The Role of Gender in Employment Polarization

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Labor market participation: Forces at work and policy challenges
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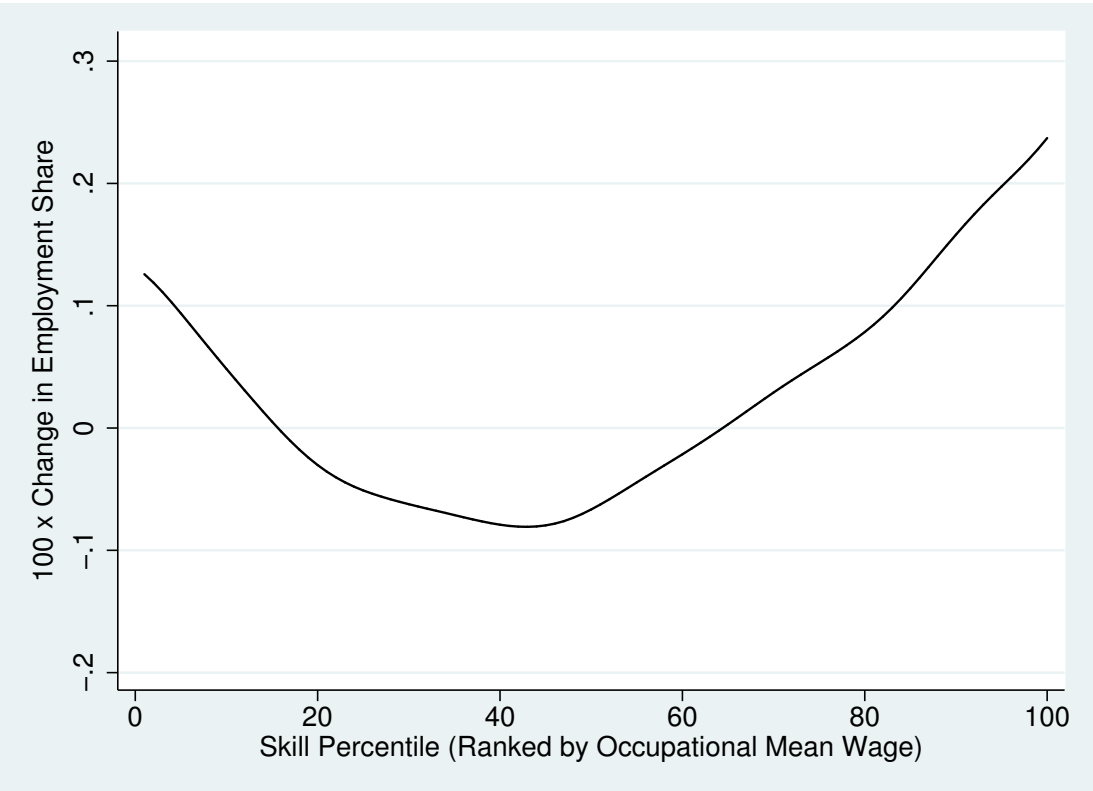
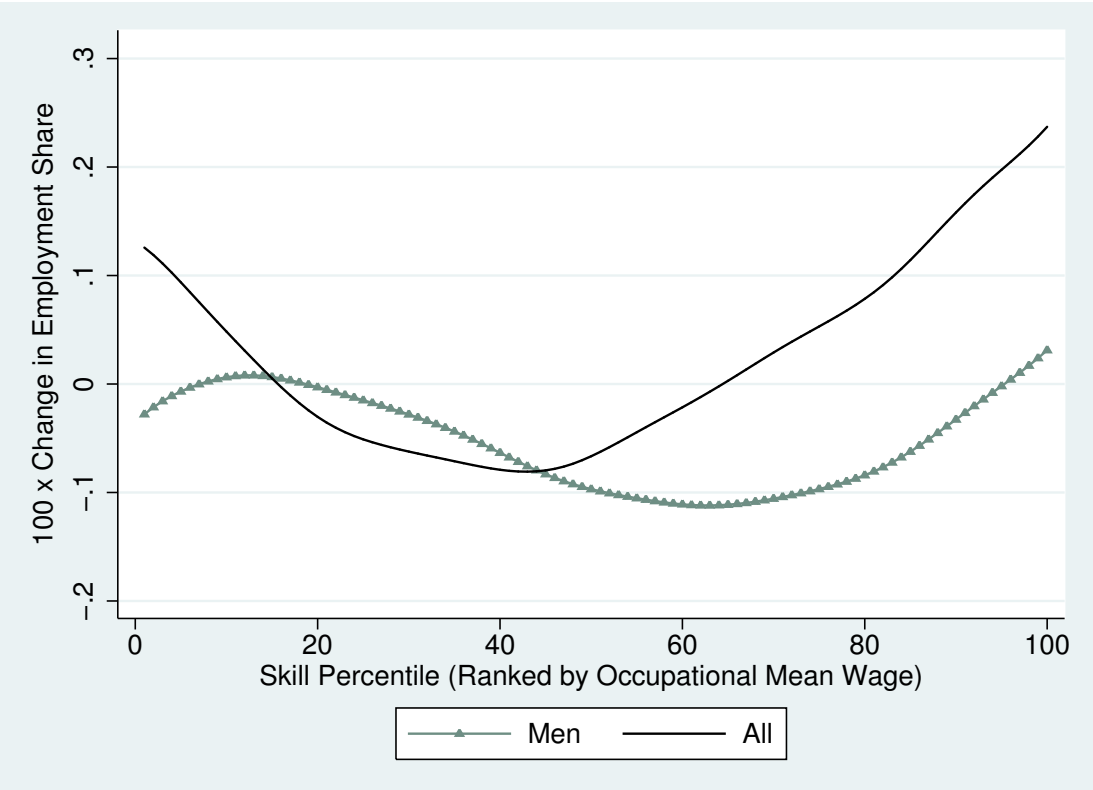
Topic

- Employment polarization US 1980-2008: increase in employment shares at bottom and top of skill distribution combined with decline in middle



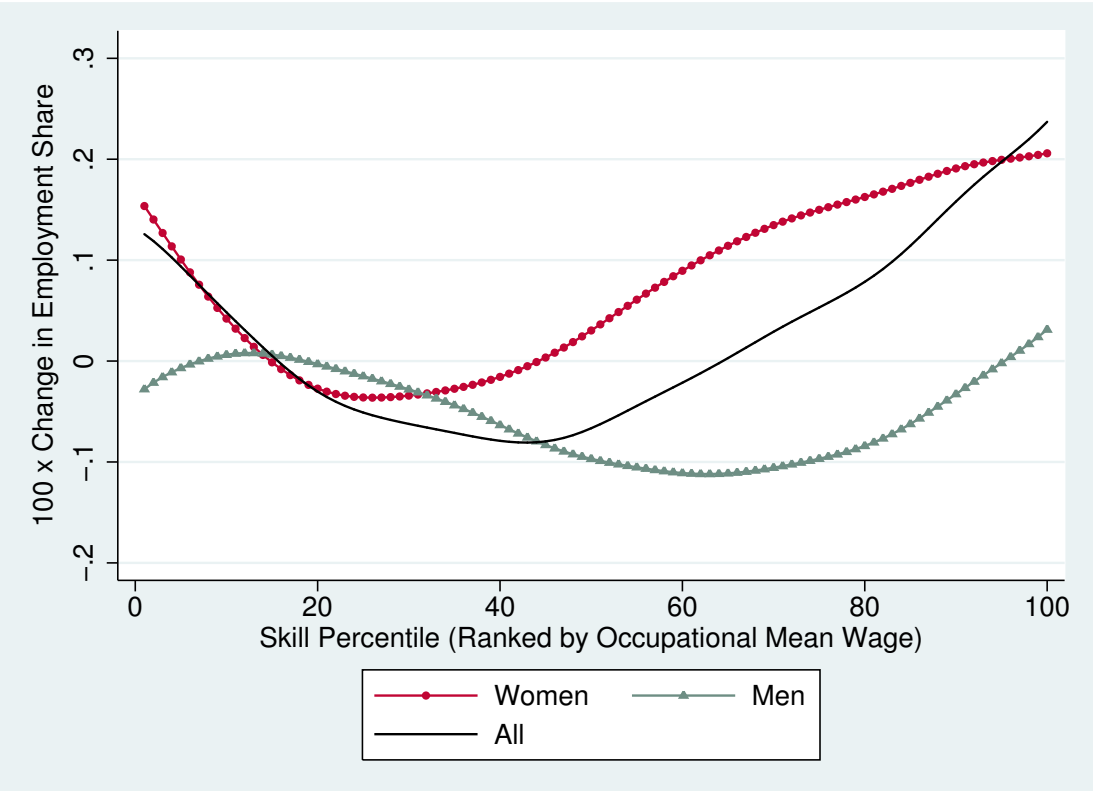
Acemoglu and Autor (2011): HLE

Demographics: Men



Census IPUMS 5 for 1980 and Census American Community Survey for 2008

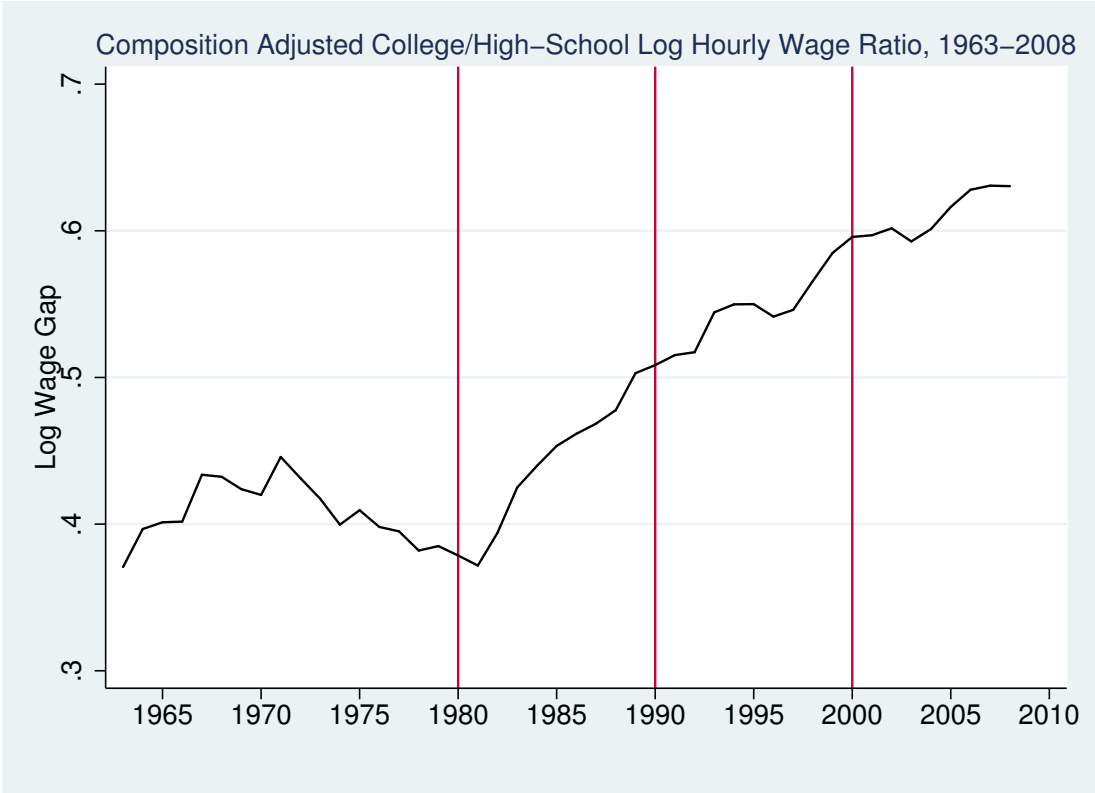
Demographics: Men vs. Women



Averages

What happens in the 80s? Education premium

- The education premium starts growing



Own computation data from Acemoglu and Autor (2011): HLE

- Main explanation: Skilled-biased technological change (AA, 2011)

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- Gender + multisector dimension $\Rightarrow$ polarization

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- EP in the calibrated model is due to women increasing participation asimmetrically along the skill distribution. SBTC key driver.
- Out of sample counterfactuals. SBTC can explain:
  1. why job-polarization emerges after 1980
  2. the clockwise tilting behavior during the 1980-2008

Literature/1

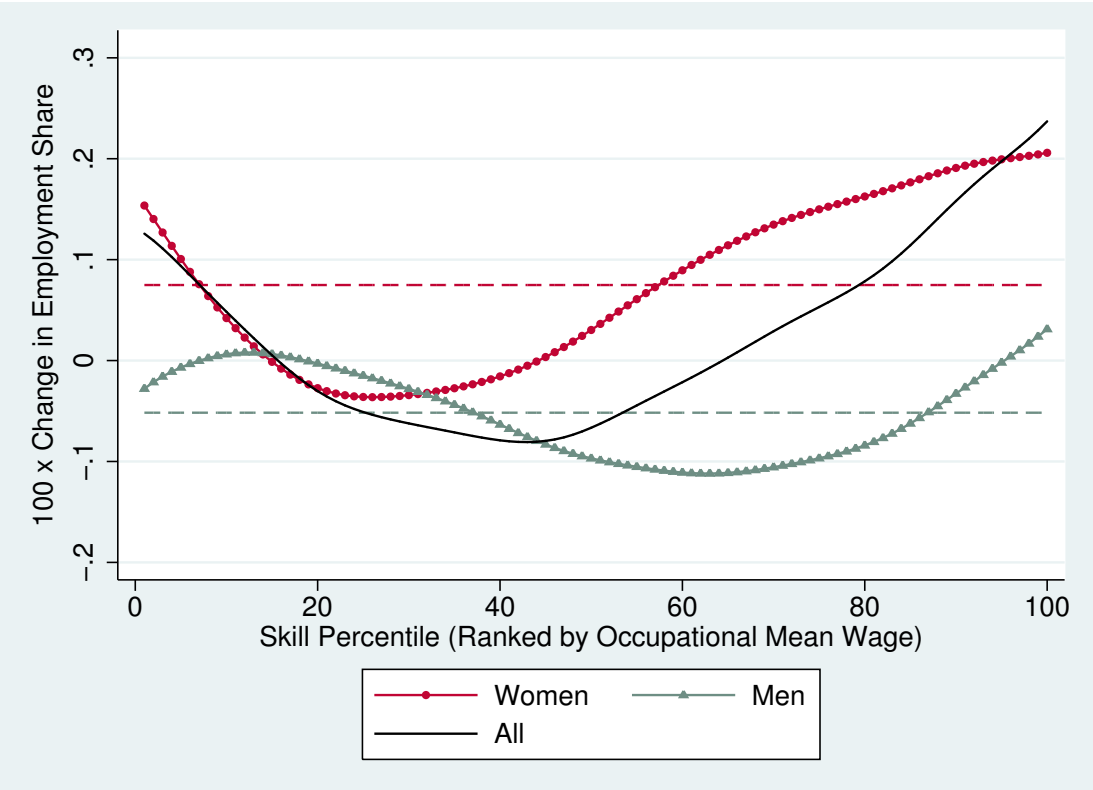
- Our story is consistent with
  - Eeckhout et al.(JPE, 2014): fat tails of the skill distribution in large cities in the U.S. where most of SBTC took place
  - Moretti, 2015: For each new high-tech job in a city, five additional jobs are ultimately created outside of the high-tech sector in that city, both in skilled occupations (lawyers, teachers, nurses) and in unskilled ones (waiters, hairdressers, carpenters)" (The New Geography of Jobs, p. 29)
  - Manning (2004 SJPE), Mazzolari and Ragusa (RESTAT 2013): consumption spillovers
  - We add the gender dimension, connect it to SBTC and provide quantitative estimate of the importance of this channel

Literature/2

- Three areas: employment polarization, structural change and gender.
  - Acemoglu and Autor (2011 HLE), Autor and Dorn (2013 AER), Barany and Siegel (2018, AEJ Macro), Manning (2004 SJPE), Mazzolari and Ragusa (2013 RESTAT), Rendall and Weiss (2016 EER);
  - Boppart (2014 ECMA), Caselli and Coleman (2001 JPE), Herrendorf et al. (2013 AER), Ngai and Pissarides (2007 AER), Ngai and Pissarides (2008 RED), Moro et al. (2017 AEJ Macro);
  - Rendall (2011), Guvenen and Rendall (2015 RED), Ngai and Petrongolo (2017 AEJ Macro), Heathcote, Storesletten and Violante (2010 JPE)
- Our contribution:
  - We explicitly connect these three fields in a quantitative macro model.
  - Generate graphs of employment polarization replicating the broad data features overall, by gender, by marital status, by sectors and by decades

Facts

Decomposing polarization by gender



$$All = \frac{H^f_{i,2008}}{H^f_{2008} + H^m_{2008}} - \frac{H^f_{i,1980}}{H^f_{1980} + H^m_{1980}} + \frac{H^m_{i,2008}}{H^f_{2008} + H^m_{2008}} - \frac{H^m_{i,1980}}{H^f_{1980} + H^m_{1980}}$$

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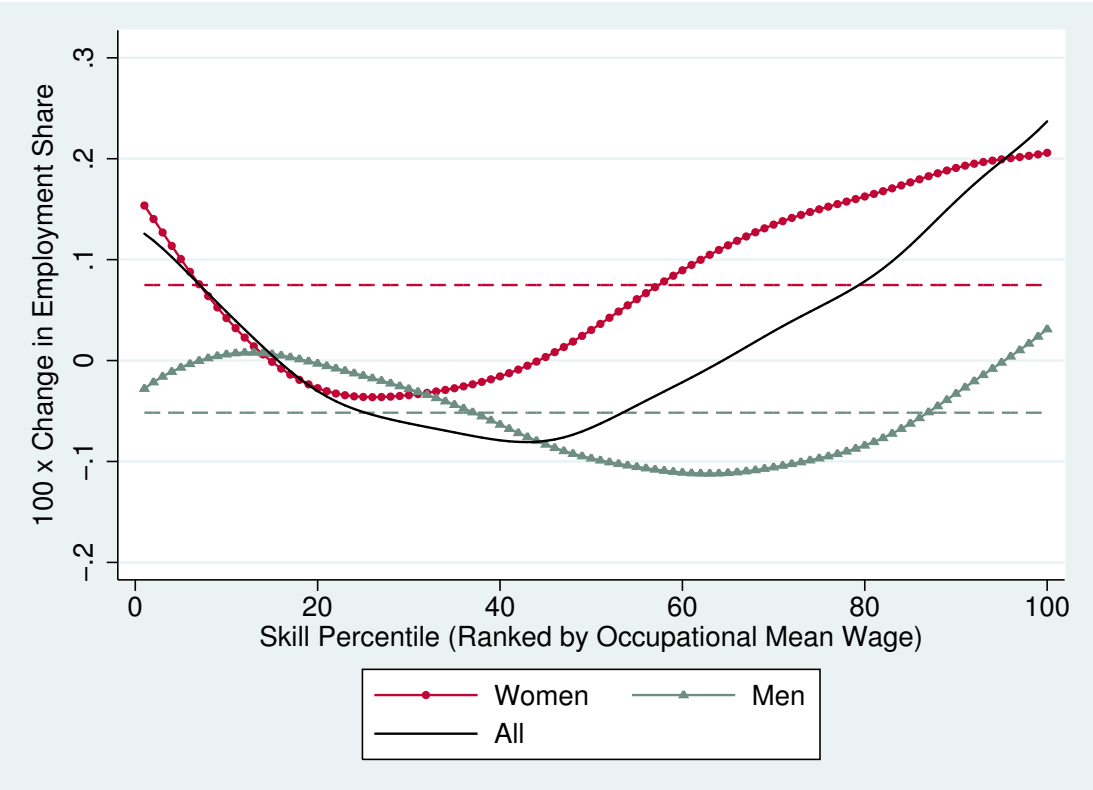

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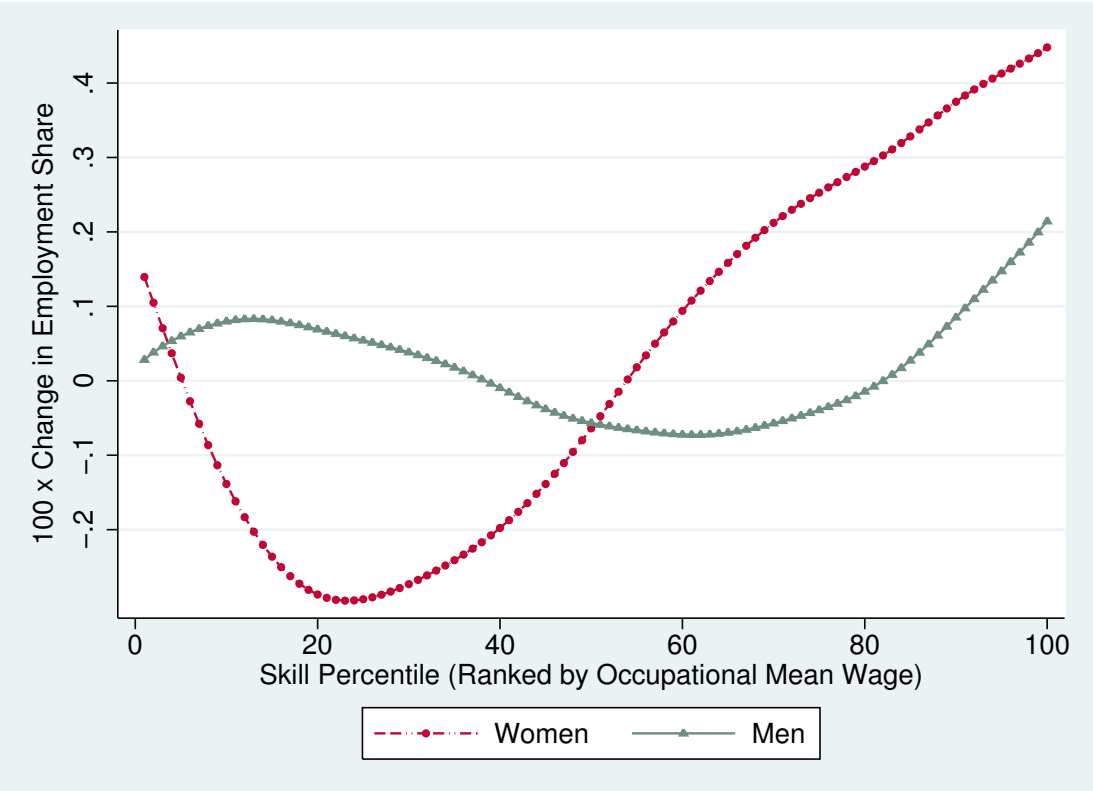
SD around the gender-specific mean is 0.084 for women and 0.044 for men

Polarization over gender-specific employment



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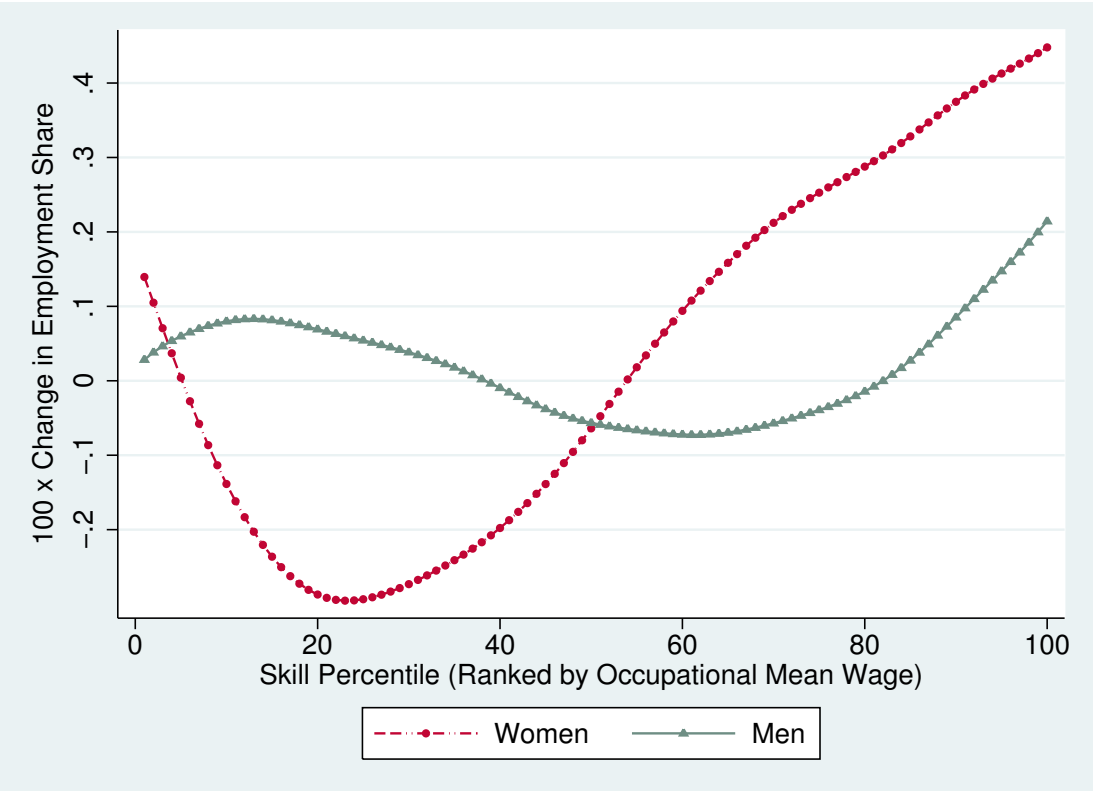

$$\frac{H^f_{i,2008}}{H^f_{2008}} - \frac{H^f_{i,1980}}{H^f_{1980}} \quad ; \quad \frac{H^m_{i,2008}}{H^m_{2008}} - \frac{H^m_{i,1980}}{H^m_{1980}}$$

SD around the 0 mean is now 0.24 for women and 0.07 for men

A polarization measure

- Inspired by Goos and Manning (2007, RESTAT) we fit the parabola

$$\triangle n_j = \beta_0 + \beta_1 j + \beta_2 j^2,$$

- where $j = 1, ..100$ is the percentile number and $\triangle n_j$ is the change in log-employment at percentile j.

Table: *Quadratic fit of the data*

	(1)	(2)	(3)
	All	Males	Females
β_1 - Rank	-0.784	-0.777	-1.083
S.E.	(0.552)	(0.612)	(0.694)
β_2 - Rank^2	0.978*	0.583	2.114**
S.E.	(0.530)	(0.587)	(0.665)
Observations	100	100	100
R-squared	0.055	0.026	0.330

Zoom on occupations

Table: Employment shares by occupation and gender - IPUMS 1 digit

Occupational Group	Wage	% Emp share 1980			Change in 2008		
		All	Male	Female	Aggregate	Male	Female
Managerial, professional	2,99	23,96	15,78	8,18	12,01	2,90	9,11
Precision production, craft, repair	2,85	13,80	13,09	0,72	-3,56	-3,45	-0,11
Operators, fabricators, laborers	2,62	21,75	16,28	5,47	-8,79	-5,91	-2,88
Technical, sales, admin support	2,52	30,04	12,65	17,39	-1,91	-0,89	-1,02
Farming, forestry, fishing	2,49	0,14	0,13	0,01	0,04	0,01	0,03
Service	2,30	10,30	4,90	5,40	2,22	0,66	1,55
TOTAL	2,68	100,00	62,84	37,16	0,00	-6,68	6,68

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- Managerial, professional occs: executives, inspectors, architects, engineers, computer, natural, social scientists, therapists, lawyers, teachers, artists
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  - About 80% in high-skill services (FIRE, Education, law, etc)
- Service occupations: food service workers, security guards, janitors and gardeners, cleaners, home health aides, child care workers, hairdressers and beauticians, and recreation occupations
  - About 50% in low-skilled services that correspond to home production activities in time use surveys. The rest in high-skill services

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- Women $\uparrow$ share in upper-tail occupations by more than 100%, men by 18%
- Women $\uparrow$ share in lower-tail occupations by about 30%, men by 13%
- Men and women (less) $\downarrow$ share in middle occupations (mostly manufacturing)

Model

Sketch of Environment: Markets

- **Markets**:
  - manufacturing goods (g),
  - modern services (ms),
  - substitutable services (ss), and
  - home sector (h)
- **Firms**: representative firm by sector - using educated/uneducated female/male labor efficiency units

Sketch of Environment: Households

- **Agents**: individuals by sex, $i = \{f, m\}$
- **Heterogeneous skills**:
  - in each market sector j ($a^i = [a^i_{ss}, a^i_g, a^i_{ms}, 1]$) - $a^i_j \sim U[\underline{a_j}, \overline{a_j}]$
- **Exogenous household size**: married or single
- **Education**: pay to increase skill levels a^i_j
- **Time**: work in market $(1 - l^i)$ and at home (l^i)

Education and Occupation Decision

- Education $e = 0, 1$ and sector j jointly chosen
- Paying a fixed cost $\chi^i \rightarrow e = 1$ and a^i_j becomes $\left(a^i_j\right)^{1+\zeta}$, for $j = ss, g, ms$
- If no cost is paid then $e = 0$ and the ability vector remains unchanged
- Given $[a^i_{ss}, a^i_g, a^i_{ms}]$ and wages per efficiency units, $\left[w^{i,e}_{ss}, w^{i,e}_g, w^{i,e}_{ms}\right]$, an agent i chooses (e, j) to maximize wage net of education costs.

Consumption and Time Allocation: Preferences

- 3 kinds of households z: couples c; single female f; single male m

$$U^z = \left((\omega_{ms})^{1/\sigma} \left(\frac{c^z_{ms}}{\kappa^z} \right)^{\frac{\sigma-1}{\sigma}} + (\omega_g)^{1/\sigma} \left(\frac{c^z_g}{\kappa^z} \right)^{\frac{\sigma-1}{\sigma}} + (\omega_s)^{1/\sigma} \left(\frac{\tilde{c}^z_{ts}}{\kappa^z} \right)^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$$

$$\tilde{c}^z_{ts} = \left(\psi \left(c^z_{ss} \right)^{\frac{\gamma-1}{\gamma}} + (1-\psi) \left(c^z_h \right)^{\frac{\gamma-1}{\gamma}} \right)^{\frac{\gamma}{\gamma-1}} + \bar{c}$$

- c^z_{ts}: aggregates of substitutable and home services; $\gamma > 1$ (substitutes)
- ms, g, ss market produced; h home services; $\sigma < 1$ (complements)
- κ^z is an index of economies of scale: $\kappa^c = 1.5 > \kappa^f = \kappa^m = 1$

Consumption and Time Allocation: Home Production

- **Time**: work in market $(1 - l^i)$ and at home (l^i).
- Home services are produced by,

$$Y_h^z = A_h L^z,$$

$$\begin{aligned} L^c &= \left[\varphi_h^c \left(l^f\right)^{\frac{\eta-1}{\eta}} + (1-\varphi_h^c)\left(l^m\right)^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}}, \\ L^f &= \left(\varphi_h^f\right)^{\frac{\eta}{\eta-1}} l^f, \\ L^m &= \left(\varphi_h^m\right)^{\frac{\eta}{\eta-1}} l^m \end{aligned}$$

- $z = c$: both male and female labor are used to produce home good.
- $z = f$, no male labor is available
- $z = m$, no female labor is available

Agent Optimization

$$\max_{\{l^z, c_{ms}, c_g, c_{ss}, c_h\}} U^z \quad s.t.$$

$$Y_h^z = A_h L^z$$

$$E^z = p_{ms} c_{ms}^z + p_g c_g^z + p_{ss} c_{ss}^z$$

$$\begin{aligned}
E^c &= W\left(a_{j^*}^i, w_{j^*}^{i,e^*}, e^*\right)(1-l^f) + W\left(a_{j^*}^i, w_{j^*}^{i,e^*}, e^*\right)(1-l^m), \\
E^f &= W\left(a_{j^*}^i, w_{j^*}^{i,e^*}, e^*\right)(1-l^f) \\
E^m &= W\left(a_{j^*}^i, w_{j^*}^{i,e^*}, e^*\right)(1-l^m).
\end{aligned}$$

Firms

- **Representative firm** in each market sector j=ms, ss, g.

$$Y_j = A_j N_j$$

where

$$N_j = \left[\phi_j \left(\varphi_j N_j^{f,1} + (1-\varphi_j) N_j^{m,1} \right)^{\frac{\eta_s - 1}{\eta_s}} + (1-\phi_j) \left(\varphi_j N_j^{f,0} + (1-\varphi_j) N_j^{m,0} \right)^{\frac{\eta_s - 1}{\eta_s}} \right]^{\frac{\eta_s}{\eta_s - 1}}$$

- $N_j^{i,e}$: aggregators of female/male labor efficiency units in sector j.
- SBTC through ϕ_j and GBTC through φ_j (Heathcote et al 2010 JPE)
- Representative firm operating in sector j maximizes profits,

$$\pi_j = p_j Y_j - w_j^{f,1} N_j^{f,1} - w_j^{m,1} N_j^{m,1} - w_j^{f,0} N_j^{f,0} - w_j^{m,0} N_j^{m,0}$$

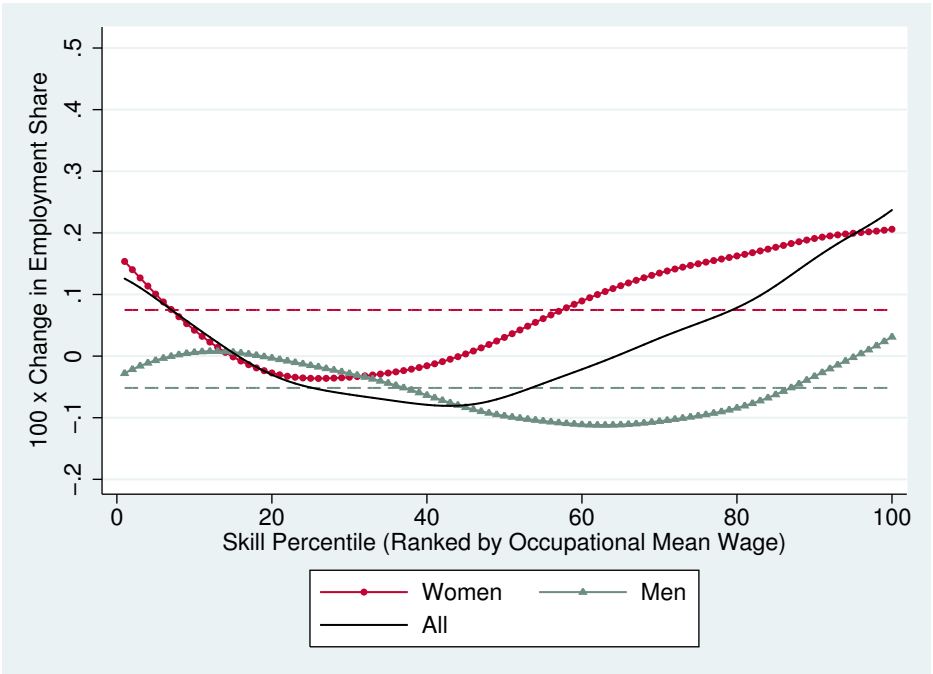
Results

Calibration and Exogenous Trends

- We calibrate the model to two equilibria to replicate a series of aggregate targets of the U.S. economy in the years 1980 and 2008
- With the implied values of the parameters we let the model speak and predict the distribution of the change in the employment share by skill
- Exogenous differences between the two equilibria
  1. SBTC (growth of ϕ_j);
  2. GBTC (growth of φ_j)
  3. Labor productivity (A_i)
  4. Marriage rates

⏩ Calibration

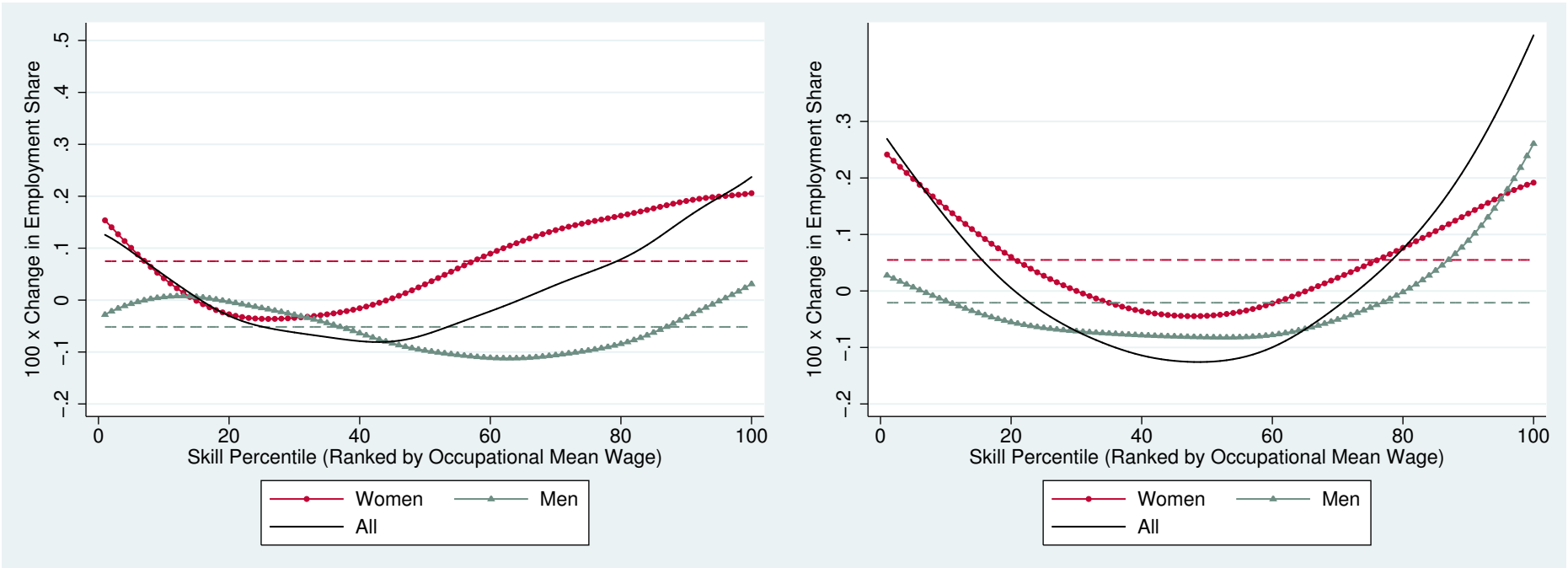
Polarization Graph: Gender



(a) Data

- Women generate most of the increase at the top and at the bottom
- Men reduces employment shares along most of the skill distribution except an increase at the top

Polarization Graph: Gender



(a) Data

(b) Model

- Women generate most of the increase at the top and at the bottom
- Men reduces employment shares along most of the skill distribution except an increase at the top (too pronounced in the model)

Quadratic fit of the data and the model

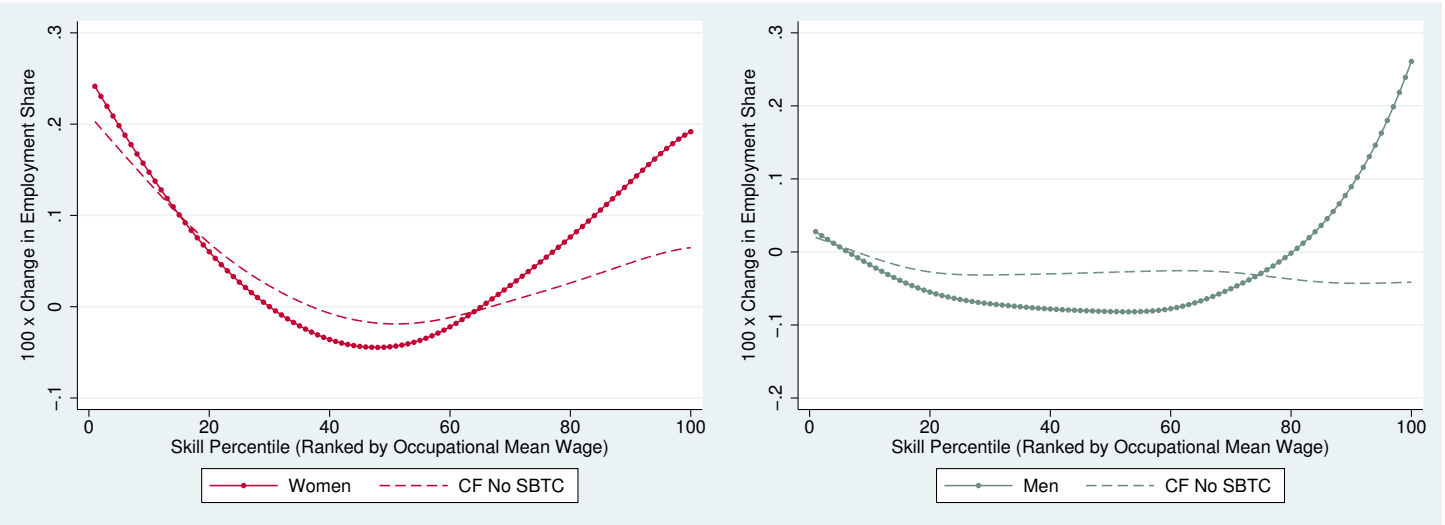
	Data			Model		
	A	M	F	A	M	F
Rank^2	0.978*	0.583	2.114**	2.102***	1.318***	3.883***
S.E.	(0.530)	(0.587)	(0.665)	(0.265)	(0.263)	(0.273)

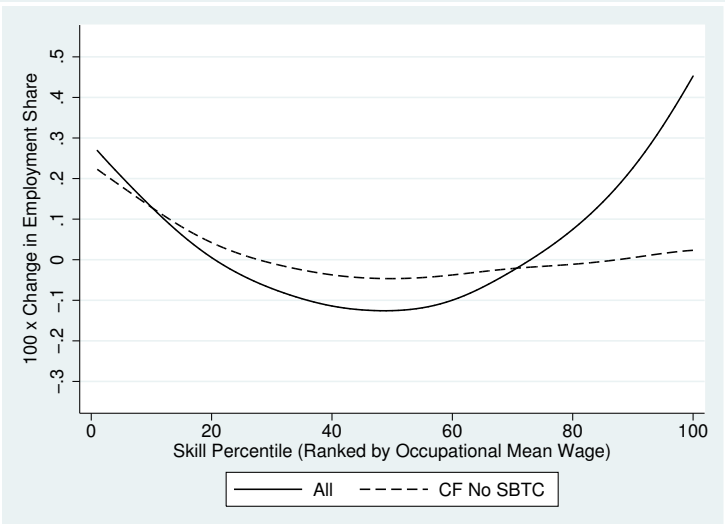
- Too much convexity with respect to the data.
- But relative polarization by gender is well-captured
- Ratio of the coefficient of one gender to the one for the aggregate:
  - Males/All: 0.60 (0.583/0.978) data; 0.63 (1.318/2.102) model
  - Females/All: 2.16 (2.114/0.978) data; 1.85 (3.883/2.102) model

⏩ Other Results

Conterfactual: no SBTC, $\gamma_{\phi_j} = 0$

- Overall polarization disappears; Some top-down complementarity

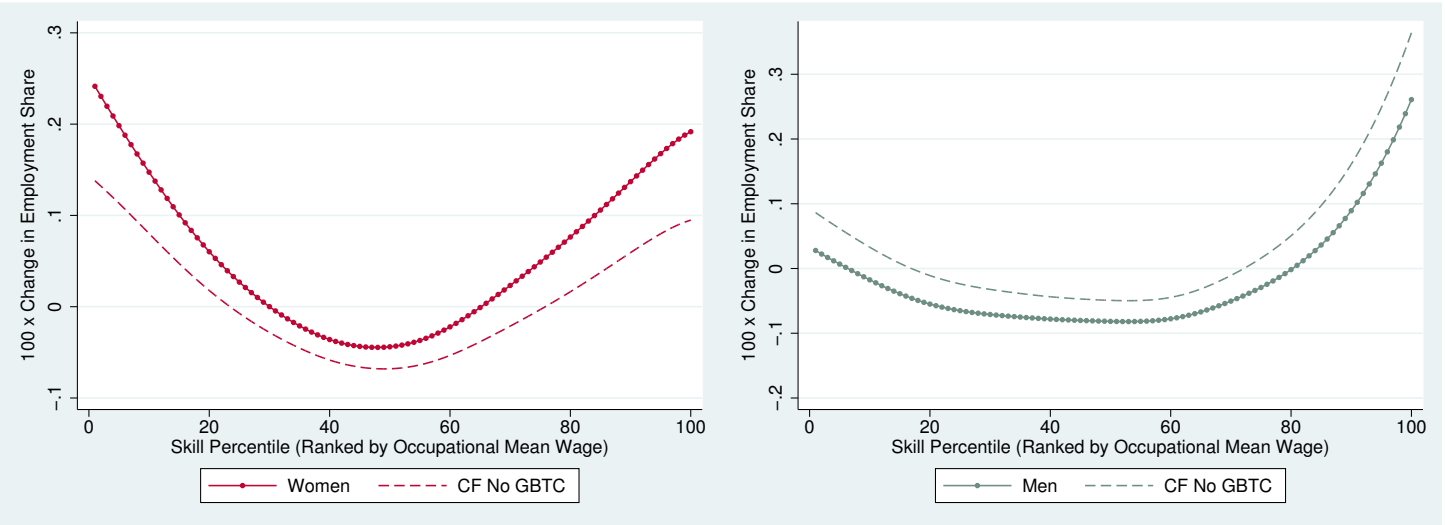


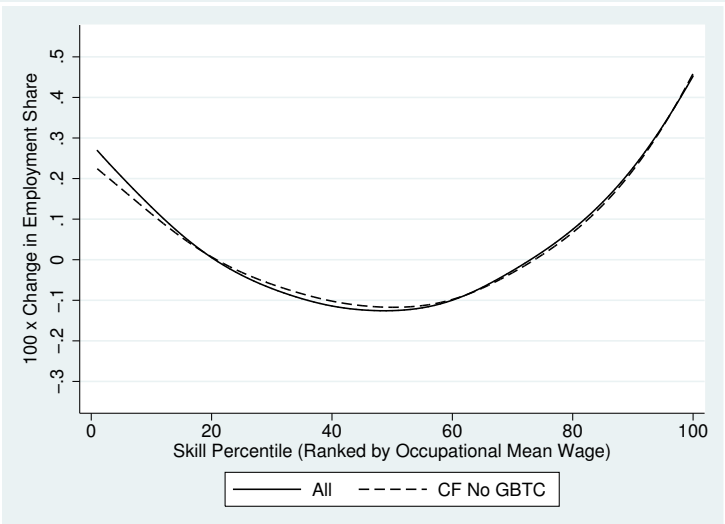


- Overall coeff on $rank^2$ drops from 2.102 to 0.785

Conterfactual: no GBTC $\gamma_{\varphi_j} = 0$

- GBTC shifts positions, no effects on the shape





- Overall coeff on $rank^2$ (only) drops from 2.102 to 1.951

Model Predictions over Time (1960-2008)

Pre-Polarization Era (1960-1980)

- Why did polarization start in the 1980s?
- Female employment started increasing after WWII

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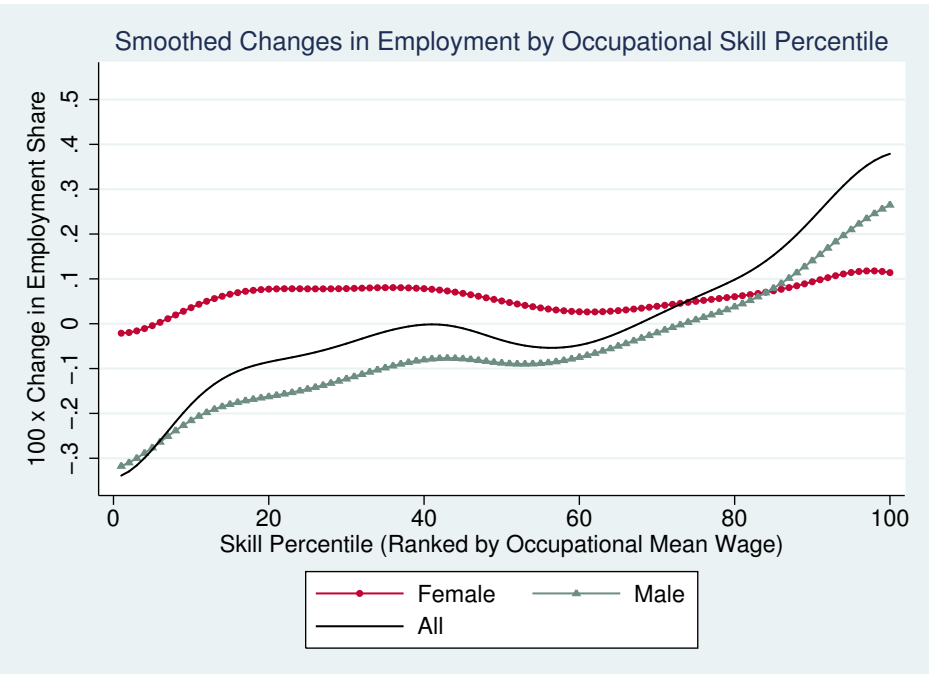
- Female employment started increasing after WWII
- Run the model backwards with exogenous channel 1960-80:
  - SBTC= -0.006 (vs. 0.013)
  - GBTC= 0.006 (vs. 0.005)
  - Home productivity growth 2.5% (Bridgeman 2016)
  - Demographic trends for the 1960 (marriage and education rates)
  - Tie our hands using SBTC and GBTC from Heathcote et al. (JPE, 2010)

Model Prediction (1960-1980)

- Changes of women employment flat along the skill distribution
- Men increasing monotonically and negative until 80th percentile
- No overall polarization



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(2) Model

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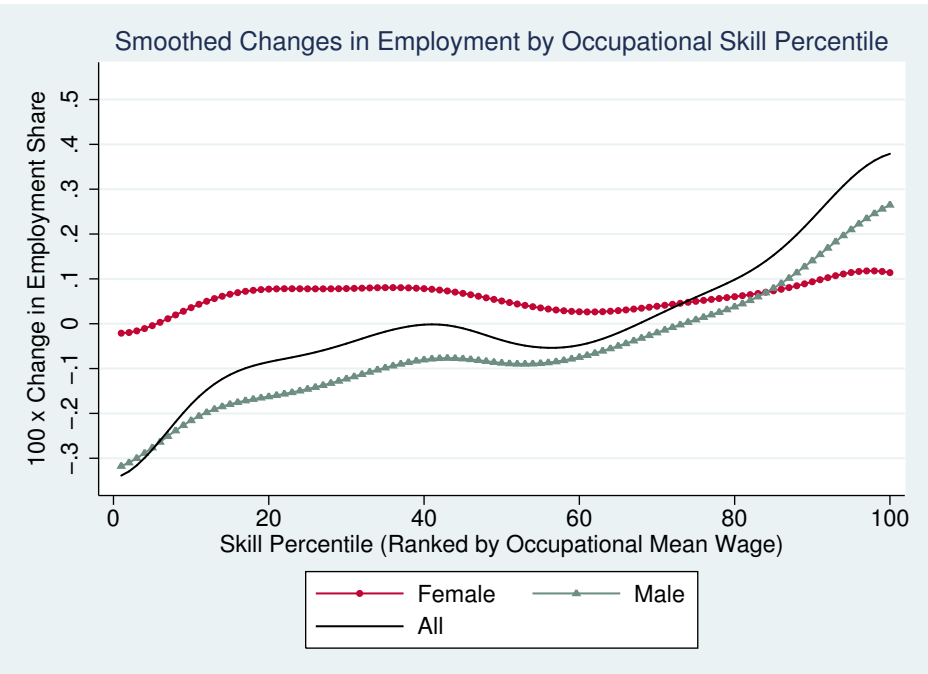

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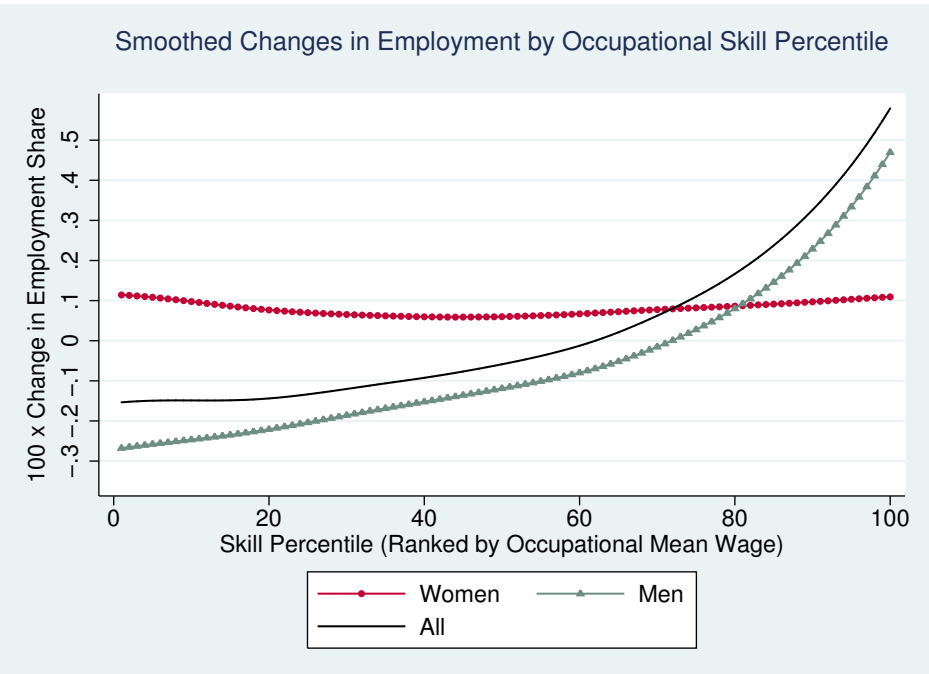
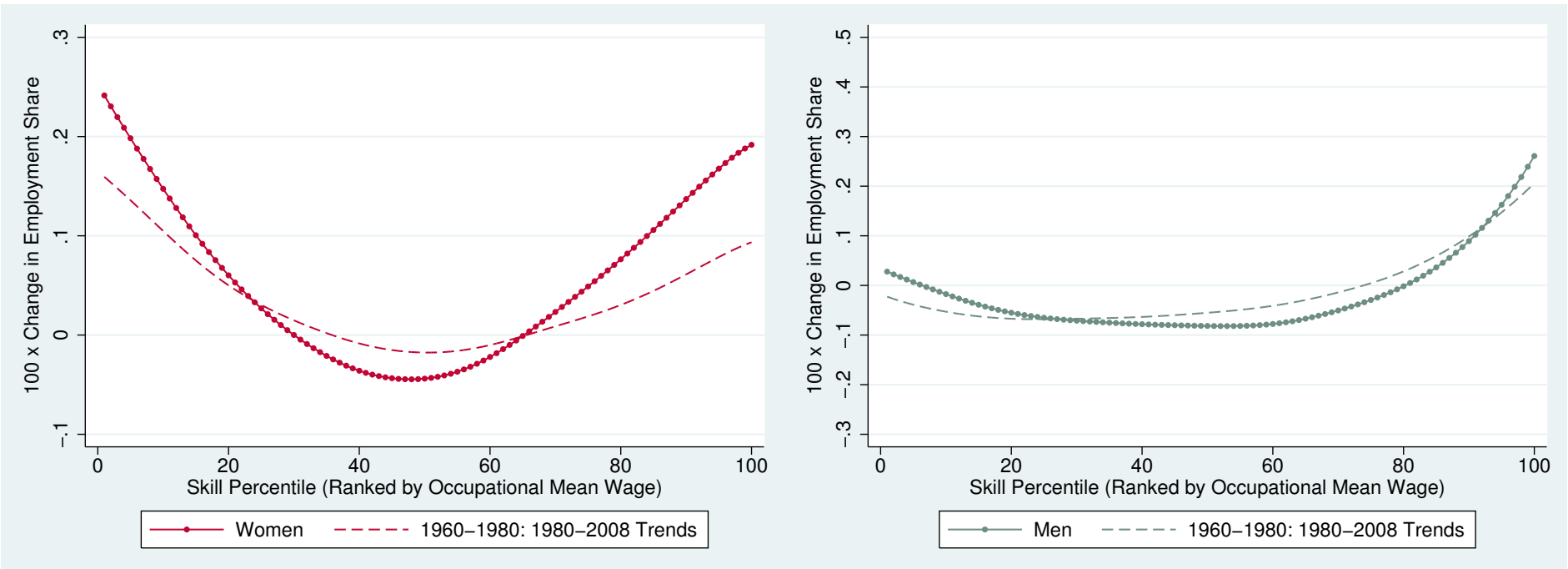


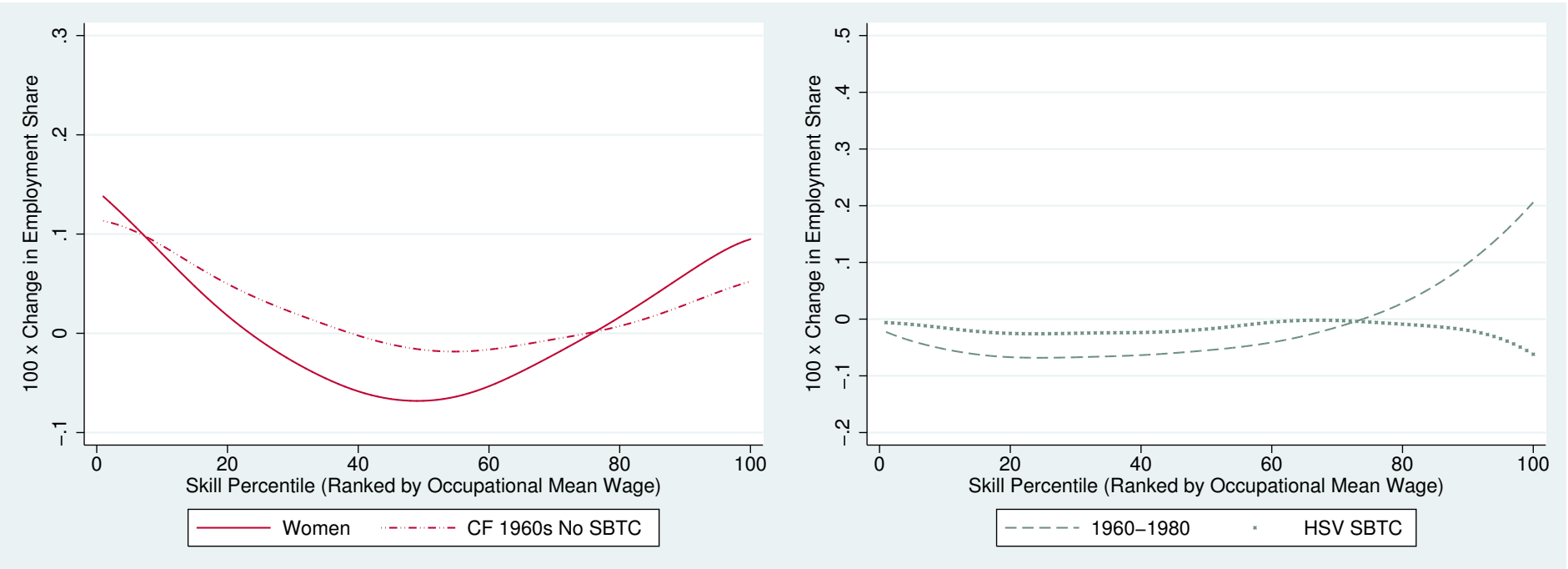
(2) Model

Model Prediction 1960-1980 with 1980-2008 Trends

- Men similar, women flatter
- 1980-2008 trends reduce polarization but not enough

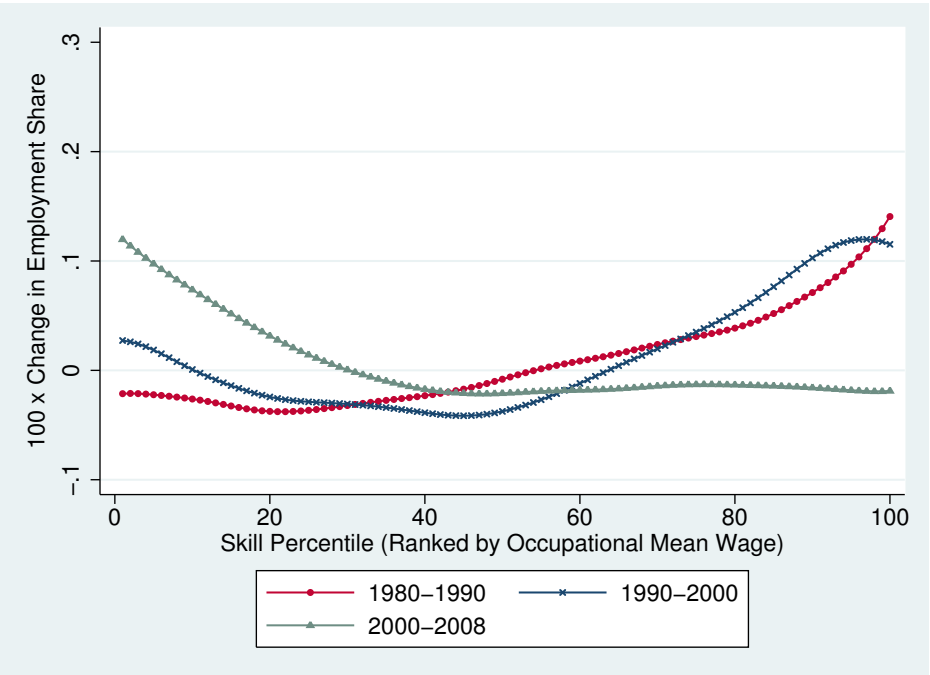


Drivers 1960-1980: SBTC counterfactuals



- Removing SBTC polarization is reduced for women

Decomposing Polarization by Decades



Data (Left) and Model (Right)

- Tilting behaviour: 1980-90 increasing, 2000-08 decreasing

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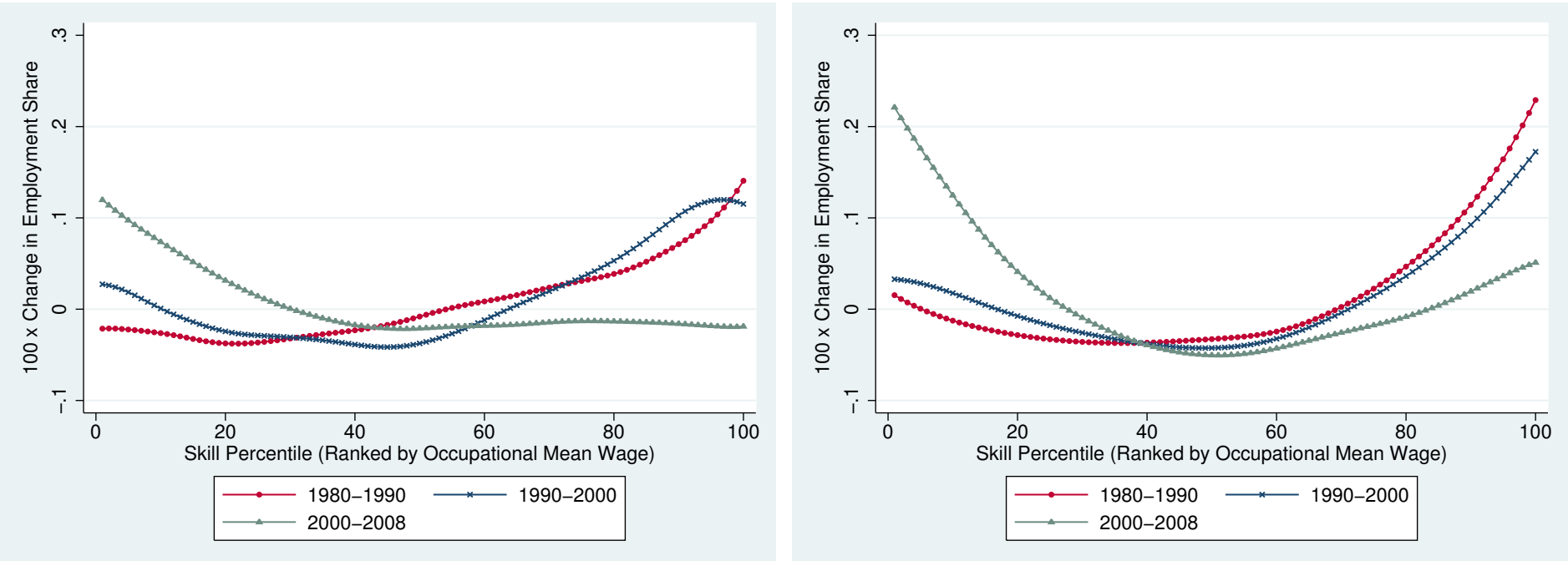


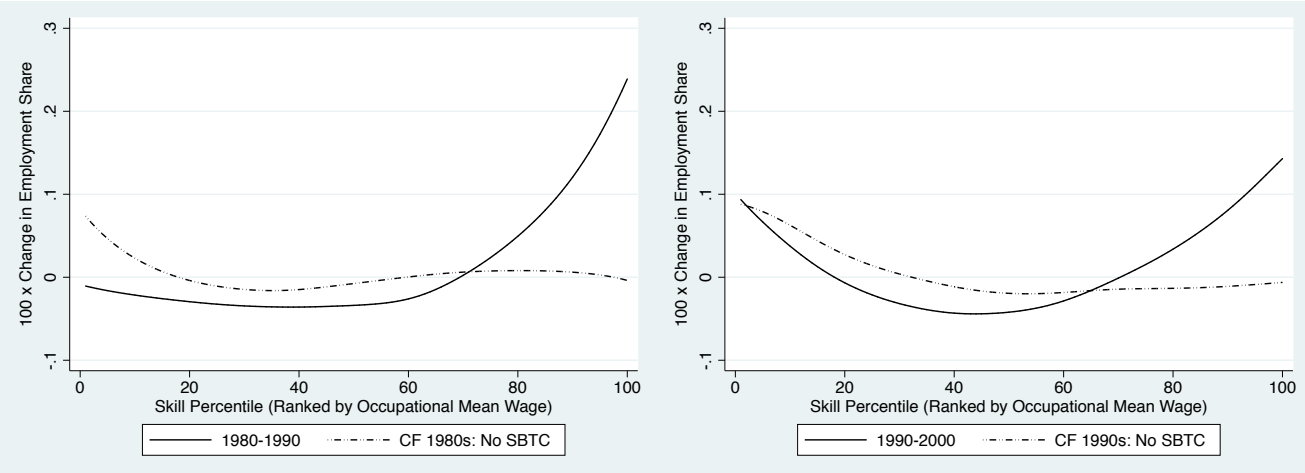
Data (Left) and Model (Right)

- Tilting behaviour: 1980-90 increasing, 2000-08 decreasing
- The model reproduces the tilting (top and bottom too high in 2000)
- Decade-specific SBTC: 80-90: 0.015; 90-00: 0.014; 00-08: 0.008

Decomposing Polarization by Decades: intuition

- Main driver: changing effect over time of SBTC on (female) employment shares.
- **Direct effect**: increase in wages and employment shares of educated/skilled individuals
- **Indirect effects**
  - Consumption spillovers from the skilled (who work less at home) to the unskilled due to a rise in the demand for ss-services
  - Production spillovers q-complementarity in production between educated and uneducated workers (more lawyers requires more cleanings/cooking etc.)
- In the model, the direct effect dominates in the first and second decade, while the indirect effects dominate in the last decade.

Polarization by Decades: SBTC counterfactuals



- Removing SBTC the tilting behaviour disappears

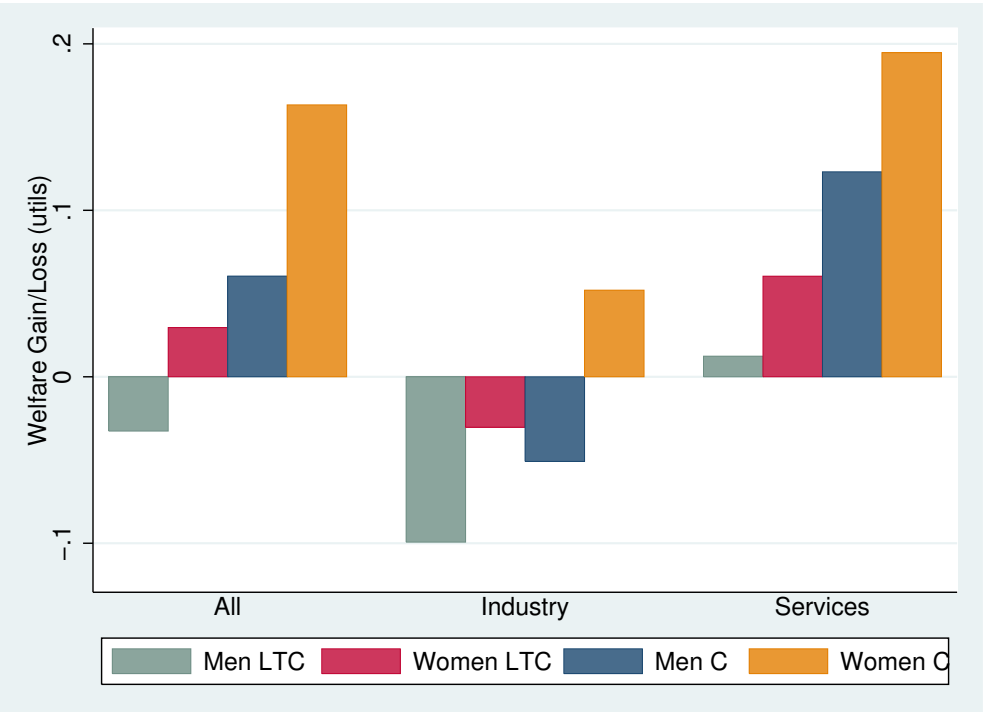
Conclusion

Summary

- Multi-sector general equilibrium model of sectoral and educational choice differentiated by gender and household type
- The calibration replicates the broad features of the data:
  - By gender: women responsible for the increase at the bottom and top;
  - By marital status: couples display more gender differences
  - By sector/gender: U-shape in services for women mainly
- It predicts polarization patterns in 1960-80 and 1980-2008 by decades
- SBTC main driver for the U-shape both at the top and at the bottom
  - Directly $\uparrow$ work hours for (married) educated women on h-s services
  - Indirectly $\uparrow$ work hours for (single) unskilled women in l-s services
  - Men globally reduce employment share and contribute to dip the middle

Open questions and extensions

- Can we reconcile RBTC with the observed gender differences?
- Spatial implications? (Eeckhout et al. 2014 JPE: large cities have fatter tails in the skill distribution, compatible with spillovers)
- Policy implications?
  - Who loses? There are 45.6 % relative losers (predict voting behaviour?)
  - Biggest losers and winners from polarization:



Analytical Results

Education and Occupation Decision

- Education $e = 0, 1$ and sector j jointly chosen
- If $e = 1$
  - by paying a fixed cost χ^i, a_j^i becomes $\left(a_j^i\right)^{1+\zeta}$, with $j = ss, g, ms$
- Given a^i and equilibrium wages $w_j^{i,e}$, an agent of gender i chooses $(e^*, j^*) \in \{0, 1\} \times \{ss, g, ms\}$ to maximize wage net of education costs,

$$(e^*, j^*) = argmax_{(e,j)} \left[w_j^{i,e} \left(a_j^i\right)^{(1+e\zeta)} - e\chi^i \right]$$

- pre-1980: Low incentive to educate for uneducated women because of
  - High gender wage gap $\frac{w_j^{m,e}}{w_j^{f,e}}$
  - Low education premium $\frac{w_j^{i,1}}{w_j^{i,0}}$ (this was true for men as well)

Firms

- Representative firm operating in sector j maximizes profits
- First order conditions imply,
  - Gender wage gap by sector and skill: $\frac{w_j^{f,e}}{w_j^{m,e}} = \frac{\varphi_j}{1-\varphi_j}$
  - Skill premium by sector: $\frac{w_j^{m,1}}{w_j^{m,0}} = \frac{\phi_j}{(1-\phi_j)} \frac{\left(\varphi_j N_j^{f,1} + \left(1-\varphi_j\right) N_j^{m,1}\right)^{-\frac{1}{\eta_s}}}{\left(\varphi_j N_j^{f,0} + \left(1-\varphi_j\right) N_j^{m,0}\right)^{-\frac{1}{\eta_s}}}$
  - Sector prices:

$$p_j = \frac{1}{A_j} \left(\phi_j^{\eta_s} \left(\frac{w_j^{m,1}}{(1-\varphi_j)} \right)^{1-\eta_s} + (1-\phi_j)^{\eta_s} \left(\frac{w_j^{m,0}}{(1-\varphi_j)} \right)^{1-\eta_s} \right)^{\frac{1}{1-\eta_s}}$$

Home production and Substitutable services

- Individuals always chase highest wage returns
- Ratio of home services versus substitutable services is

$$\frac{c_h^z}{c_{ss}^z} = \left(\frac{p_{ss}}{p_h^z}\right)^{\gamma} \left(\frac{1-\psi}{\psi}\right)^{\gamma}$$

  - with implicit home good price, p_h^z

$\Rightarrow$ Higher home price: demand relatively more subsitutable services and work less at home

Single's Price of Home Production

- Implicit home good price: $p_h^* = \frac{W\left(a_{j*}^i, w_{j*}^{i,e^*}, e^*\right)}{A_h} \left(\varphi_h^i\right)^{-\frac{\eta}{\eta-1}}$
- Singles "buy" less home services and work more in the market if
  - more skilled (high a_{j*}^i)
  - works in high-wage sector (high w_{j*}^{i,e^*})
- GBTC increases home price for women.
- SBTC increases home price for educated.

Couples' Price of Home Production

- Interior solution, ratio of home labor is,

$$\frac{l^f}{l^m} = \left(\frac{\varphi_h}{1-\varphi_h} \frac{W\left(a_{j^*}^m, w_{j^*}^{m,e^*}, e^*\right)}{W\left(a_{j^*}^f, w_{j^*}^{f,e^*}, e^*\right)} \right)^{\eta}.$$

- Women (men) work more at home if men (women) earn more in the market (through wages, ability or education)
- Implicit price for home services is,

$$p_h^k = \frac{1}{A_h} \left[\varphi_h^{\eta} \left[W\left(a_{j^*}^i, w_{j^*}^{i,e^*}, e^*\right) \right]^{1-\eta} + (1-\varphi_h)^{\eta} \left[W\left(a_{j^*}^m, w_{j^*}^{m,e^*}, e^*\right) \right]^{1-\eta} \right]^{\frac{1}{1-}}$$

- Home services are more expensive for couples that earn higher wages (more skilled/ educated)

◂ Return

Calibration

Sectors

- Services:
  - From time use surveys we pick activities that are considered home production: "cooking", "house work", "odd jobs", "gardening", "shopping", "child care", "domestic travel".
  - Use 1990 CENSUS classification (3 digits) to choose industries that produce an output that corresponds to the home production activities in time use surveys.
  - Bus service and urban transit; Taxicab service; Retail bakeries; Eating and drinking places; Private households; Laundry, cleaning, and garment services; Beauty shops; Barber shops; Dressmaking shops; Nursing and personal care facilities; Child day care services.

Predetermined parameters

Predet.	**Type**	**Value**
σ	Ngai and Pissarides (2008)	0.3
γ	Ngai and Pissarides (2008)	2.3
η	Knowles (2013)	3
η_s	Heathcote, Storesletten, and Violante (2010)	1.43
γ_h	Bridgman (2016) and Moro, Moslehi, and Tanaka (2017)	0.001

- Remaining 28 parameters are calibrated to match 28 moments

Targets (I)

Type	**Data**	**Model**
1980 - ability $\left(\{\underline{a}_j, \overline{a}_j\}_{j=ms,ss,g}\right)$		
Male industry to substitutable services wage	1.33	1.41
Male modern to substitutable services wage	1.42	1.48
Std dev of industry log male wages	0.27	0.31
Std dev of substitutable services log male wages	0.28	0.28
Std dev of modern services log male wages	0.29	0.34
1980 - consumption $\left(\{\omega_j\}_{j=ms,ss,g}\right)$		
Hours share in industry	0.35	0.35
Hours share in substitutable services	0.59	0.57
1980 - home production $\left(\psi, \varphi_h^c, \varphi_h^f, \varphi_h^f\right)$		
Labor hours share married male	0.78	0.95
Labor hours share single male	0.61	0.51
Labor hours sharemarried female	0.34	0.36
Labor hours share single female	0.49	0.48

Targets (II)

Type	**Data**	**Model**
1980 - gender weights in the market $(\{\varphi_j\}_{j=ms,ss,g})$		
Gender Wage Gap aggregate	0.59	0.46
Female to male industry-hours gap	0.32	0.32
Female LS to HS hours gap	0.17	0.14
1980 - education ability returns $(\zeta, \{\phi_{j,1980}\}_{j=ms,ss,g})$		
Female college wage premium	1.57	1.62
Male college wage premium	1.54	1.65
Share of LTC Hours in manufacturing	0.88	0.84
Share LTC Hours in low-skilled services	0.92	0.79
1980 - Mean of education cost (μ_χ^m, μ_χ^f)		
Fraction of educated men in 1980	0.16	0.16
Fraction of educated women in 1980	0.13	0.13
Variance of education cost $(\sigma_\chi^m, \sigma_\chi^f)$		
Fraction of educated men in 2008	0.28	0.27
Fraction of educated women in 2008	0.27	0.27

Targets (III)

Type	**Data**	**Model**
2008/1980 ratios - Non-hom. and product. $(\bar{c}, \{A_j\}_{j=ms,ss,g})$		
Hours in industry	0.67	0.72
Hours in modern services	1.24	1.28
Industry to substitutable services wage	0.99	0.94
Modern to substitutable services wage	1.19	1.10
2008/1980 ratios - SBTC and GBTC $(\{\gamma_j\}_{j=\phi,\varphi})$		
Gender wage gap (change over time)	1.25	1.28
Relative college wages (change over time)	1.28	1.33

Parameters (1)

Parameter	Type	Value
$\{\underline{a}_{ss}, \overline{a}_{ss}\}$	substitutable services ability	$\{0.50, 3.37\}$
$\{\underline{a}_{ms}, \overline{a}_{ms}\}$	modern services ability	$\{1.05, 4.87\}$
$\{\underline{a}_{g}, \overline{a}_{g}\}$	manufacturing ability	$\{0.77, 4.40\}$
ω_{ms}	Consumption market weights	0.43
ω_{g}	Consumption market weights	0.33
ψ	Low-skilled market service weight	0.25
φ_h^c	Home female-labor weight	0.54
φ_h^f	Single female home labor weight	0.41
φ_h^m	Single male home labor weight	0.50
φ_{ms}	Female-labor weight in high skilled services	0.34
φ_{g}	Female-labor weight in manufacturing	0.31
φ_{ss}	Female labor weight in low-skilled services	0.37

Parameters (2)

Parameter	Type	Value
ζ	Education productivity factor	0.21
χ^f	Cost of education female	0.64
χ^m	Cost of education male	1.25
σ_χ^f	Variance of the cost of education female	0.94
σ_χ^m	Variance of the cost of education male	1.05
$\phi_{ms,1980}$	Educated weight in modern services	0.34
$\phi_{g,1980}$	Educated weight in manufacturing	0.32
$\phi_{ss,1980}$	Educated weight in substitutable services	0.38
$\bar{c}$	Non-homothetic component	-0.09
γ_h	Annual growth in A_h	0.001
γ_{ms}	Annual growth in A_{ms}	0.004
γ_{ss}	Annual growth in A_{ss}	0.017
γ_g	Annual growth in A_g	0.034
γ_ϕ	SBTC (annual growth rate in ϕ_j)	0.013
γ_φ	GBTC (annual growth rate in φ_j)	0.005

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Mapping Model and Data

- In the data occupations are ranked using wage as a proxy for skills;
- Our take on an occupation is a set of skills;
- Model's counterpart is a group of agents with similar skills;
- Popular alternative: an occupation is a set of tasks (to be performed).

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Demographic Trends

	1980	2008
Singles		
Male	0.23	0.31
Female	0.26	0.30
Share Educated		
Single Men	0.16	0.19
Single Women	0.13	0.23
Married Men	0.20	0.34
Married Women	0.13	0.32
Couple Types		
Educated Couples	0.09	0.22
Educated Husband Only	0.11	0.12
Educated Wife Only	0.04	0.10
Uneducated Couples	0.76	0.56

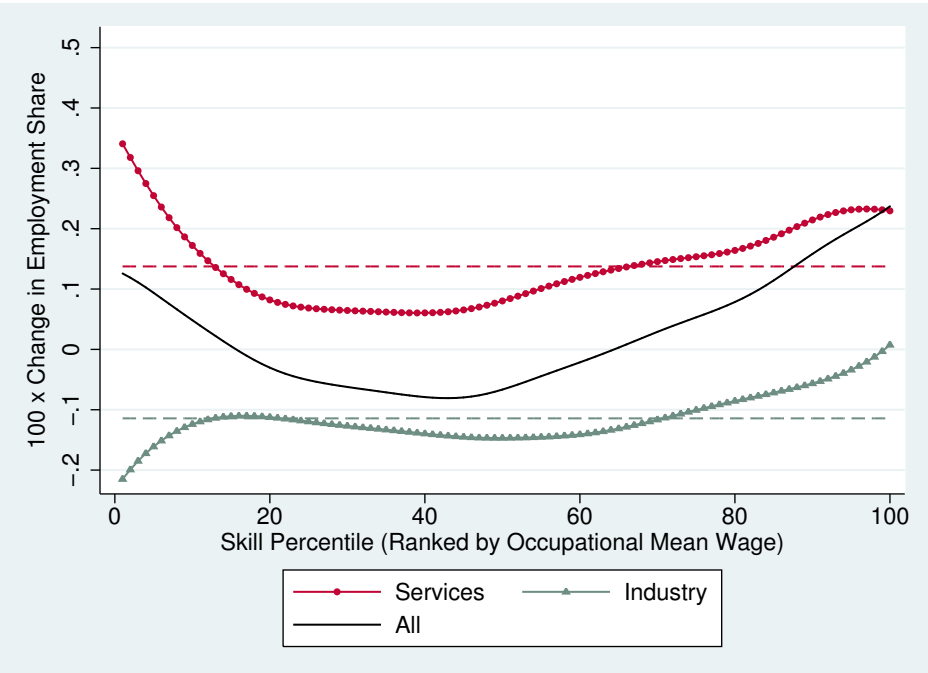
Aggregate Results

Table: *Aggregate Results*

	Data			Model		
	1980	2008	*Diff.*	1980	2008	*Diff.*
Hours (market)						
Men	0.72	0.71	-0.01	0.81	0.72	-0.09
Women	0.39	0.52	0.14	0.40	0.45	0.05
Educated Men	0.83	0.82	-0.01	0.84	0.80	-0.04
Educated Women	0.49	0.62	0.14	0.41	0.47	0.06
Uneducated Men	0.70	0.66	-0.04	0.81	0.70	-0.11
Uneducated Women	0.37	0.49	0.11	0.40	0.44	0.04
Married Men	0.78	0.79	0.01	0.95	0.90	0.05
Married Women	0.34	0.50	0.16	0.36	0.43	0.07
Single Men	0.61	0.61	0.00	0.51	0.50	-0.01
Single Women	0.49	0.56	0.07	0.48	0.47	-0.01

Other results

Polarization Graph: Sectors



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- Polarization in services, less in manufacturing

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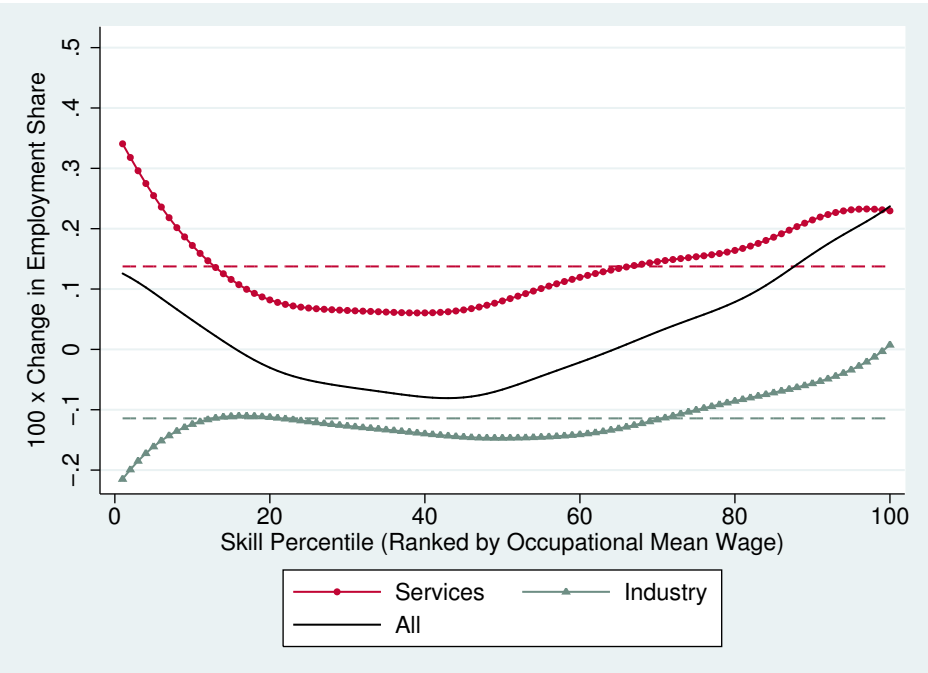

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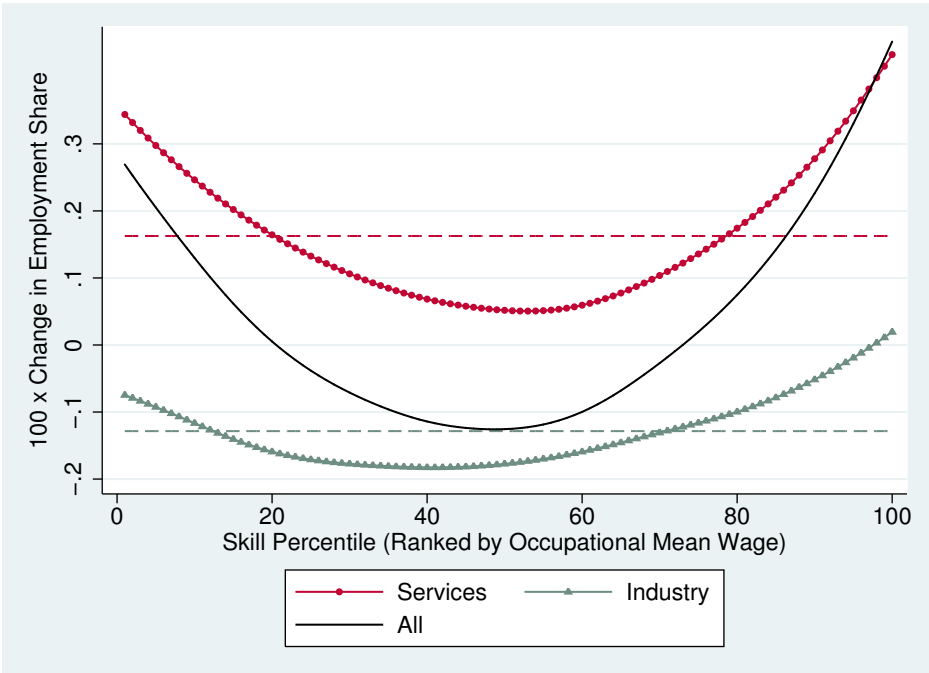

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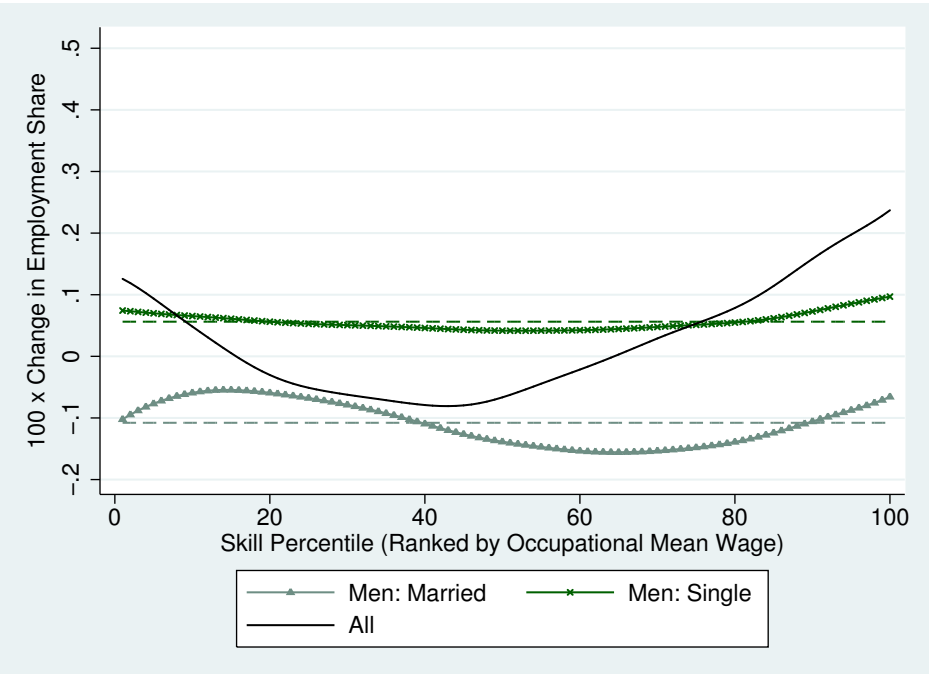
Polarization Graph: Gender and Marital Status



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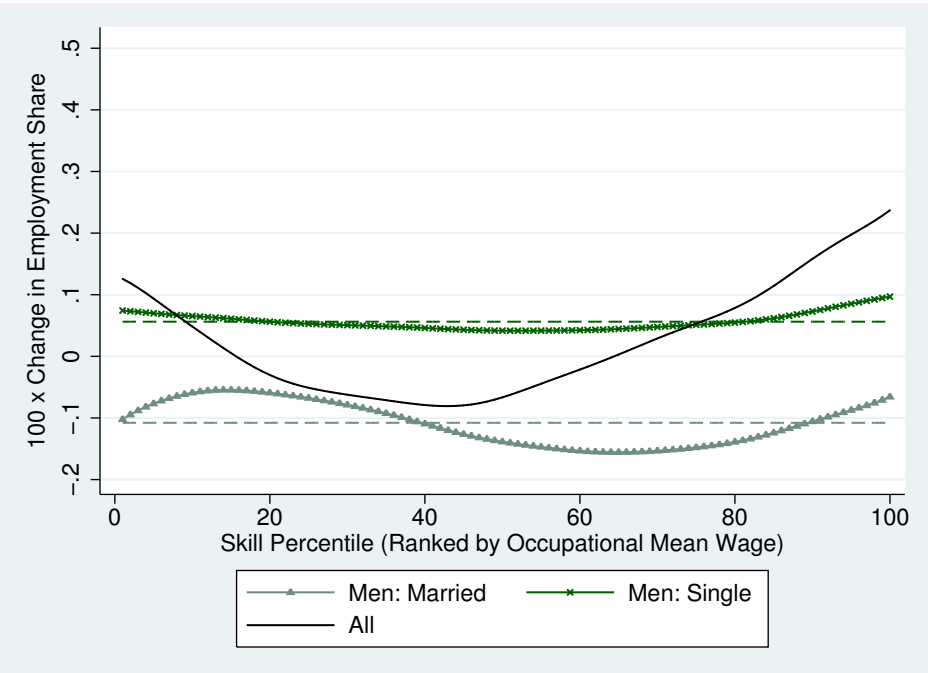

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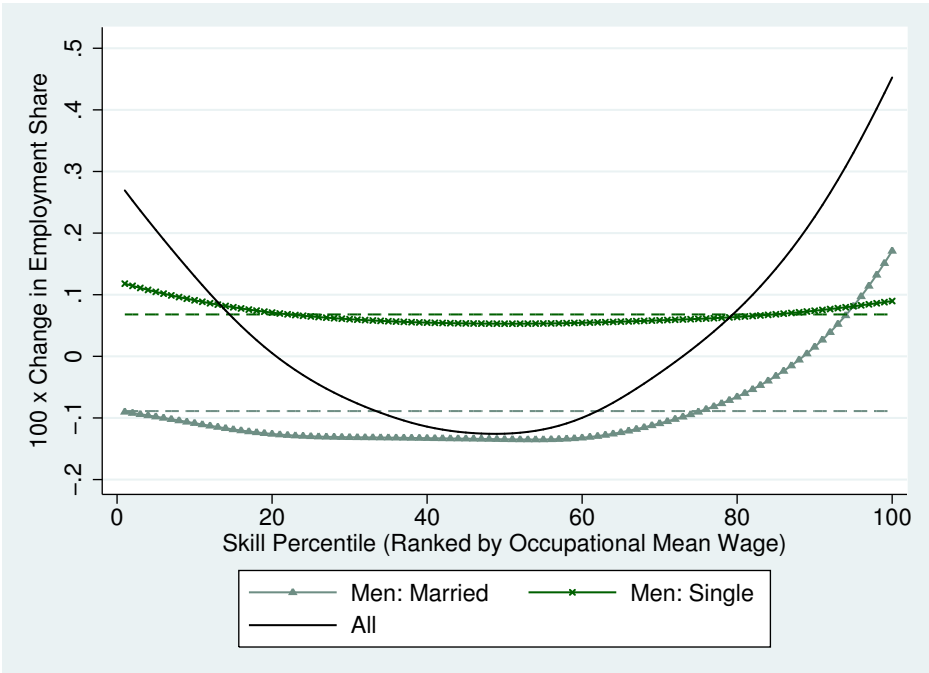

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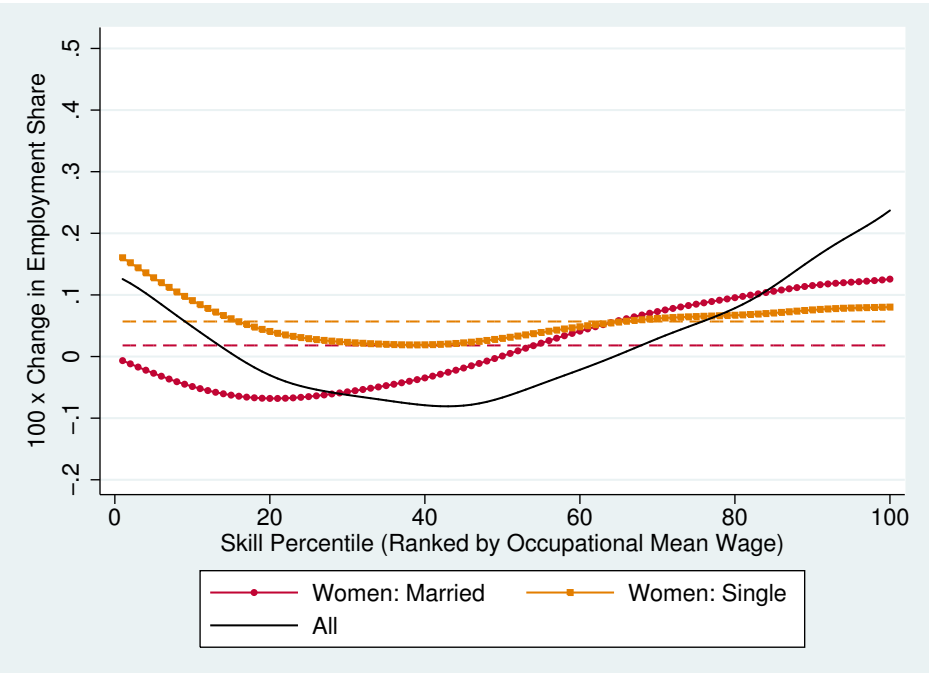

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- Couples reallocate working hours within the family
  - Singles flatter than married
  - Much less gender difference among singles
- Married women at the top, single women at the bottom
  - The former educate faster (2.53 times in 2008 vs. 1.8)

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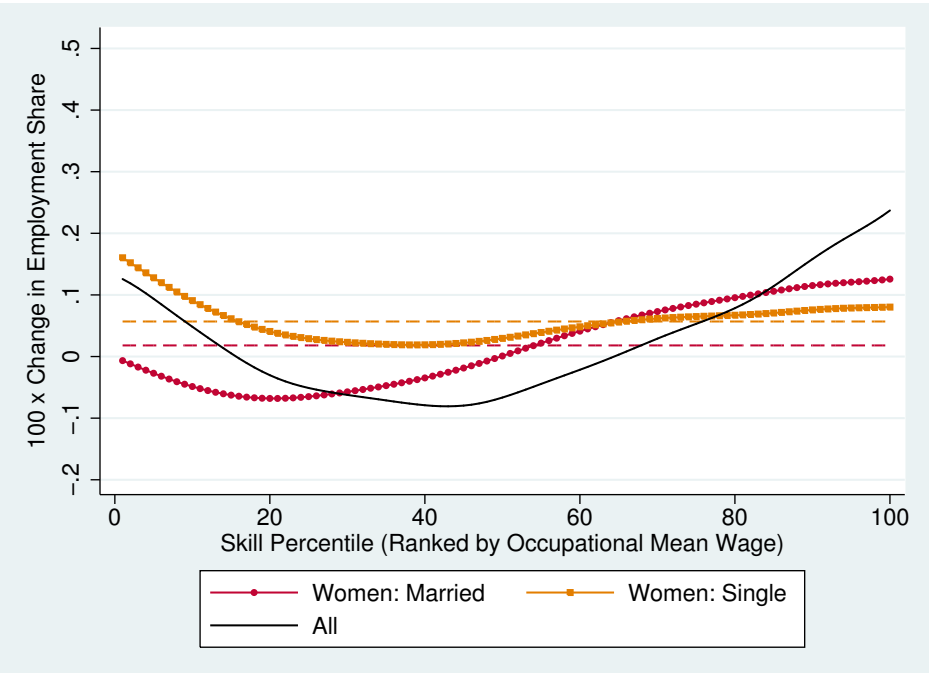

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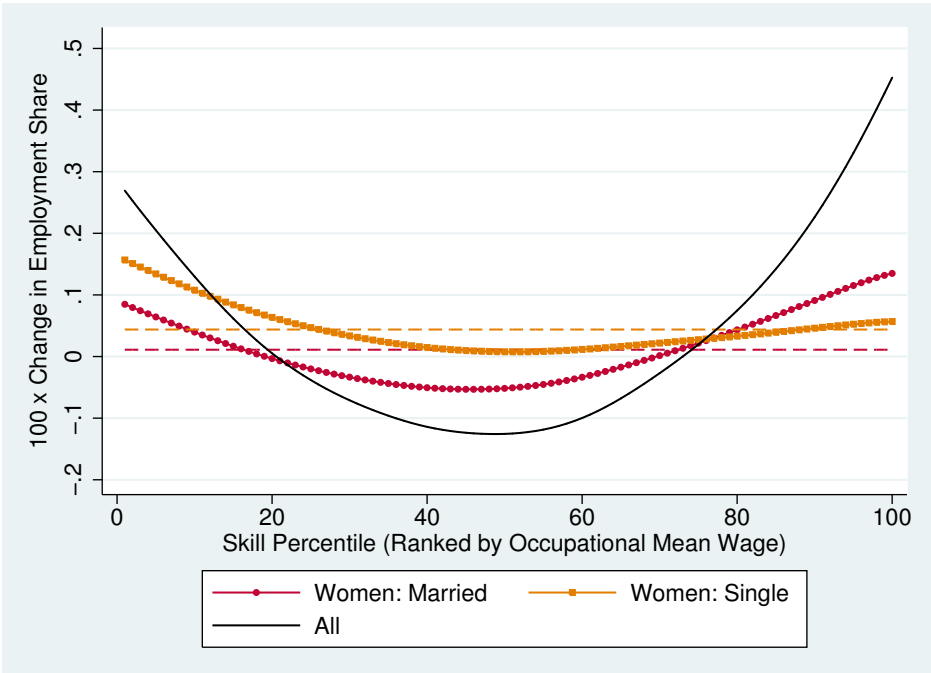

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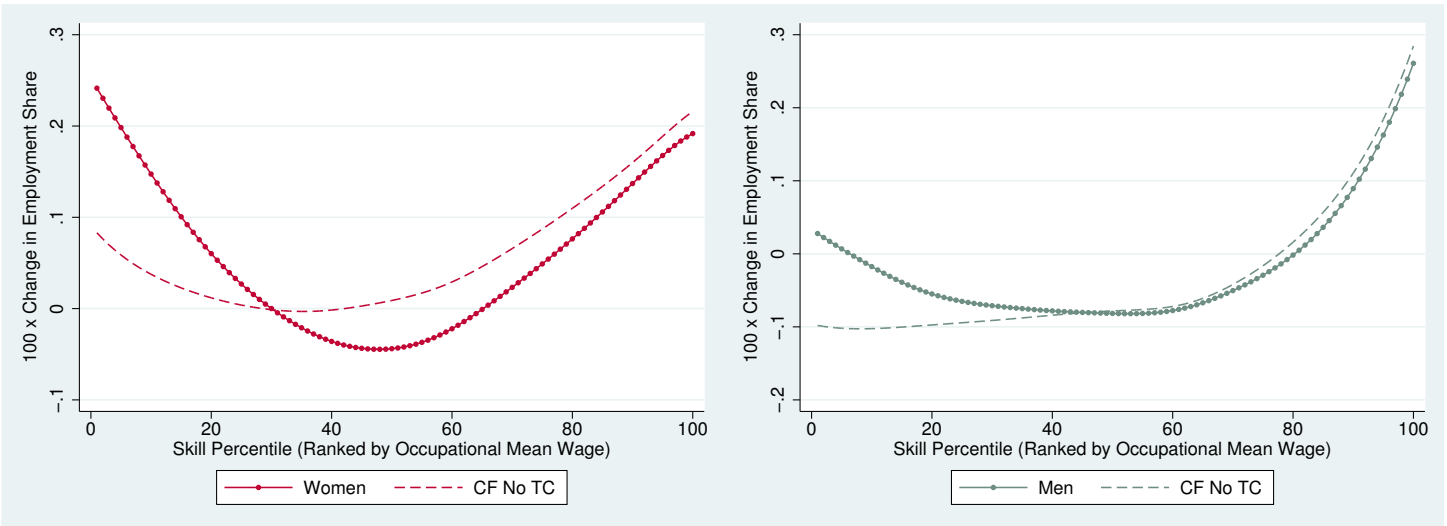
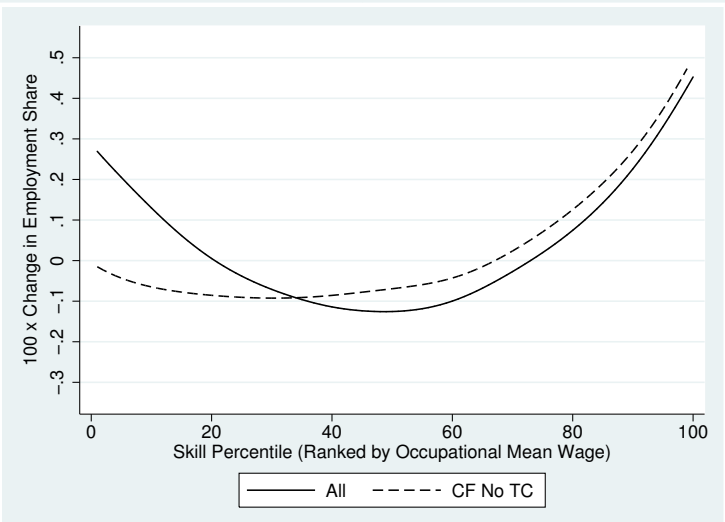
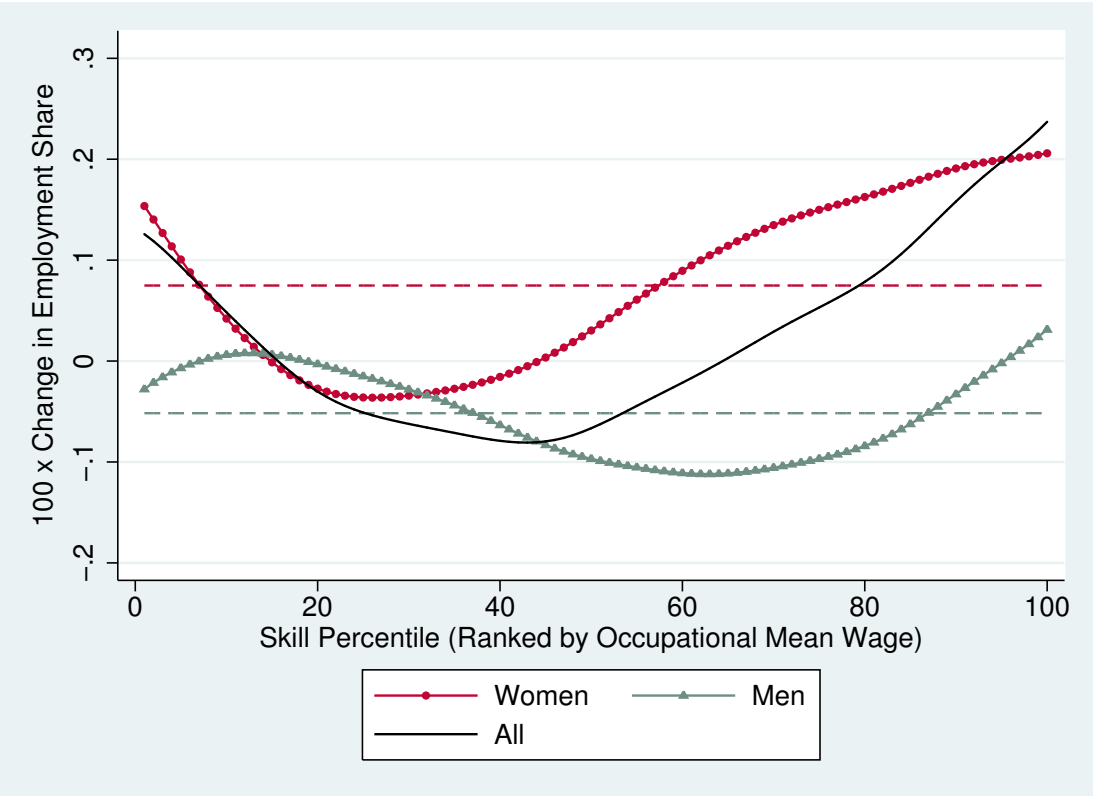
Conterfactual: no Labor Productivity Growth

- Polarization disappears overall and it is reduced for women (BS2018)
- Overall coeff on $rank^2$ drops from 2.102 to 1.152 back





Demographics: Men vs. Women



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