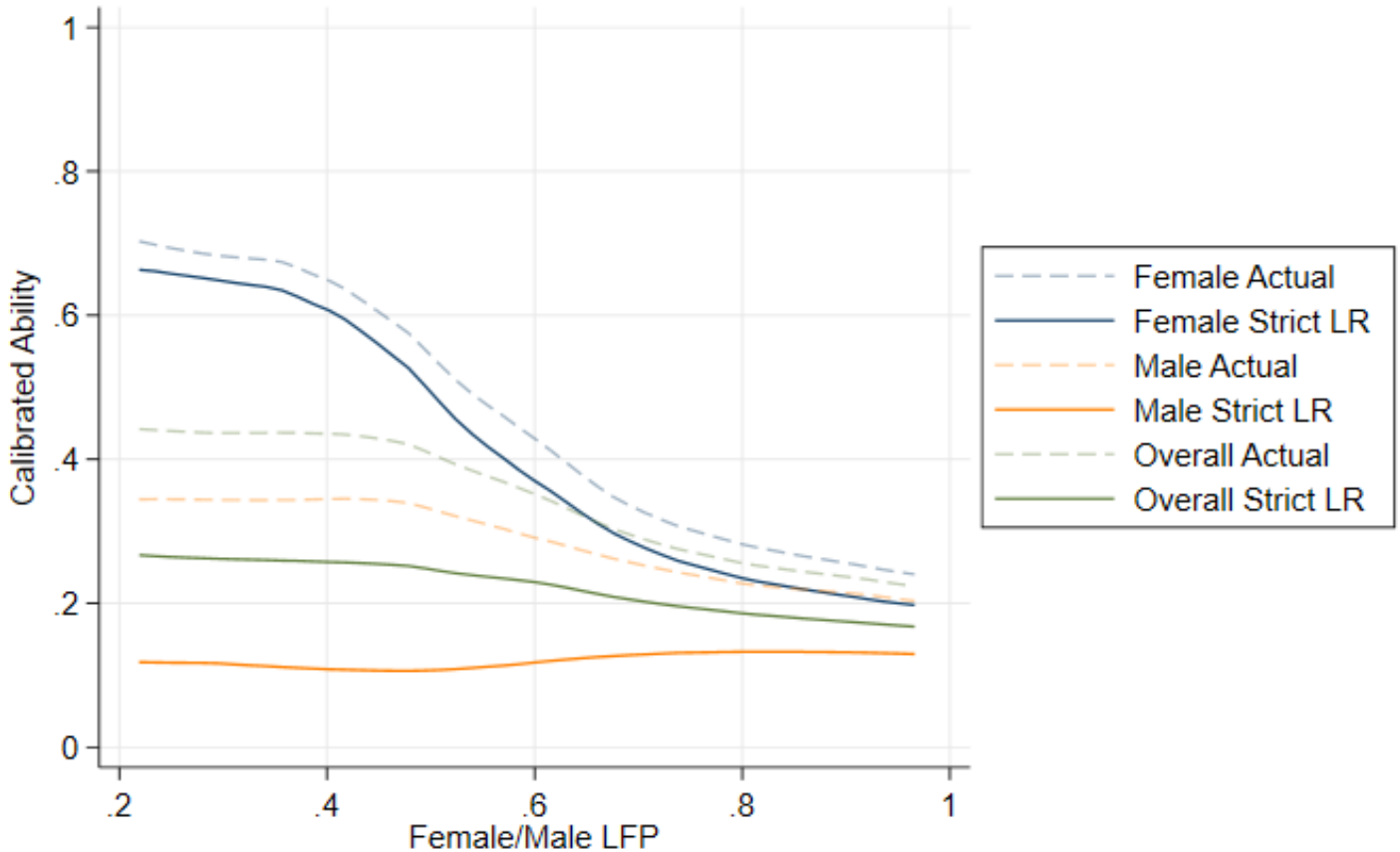


The Cost of Labor Regulation

- We compute average ability under the constrained optimal wage policy for the firm by adding a constraint $\beta^1_{gtac} \leq \max\{\beta^1_{Fta,FRA}, \beta^1_{Mta,FRA}\}$ (France is the 95th pctile. of the WEF index)
- We leave the value of staying at home parameters $(\alpha^0_{gtac}, \nu^0_{gtac})$ unchanged, so that we allow for LFP of each group to respond optimally to the change in incentives

The Cost of Labor Regulation

Figure: Counterfactual Average Ability with Strict Labor Regulation



▸ Back to counterfactuals overview

Beyond the firm

- we estimate the cost of gender inequalities for one firm
- do our estimates matter for other firms (over and above LFP differences)?
- we use ORBIS data on manufacturing firms in the same countries where our firm operates
- 800k firms, 150 SIC3 sectors, 47 countries

Production Function at the Firm Level

Table: $\overline{A}_F - \overline{A}_M$ and Log(sales), Orbis

	Log(sales)		
	(1)	(2)	(3)
Ability gap	-3.272	-5.294	
	(1.398)	(1.056)	
Same SIC 3=1 × Ability gap			-0.282
			(0.106)
Log(employment)	0.491	0.482	0.472
	(0.242)	(0.238)	(0.00111)
Log(capital)	0.216	0.241	0.266
	(0.0600)	(0.0497)	(0.000926)
Log(GDP)	0.873	0.824	
	(0.153)	(0.121)	
LFPR		-4.351	
		(2.912)	
Same SIC 3=1			-0.0169
			(0.0146)
Country FE	No	No	Yes
R-squared	0.631	0.638	0.678
N	769541	769541	769541

Notes. An observation is a firm in the Orbis database. Cross-section based on latest year up to 2019, sample restricted to firms whose latest year is after 2011. Standard errors clustered at the country level.

▸ Orbis Coverage

Productivity mean and dispersion at the 3digit SIC level

Table: $\overline{A}_F - \overline{A}_M$ and productivity dispersion, Orbis

	Log(sales/emp.), Mean		**Log(sales/emp.), CV**	
	(1)	(2)	(3)	(4)
Ability gap	-6.485	-6.771	0.225	0.243
	(1.678)	(1.349)	(0.133)	(0.114)
Log(GDP)	1.066	0.948	-0.00299	0.00128
	(0.102)	(0.203)	(0.00900)	(0.0115)
LFPR	-1.622	-2.805	0.0399	0.135
	(3.434)	(2.910)	(0.250)	(0.228)
Log(capital), Mean		0.100		
		(0.113)		
Log(capital), CV				0.0987
				(0.101)
Industry FE	Yes	Yes	Yes	Yes
R-squared	0.885	0.888	0.288	0.304
N	1595	1595	1595	1595

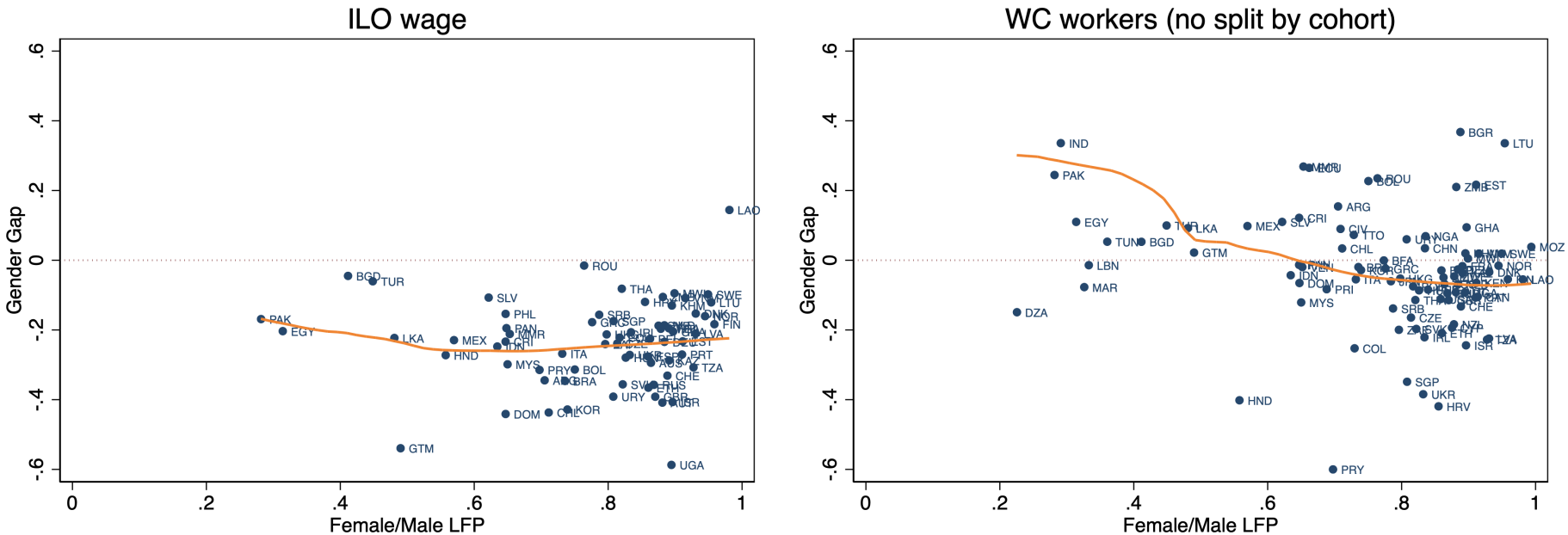
Notes. An observation is an industry (US SIC 3) -country cell in the Orbis database. Analytics weights used. Measures based on cross-section of firms based on latest year up to 2019, sample restricted to firms whose latest year is after 2011. Standard errors clustered at the country level.

Implications

- accounting for selection changes our understanding of gender gaps and policies in labor markets
- wage gaps are larger
- women more likely to suffer from labor regulation in low FLFP countries
- gender equity (in pay, promotions, dismissals) is not actually equitable

Appendix

Evidence from cross-country data



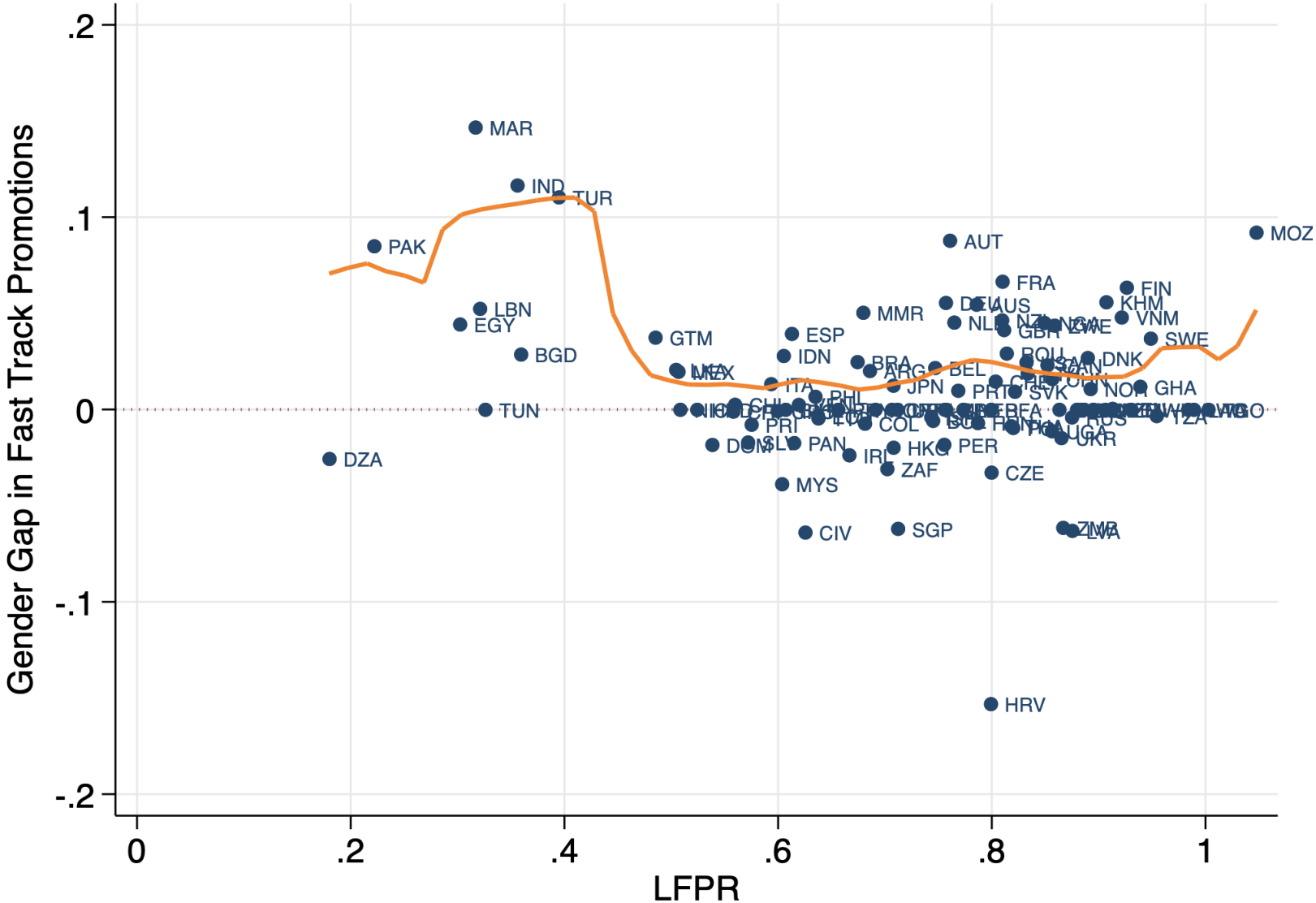
(a) Managerial & services occs. (ILO)

(b) WC employees (firm)

Figure: Gender gap in managerial and services occupations vs WC in our firm

Back

Gender gap in fast-track promotions



Back

Developing countries only

Table: Gender Wage Gap and LFPR - developing countries only

	Full Sample				New Hires
	(1)	(2)	(3)	(4)	(5)
	Pay + Bonus (logs)				
Female	0.424	0.336	0.341	0.182	0.366
	(0.124)	(0.0758)	(0.0737)	(0.0689)	(0.0905)
LFPR	0.805	0.930	0.941	0.450	1.063
	(0.227)	(0.190)	(0.189)	(0.287)	(0.235)
Female × LFPR	-0.575	-0.546	-0.542	-0.337	-0.528
	(0.166)	(0.112)	(0.112)	(0.0987)	(0.140)
Controls	No	Yes	Yes	Yes	Yes
Cohort FE	No	No	Yes	No	Yes
Country FE	No	No	No	Yes	No
N	191591	191591	191591	191591	43723
R-squared	0.0580	0.201	0.208	0.303	0.269

Notes. An observation is a worker-year. Sample restricted to low and middle income countries only (WB classification). Year FE are included in every specification. Controls include: tenure, tenure squared and function FE. The last column reports estimates when restricting the sample to employees with no more than 1 year of tenure. Standard errors clustered at the country-cohort level.

▸ Back

Using base pay only

	Full Sample				New Hires
	(1)	(2)	(3)	(4)	(5)
			Pay (logs)		
Female	0.358	0.232	0.230	0.167	0.162
	(0.135)	(0.0923)	(0.0910)	(0.0741)	(0.0956)
LFPR	1.582	1.578	1.599	0.144	1.598
	(0.282)	(0.212)	(0.204)	(0.234)	(0.228)
Female × LFPR	-0.533	-0.436	-0.415	-0.328	-0.212
	(0.185)	(0.131)	(0.129)	(0.0997)	(0.130)
Controls	No	Yes	Yes	Yes	Yes
Cohort FE	No	No	Yes	No	Yes
Country FE	No	No	No	Yes	No
N	303756	303756	303756	303756	63887

Notes. An observation is a worker-year. Year FE are included in every specification. Controls include: tenure, tenure squared and Function FE. The last column reports estimates when restricting the sample to employees with no more than 1 year of tenure. Standard errors clustered at the country-cohort level.

▸ Back

Heterogeneity by managers' norms

	Full Sample				New Hires
	(1)	(2)	(3)	(4)	(5)
	Pay + Bonus (logs)				
Panel A: Top Managers Low LFPR Norms					
Female	0.485	0.363	0.383	0.250	0.444
	(0.163)	(0.0966)	(0.0864)	(0.0945)	(0.101)
LFPR	1.550	1.728	1.803	0.401	1.844
	(0.360)	(0.261)	(0.252)	(0.300)	(0.232)
Female × LFPR	-0.767	-0.639	-0.653	-0.479	-0.703
	(0.256)	(0.171)	(0.157)	(0.166)	(0.171)
N	135025	135025	135025	135025	27483
R-squared	0.102	0.257	0.276	0.406	0.326
Panel B: Top Managers High LFPR Norms					
Female	0.136	0.0473	-0.0225	-0.0288	-0.137
	(0.204)	(0.166)	(0.179)	(0.162)	(0.119)
LFPR	1.065	1.135	1.337	-0.283	1.555
	(0.685)	(0.436)	(0.420)	(0.333)	(0.418)
Female × LFPR	-0.261	-0.215	-0.107	-0.0968	0.165
	(0.258)	(0.210)	(0.225)	(0.197)	(0.152)
Controls	No	Yes	Yes	Yes	Yes
Cohort FE	No	No	Yes	No	Yes
Country FE	No	No	No	Yes	No
N	168731	168731	168731	168731	36404
R-squared	0.0282	0.227	0.253	0.579	0.260
P-values: Panel A= Panel B					
Female	0.18	0.10	0.04	0.14	0.0002
LFPR	0.53	0.24	0.34	0.13	0.54
Female × LFPR	0.16	0.12	0.05	0.14	0.0001

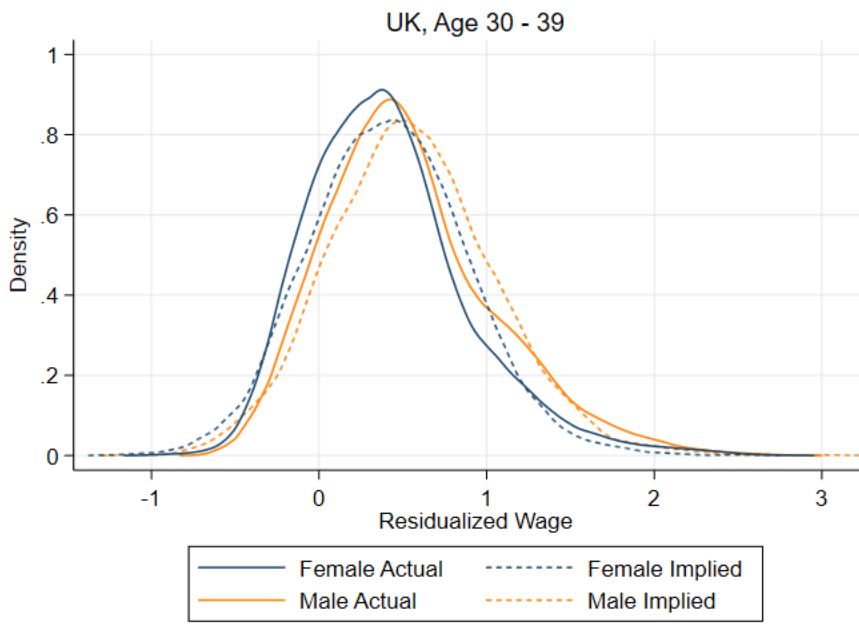
Notes. An observation is a worker-year. Year FE are included in every specification. Controls include: tenure, tenure squared and function FE. The last column reports estimates when restricting the sample to employees with no more than 1 year of tenure. Standard errors clustered at the country-cohort level. Panel A (B) is selecting on top managers in a given country initially hired in countries with below (above) average LFPR norms.

▸ Back

Goodness of Fit

- Normality seems to be a reasonable assumption (at least in country-cohorts for which we have enough observations)

(a) India



(b) UK

▸ Back

Counterfactual II: Optimal Wage Policy

- We solve, for each country-cohort-tenure cell, the following program:

$$\max_{(\alpha^1_{gtac},\beta^1_{gtac})_{g\in\{F,M\}}} \left[1-\Phi\left(\widetilde{\xi}_{Ftac}\right)\right]\frac{\beta^1_{Ftac}}{\sigma_{Ftac}}\lambda\left(\widetilde{\xi}_{Ftac}\right)+\left[1-\Phi\left(\widetilde{\xi}_{Mtac}\right)\right]\frac{\beta^1_{Mtac}}{\sigma_{Mtac}}\lambda\left(\widetilde{\xi}_{Mtac}\right)$$

$$\text{subj. to:}\quad 1-\Phi\left(\widetilde{\xi}_{Ftac}\right)+1-\Phi\left(\widetilde{\xi}_{Mtac}\right)=FLFP_{tac}+MLFP_{tac} \tag{1}$$

$$\left[1-\Phi\left(\widetilde{\xi}_{Ftac}\right)\right]\left[\alpha^1_{Ftac}+\frac{(\beta^1_{Ftac})^2}{\sigma_{Ftac}}\lambda\left(\widetilde{\xi}_{Ftac}\right)\right]+$$

$$+\left[1-\Phi\left(\widetilde{\xi}_{Mtac}\right)\right]\left[\alpha^1_{Mtac}+\frac{(\beta^1_{Mtac})^2}{\sigma_{Mtac}}\lambda\left(\widetilde{\xi}_{Mtac}\right)\right]=\overline{y}^1_{Ftac}+\overline{y}^1_{Mtac} \tag{2}$$

where $\widetilde{\xi}_{gtac}=(\widehat{\alpha}^0_{gtac}-\alpha^1_{gtac})/\sigma_{gtac}$, $\sigma_{gtac}=\sqrt{(\beta^1_{gtac})^2+(\widehat{\nu}^0_{gtac})^2}$ keeping the value of staying at home parameters at the calibrated levels, $\widehat{\alpha}^0_{gtac}$, $\widehat{\nu}^0_{gtac}$.

- Maximize average ability of those employed keeping (1) total LFP and (2) the total wage bill at the firm constant.

Back

Restrictive Labor Regulations Index

- *Global Competitiveness Index* (2008-2020) from the World Economic Forum
- Competitiveness is defined as *the set of institutions, policies, and factors that determine the level of productivity of a country*
- Annual survey on the most problematic factors for doing business: 150 questions grouped in 12 pillars, e.g. infrastructure, labor market efficiency, innovation
- Data is then organized in several indices (for e.g., corruption, taxes, inflation)
  $\Rightarrow$ *the restrictive labor regulations index* includes labor-employer relations, wage flexibility, hiring and firing practices, performance pay, labor taxes, attraction and retention of talent
- Representative sample of approx. 15K business executives in around 150 economies

▸ Back

Women, Business and the Law Index

- *Women, Business and the Law Index* (2020) from the World Bank
- Index covering 190 economies (1971-2020) and structured around the life cycle of a working woman
- Eight indicators constructed around women's interactions with the law: mobility, pay, workplace, marriage, parenthood, entrepreneurship, assets and pensions
- Data constructed using laws and regulations that are currently in force; religious and customary laws are not considered (unless they are codified)
- Hyland et al. (2020) provide an overview of the data documenting how gender discrimination by the law affects women's economic opportunity

Back

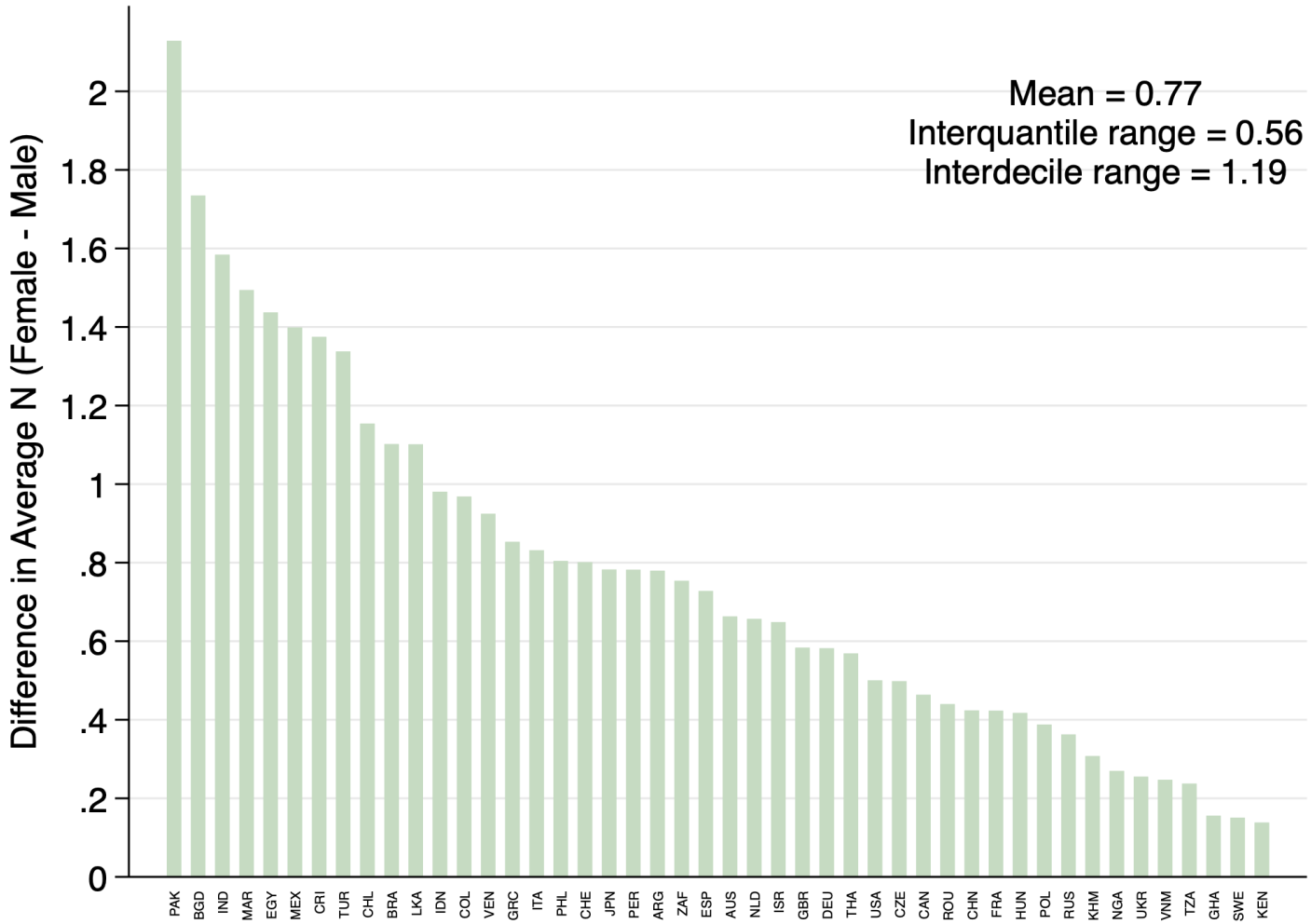
Could this be explained by differences in preferences?

- Our model assumes that the underlying distribution of A_i and N_i is the same for men and women, so that differences in LFP are due to cost of social norms
- Alternatively, we can ask ourselves how different the population mean N_i would have to be to justify the current LFP gap
- If the observed LFPs are optimal, so that the marginal man and woman are the same ability, we should have

$$\mu_N^F - \mu_N^M = \Phi^{-1}(MLFP) - \Phi^{-1}(FLFP)$$

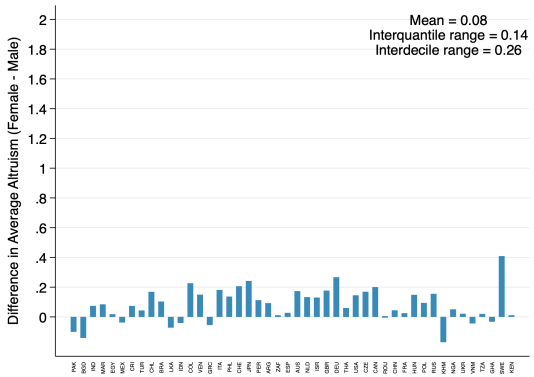
Counterfactual N_i gap

Figure: Counterfactual mean N_i gap to account for the LFP gap

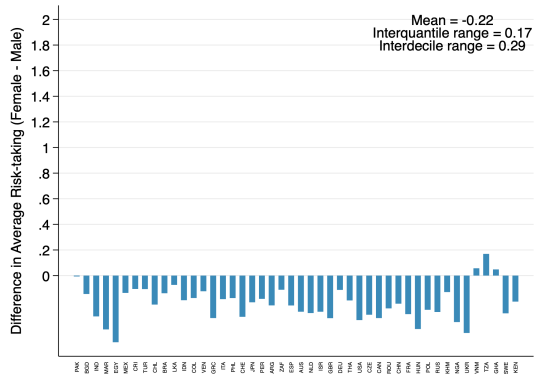


▸ Gender differences in preference ▸ Gender inequality in education ▸ Back

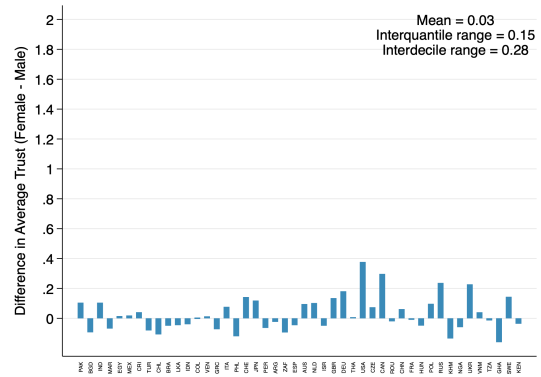
Gender differences in preferences



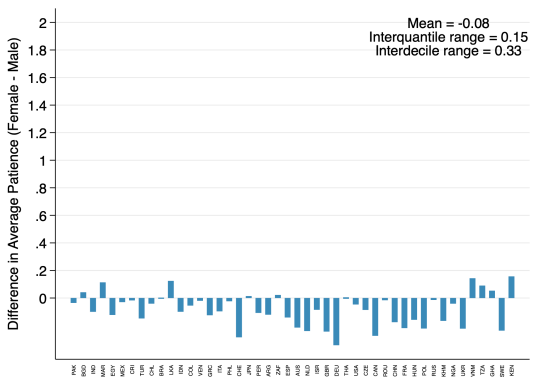
(a) Altruism



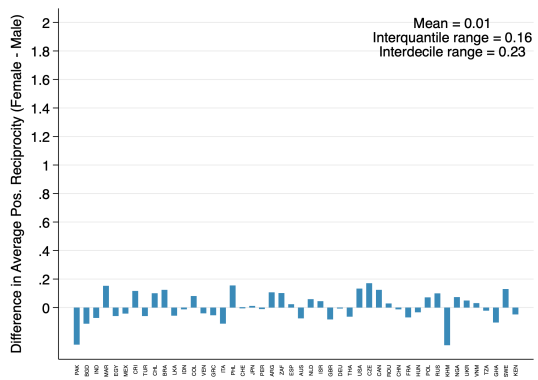
(b) Risk-taking



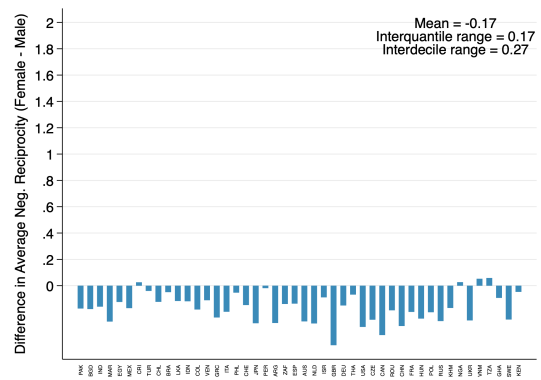
(c) Trust



(d) Patience



(e) Positive Reciprocity



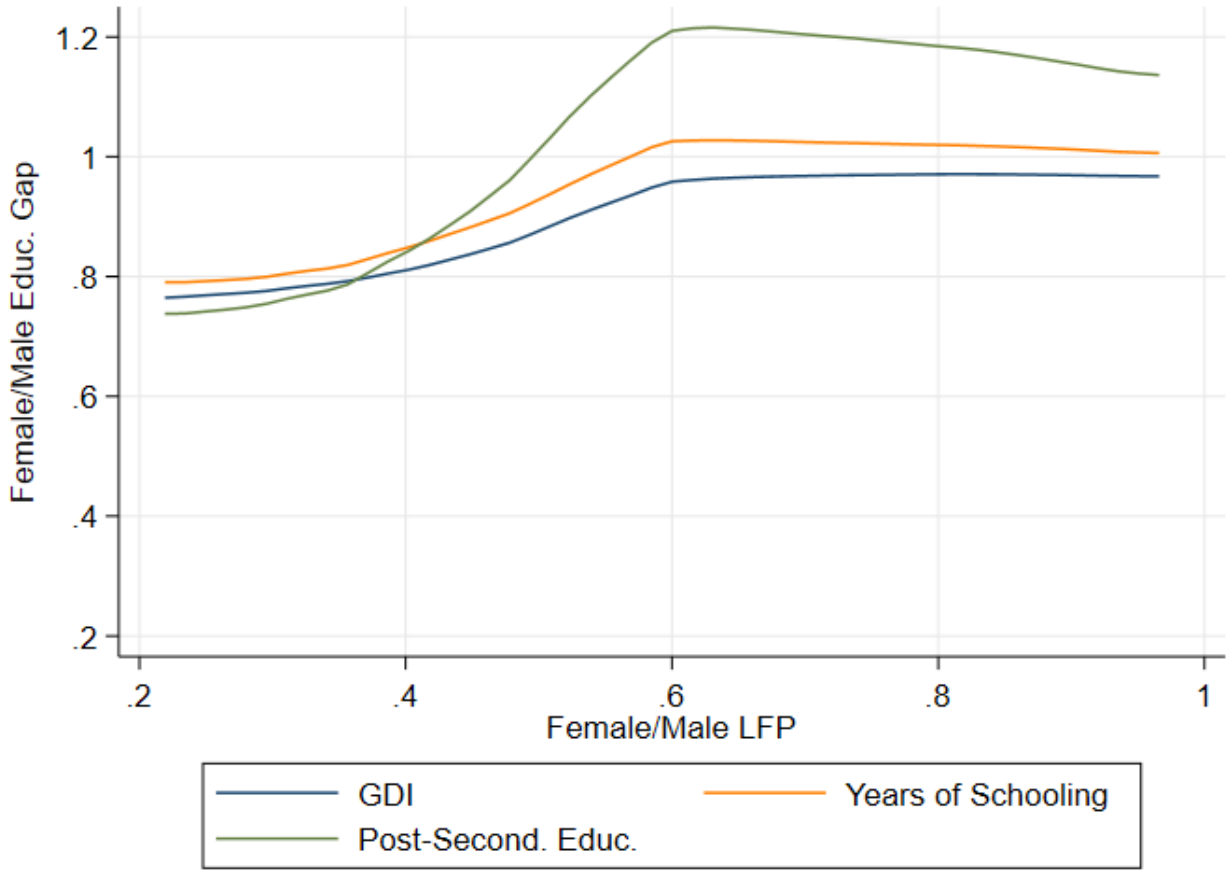
(f) Negative Reciprocity

Figure: Economic preferences. GPS data (Falk et al. 2018).

▸ Back

Gender education gap versus LFP gap

Figure: The gender education gap is much smaller than the LFP gap



Back

Calibrated ability: Interpretation

- We back out "ability" from wages, but wages depends on productivity
- Any unobservables that correlate with both will be classified as "ability"
- Example 1: peer effects might lead to overestimate low As and underestimate high As (Bandiera et al 10, Mas and Moretti 09)
- Example 2: value of diversity ("woman's perspective") will lead to overestimate female As and, possibly, male As too

$\Rightarrow$ both imply a link between calibrated As and the share of women in the team ▸ Table: Women ▸ Table: Men ▸ Back to validation

Men's Ability by Share of Females in Team

Table: Men Only

	Full Sample				New Hires
	(1)	(2)	(3)	(4)	(5)
	Calibrated Ability				
FShareTeam	0.495	1.814	1.813	2.045	1.607
	(0.0935)	(0.443)	(0.444)	(0.449)	(0.482)
LFPR		0.335	0.336	0.549	0.424
		(0.0913)	(0.0925)	(0.188)	(0.128)
FShareTeam × LFPR		-1.933	-1.931	-2.217	-1.978
		(0.579)	(0.579)	(0.592)	(0.629)
Controls	Yes	Yes	Yes	Yes	Yes
Cohort FE	No	No	Yes	No	Yes
Country FE	No	No	No	Yes	No
N	129131	129131	129131	129131	29483
R-squared	0.0520	0.0602	0.0603	0.0677	0.103

Notes. An observation is a worker-year. Year FE are included in every specification. Controls include: tenure, tenure squared and function FE. The last column reports estimates when restricting the sample to employees with no more than 1 year of tenure. Standard errors clustered at the country-cohort level.

▸ Back

Women's Ability by Share of Females in Team

Table: Women Only

	Full Sample				New Hires
	(1)	(2)	(3)	(4)	(5)
	Calibrated Ability				
FShareTeam	-0.374	-0.00974	-0.0112	0.249	0.0188
	(0.0540)	(0.191)	(0.193)	(0.189)	(0.173)
LFPR		-0.886	-0.886	-0.556	-1.023
		(0.251)	(0.256)	(0.246)	(0.277)
FShareTeam × LFPR		-0.325	-0.321	-0.657	-0.117
		(0.261)	(0.264)	(0.259)	(0.237)
Controls	Yes	Yes	Yes	Yes	Yes
Cohort FE	No	No	Yes	No	Yes
Country FE	No	No	No	Yes	No
N	108517	108517	108517	108517	28867
R-squared	0.117	0.153	0.154	0.169	0.209

Notes. An observation is a worker-year. Year FE are included in every specification. Controls include: tenure, tenure squared and function FE. The last column reports estimates when restricting the sample to employees with no more than 1 year of tenure. Standard errors clustered at the country-cohort level.

Back

100k employees in 100+ countries with different FLFP

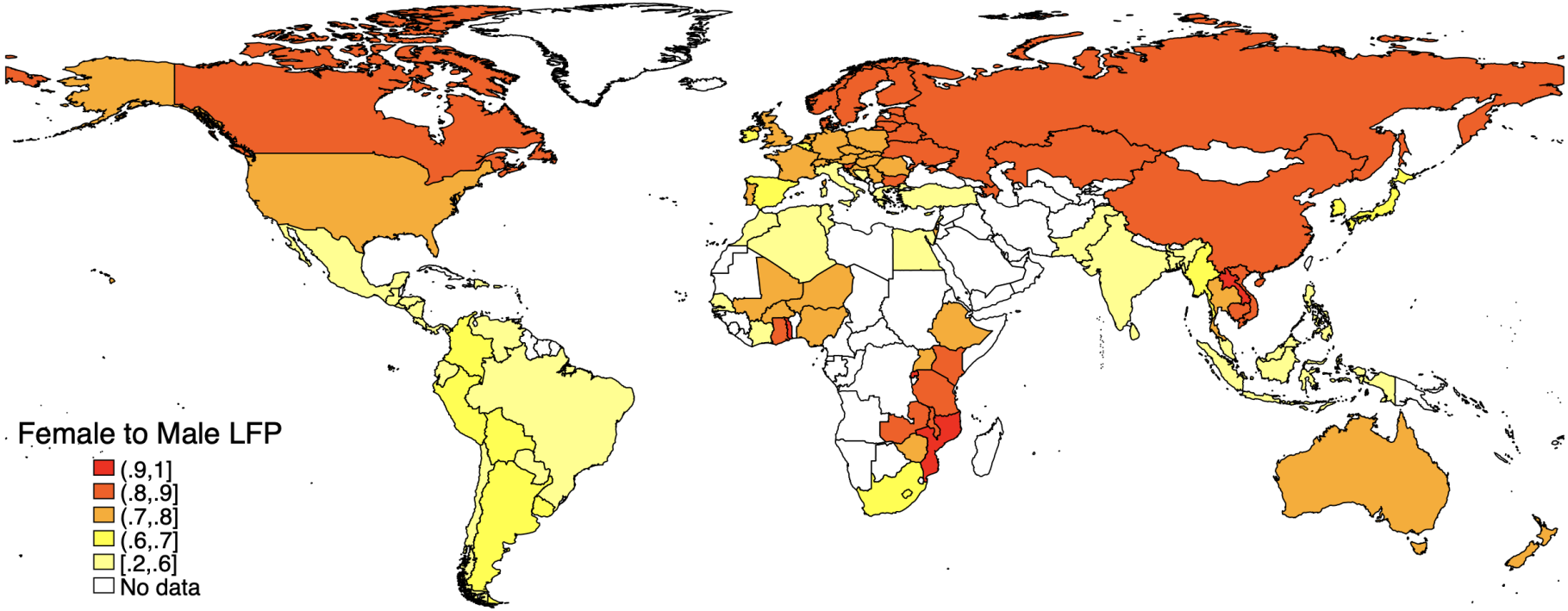


Figure: Female to male LFP in the countries where the firm operates

Back

Average wages in firm are higher than country's average

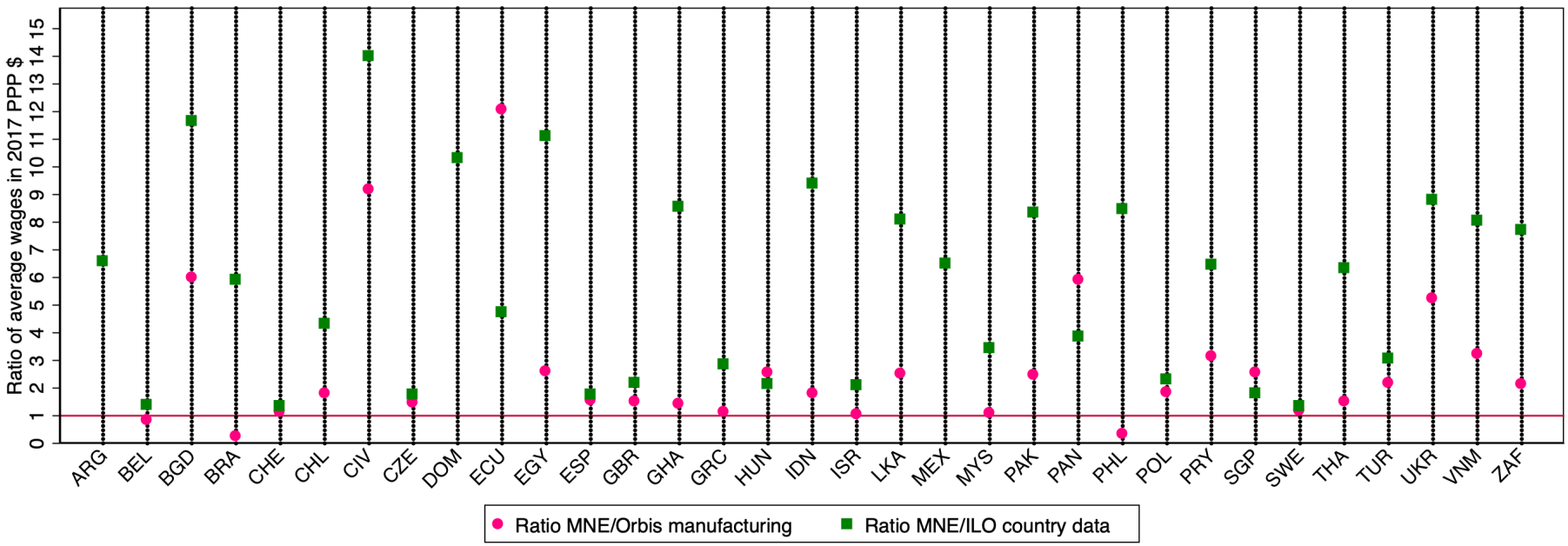


Figure: Average wage in firm and in country overall: 1) Orbis, manufacturing only b) ILO, white collar occupations only

▸ Back

Variation RHS

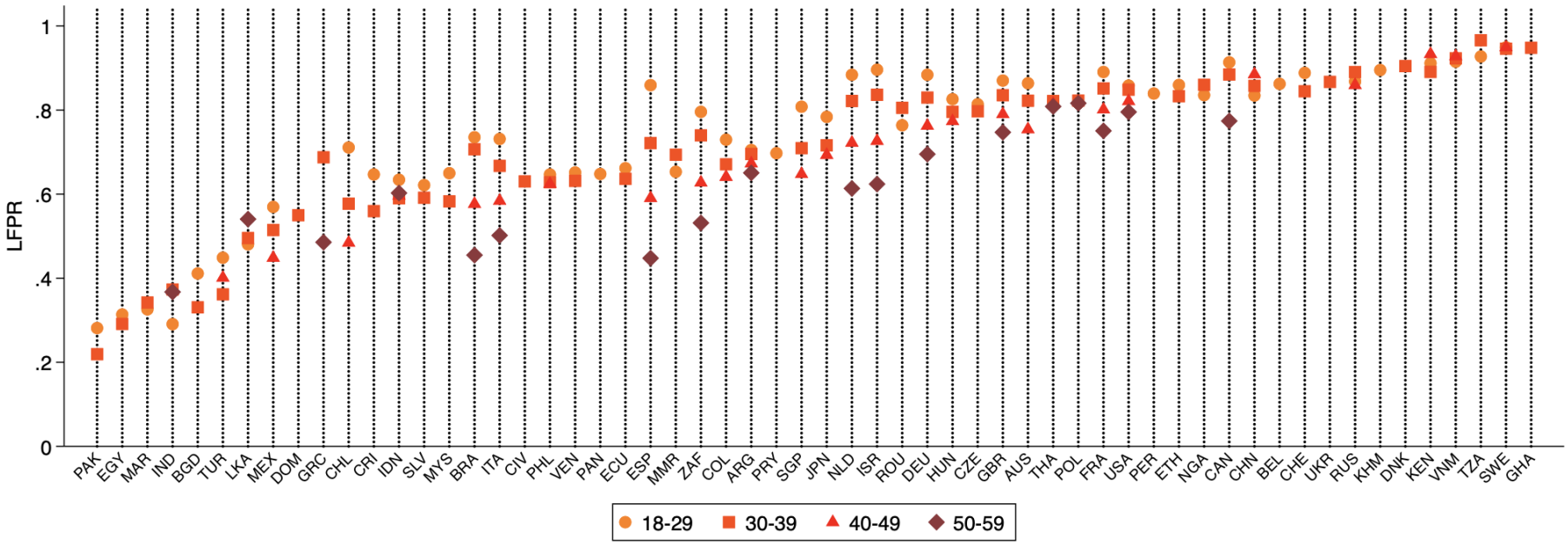


Figure: Female/Male LFP across countries and cohorts

Back

Variation LHS

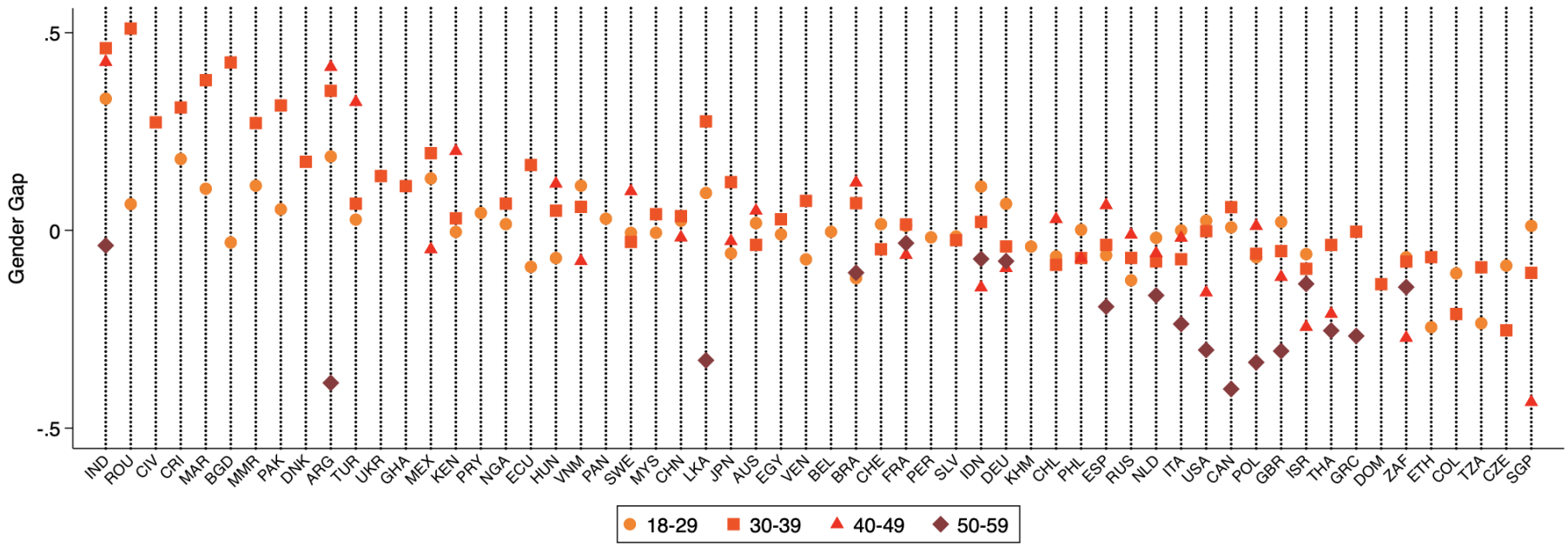


Figure: Gender wage gap by countries and cohorts

▸ Back

Within Cohort (id.A2)

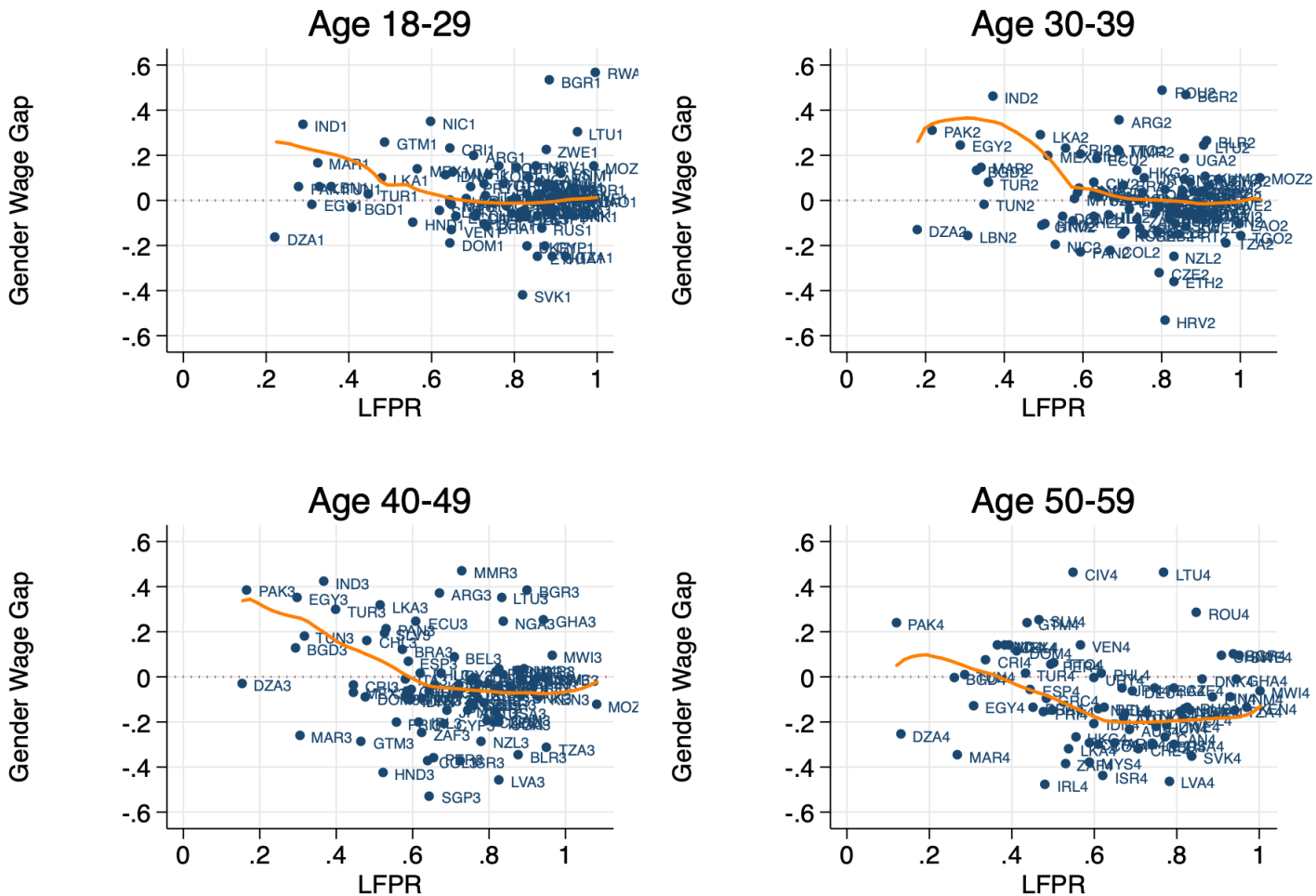
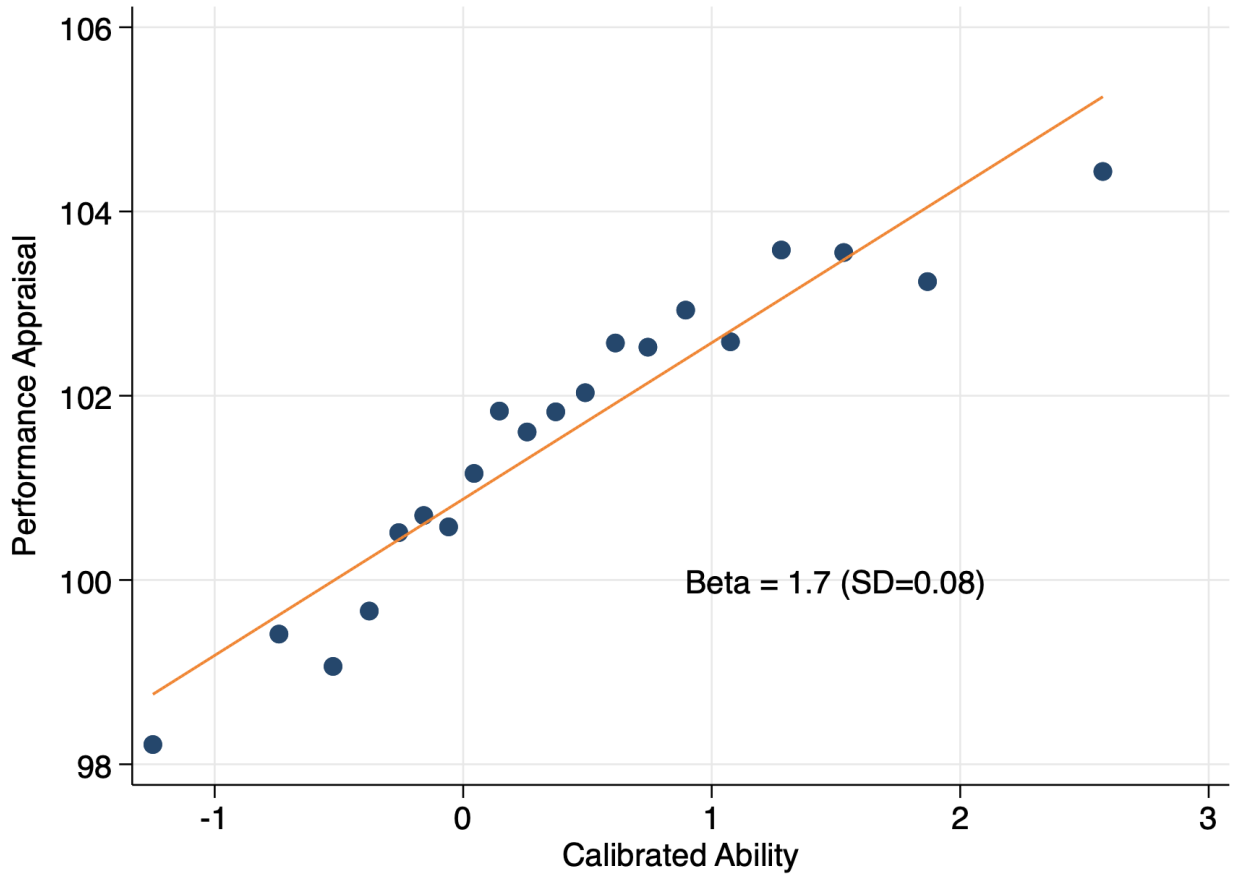


Figure: Gender wage gap and Female/Male LFP

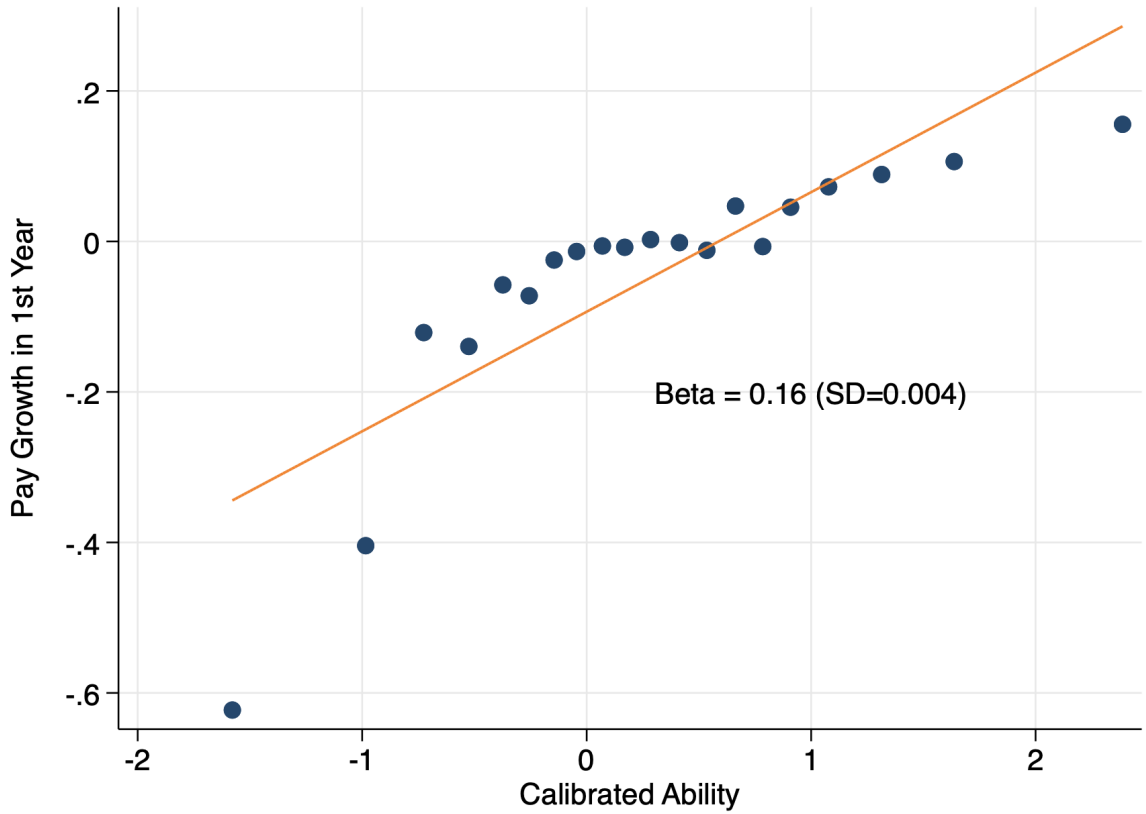
Back

Calibrated Ability Correlates with Appraisals



▸ Back to validation

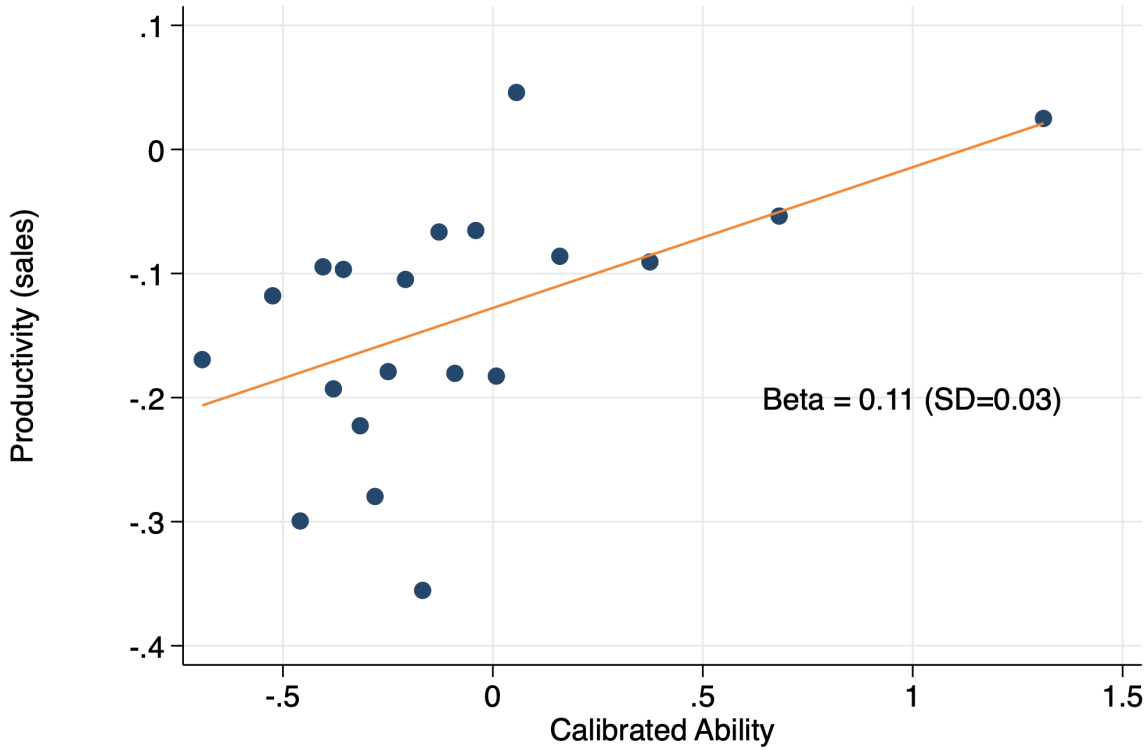
Calibrated Ability Correlates with Future Wage Growth



▸ Back to validation

Calibrated Ability Correlates with Sales Productivity

Figure: Productivity (sales) vs. Calibrated Ability: Binned Scatterplot

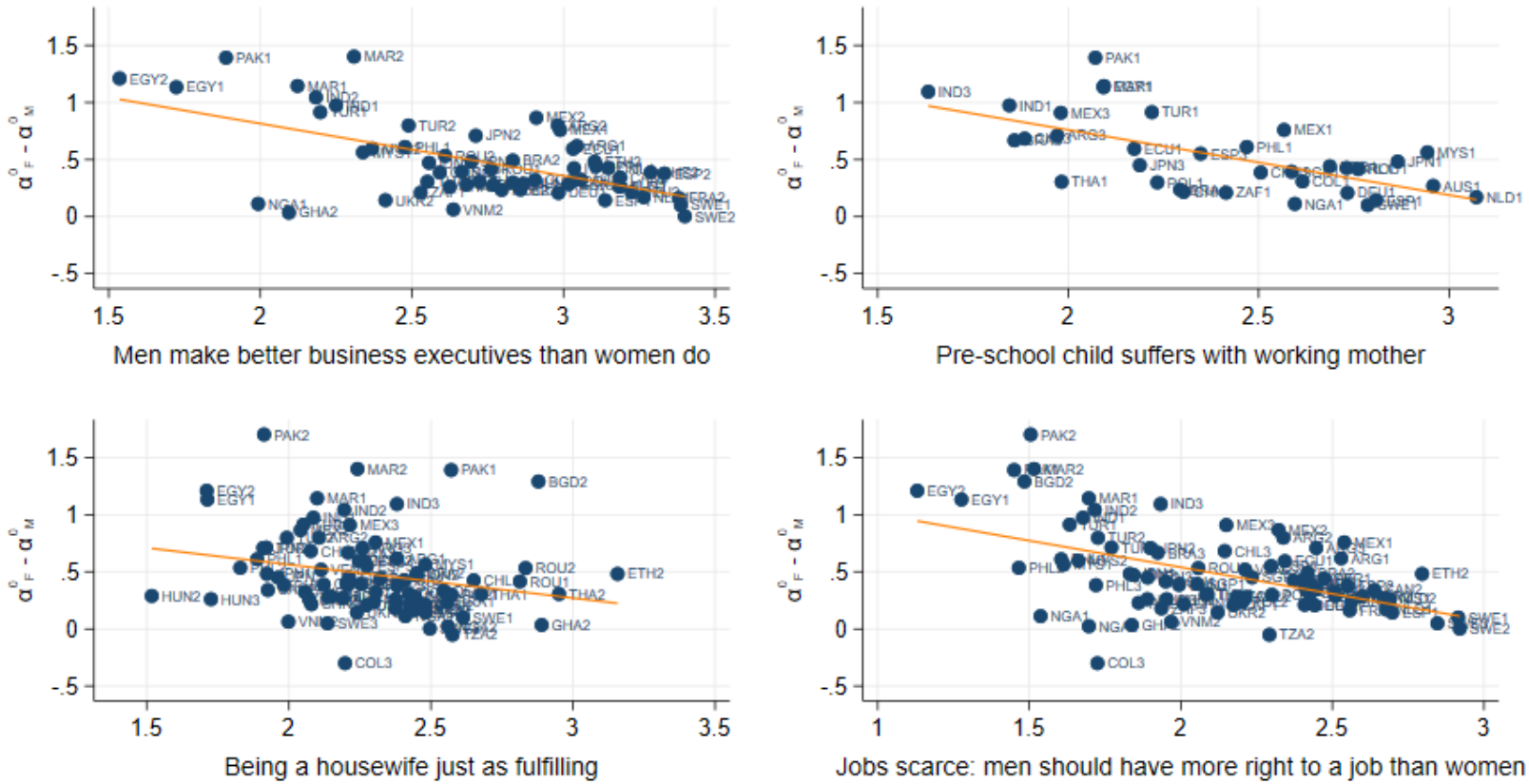


Notes. Sample restricted to sales population, WL1-WL2, 2018-2019. 1997 unique employees.
10 Countries: Colombia, Costa Rica, Ecuador, El Salvador, Greece, India, Italy, Mexico, Philippines, Russia.
Productivity is based on employees' achieved sales relative to target and is standardized within country (mean = 0 and SD =1).

▸ Back to validation

Model Validation II: Home Payoff and Norms

Figure: WVS Values and $\alpha_F^0 - \alpha_M^0$

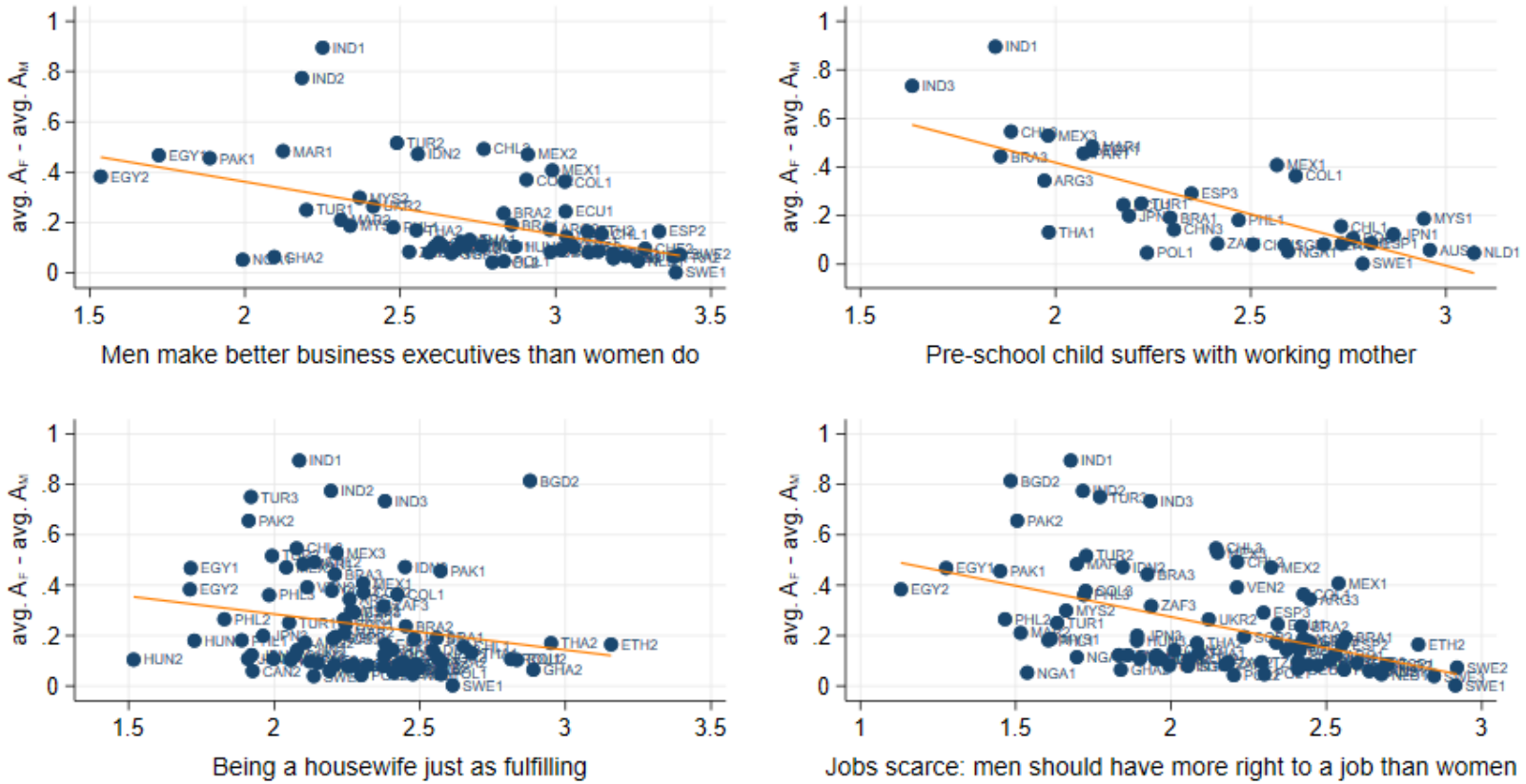


Lower values = agree

Back

Model Validation II: Norms and Ability

Figure: WVS Values and $\overline{A}_F - \overline{A}_M$

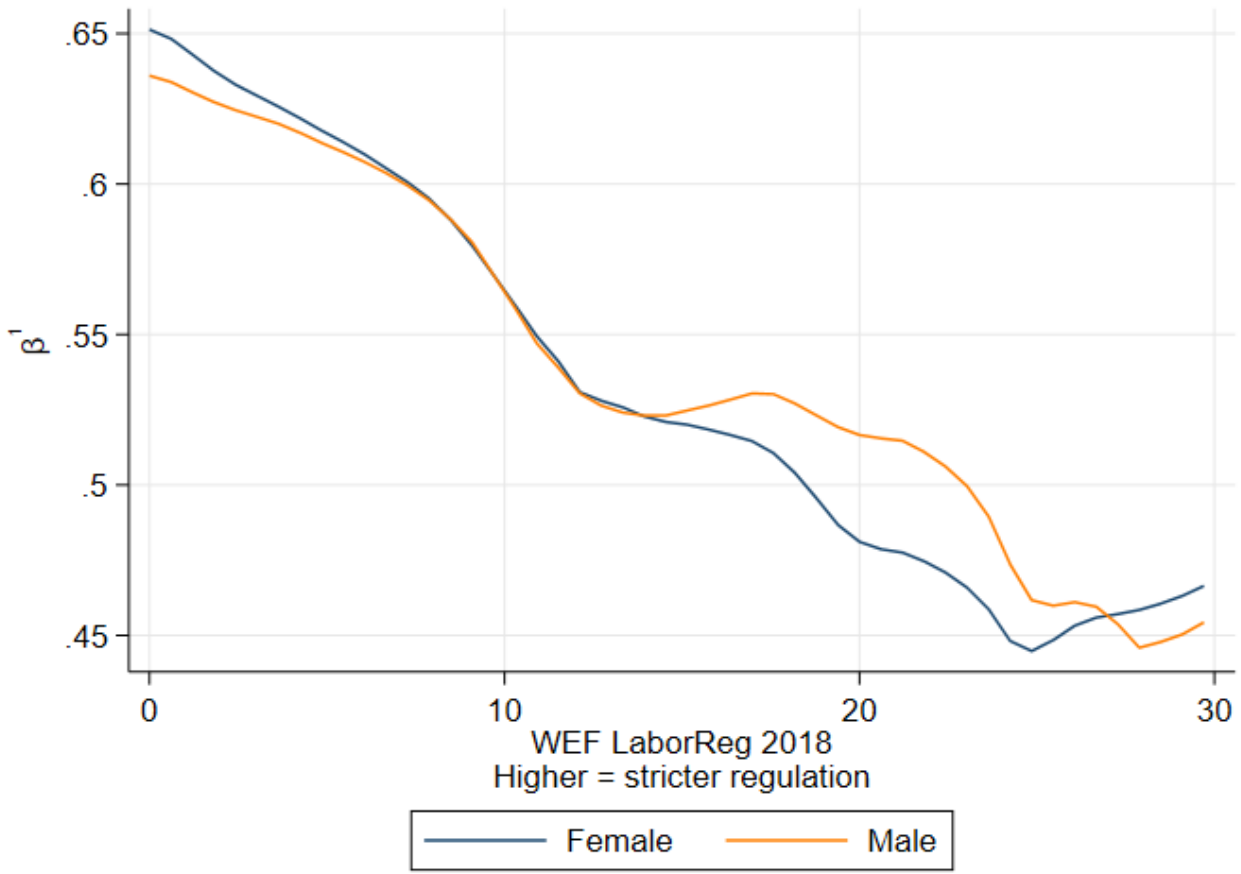


Lower values = agree

Back

Model Validation III: Performance Rewards and Labor Regulation

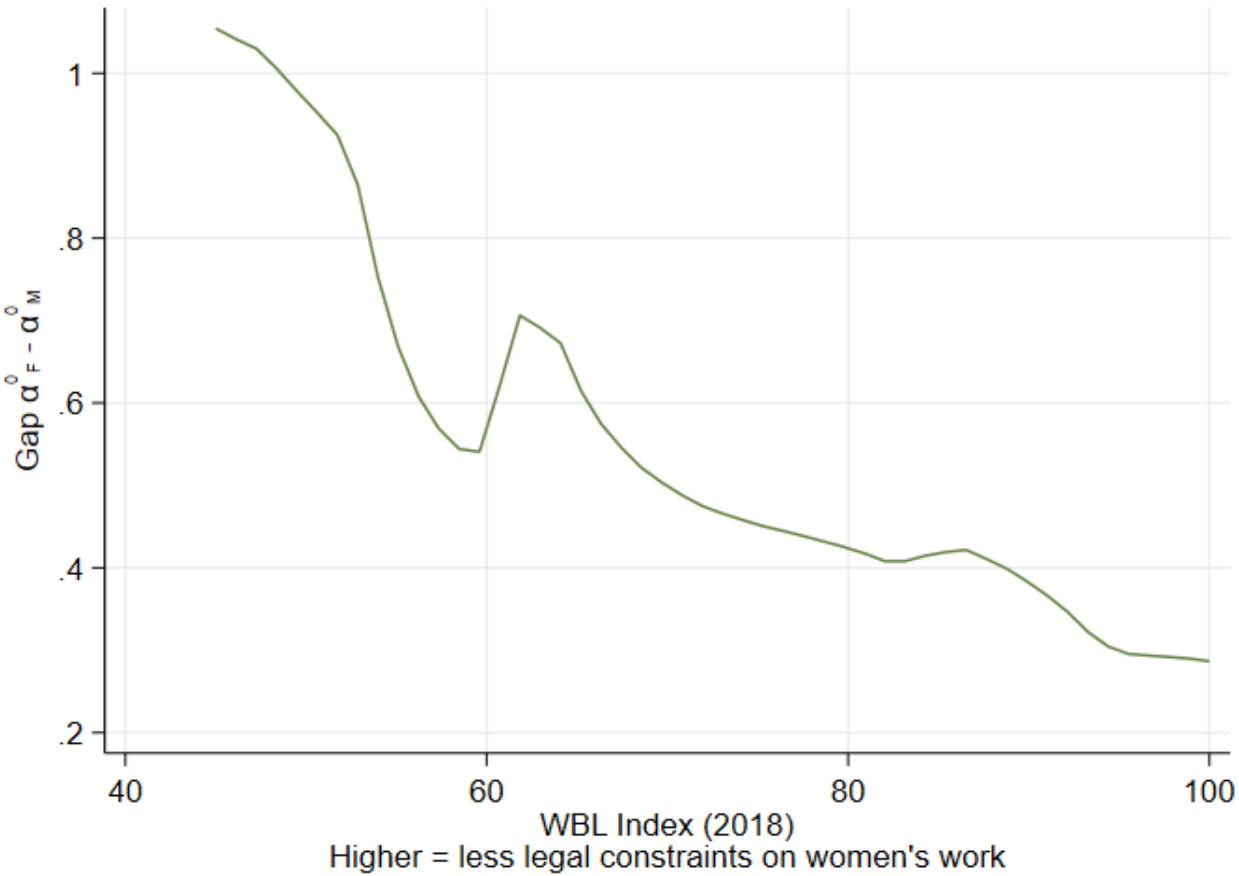
Figure: Labor regulation (WEF) and β^1



▸ Labor regulation index, details

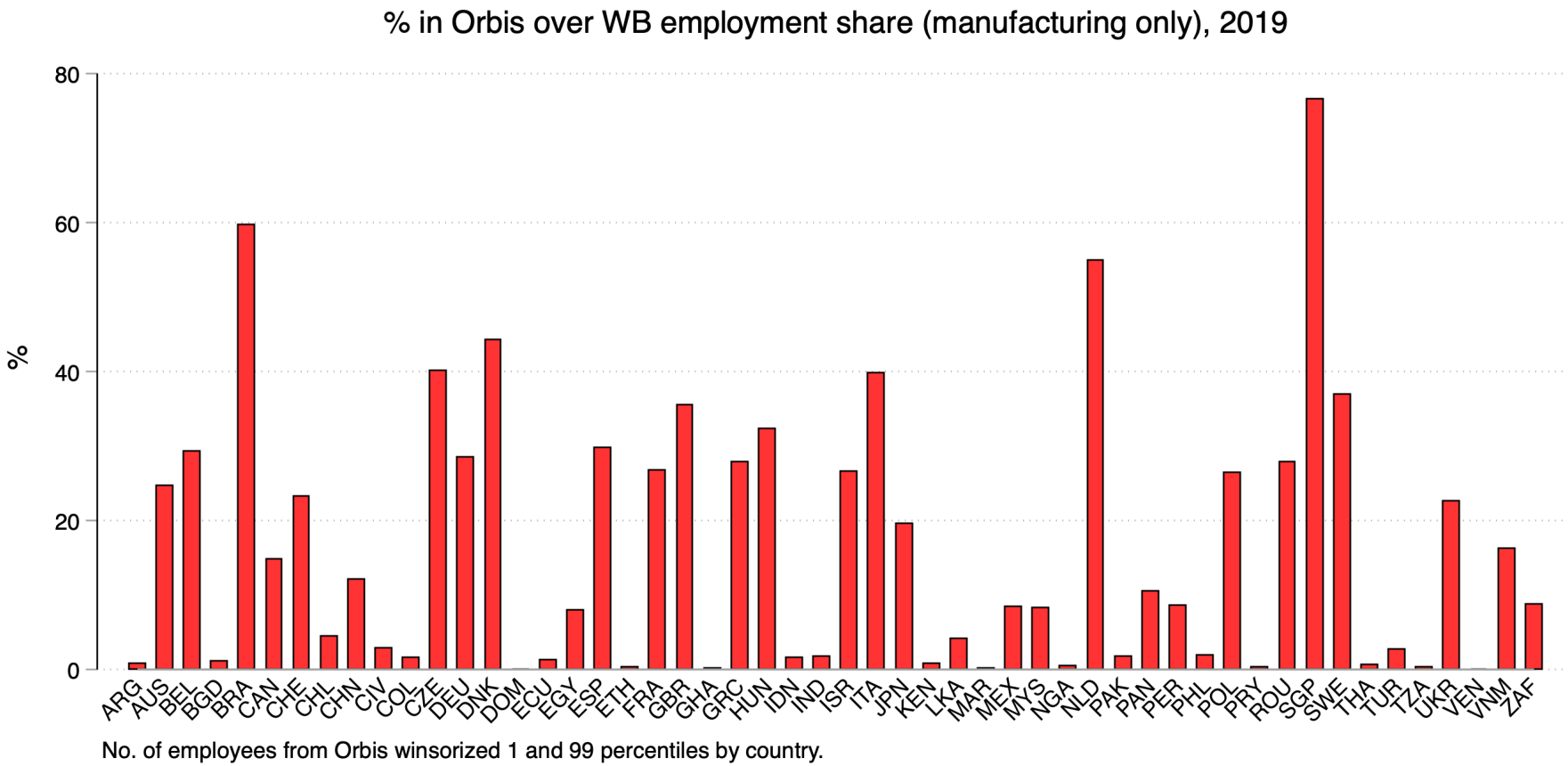
Model validation IV: Laws Restricting / Facilitating Women's Work

Figure: Women, Business and the Law Index (WBL) and α^0



▸ Gender inequality in the law, details ▸ Back to validation

Orbis coverage



Back

Application: Adjusting the Wage Gap for Selection

- Our model implies the following relationship between the moments of the observed and population distributions of the wage:

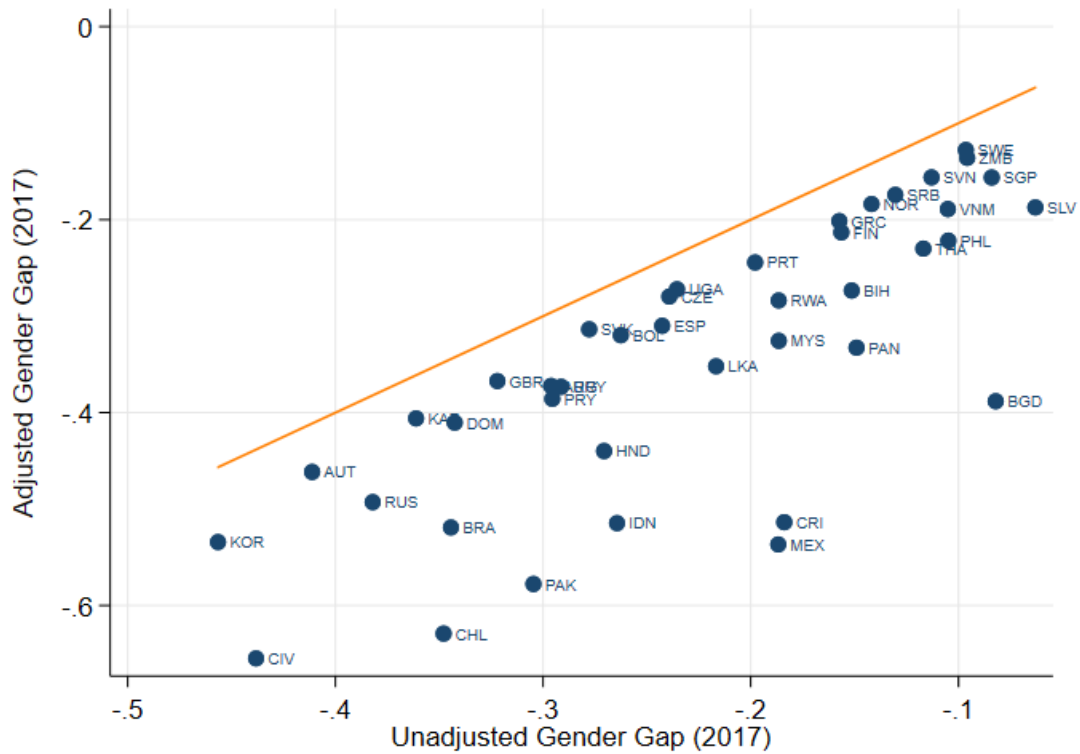
$$\mathbb{E}[y^1_{igtac} \,|\, \text{empl'd }] = \mathbb{E}[y^1_{igtac}] + (\beta^1_{gtac})^2 \lambda(\xi_{gac}).$$

- Hence, given external estimates of the observed wage gap, we can adjust them for selection as follows:

$$\underbrace{\mathbb{E}[y^1_{iFtac}] - \mathbb{E}[y^1_{iMtac}]}_{\text{Adjusted Gender Gap}} = \underbrace{\mathbb{E}[y^1_{iFtac} \,|\, \text{empl'd }] - \mathbb{E}[y^1_{iMtac} \,|\, \text{empl'd }]}_{\text{Unadjusted Gender Gap}} - \underbrace{[(\beta^1_{Ftac})^2 \lambda(\xi_{Fac}) - (\beta^1_{Mtac})^2 \lambda(\xi_{Mac})]}_{\text{Adjustment term}}$$

Due to Positive Selection, Corrected Gaps are much Larger when Female/Male LFP is Low

- We adjust the wage gap for ISCO-08 categories 1–5 (white collars).
- For 68 countries not in our firm sample, we impute the adjustment term based on a cubic regression on the Female/Male LFP.



back