



The role of part-time work in rising wage inequality

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Two papers:

Biewen/Plötze (2018): **‘The role of hours changes for the increase in German earnings inequality’**, forthcoming in *Journal of Economics and Statistics*

Biewen/Fitzenberger/DeLazzer (2018): **‘The role of employment interruptions and part-time work for the rise in wage inequality’**, forthcoming in *IZA Journal of Labor Economics*



General motivation

- Global trend of rising inequality in past thirty years
- Potential explanations: Supply/demand, technical change, occupations, de-unionization, firm differences, . . .
- Rarely considered:
 - Changes in working hours arrangements incl. part-time and marginal part-time
 - Effects of employment interruptions and previous part-time episodes
- Changes in working hours may substantially shape earnings distributions, especially if part-time/marginal part-time work is included
- Previous part-time experiences and patchy employment histories may influence future wages and thus wage inequality



The role of hours changes for the increase in wage inequality



General idea

- Hours worked are an important component of measures like daily or monthly wages
- Changes in the incidence of different working hours arrangements may therefore influence wage inequality



Literature

- **Doiron/Barret (1996), Johnson/Kuhn (2004):** Hours and male/female earnings inequality in Canada
- **Fuchs-Schündeln et al. (2010):** Documentation of changes in hourly wages, monthly wages, monthly hours for Germany
- **Blau/Kahn (2011):** Differences in changes in earnings inequality, hours and wages for a wide range of countries
- **Checchi et al. (2016):** Hours, hourly wages, and rising earnings inequality in US, UK, Germany, France



Data

- ***German Structure of Earnings Survey (GSES)***
- Only large scale data set including info on working hours
- Mandatory linked employer-employee survey conducted by German Federal Statistical Office, large sample size
- Random sample of individuals in establishments with at least ten employees subject to social insurance contributions
- Cross sections for the years 2001, 2006 and 2010
- Sample selection: 25-60 years, male/female, East+West
- Due to incomplete sector coverage of GSES in the past, we have to restrict analysis to the following set of sectors:

Mining and other quarrying, Manufacturing, Electricity, Water, Recycling, Construction, Trade of vehicle, Wholesale trade, Retail trade, Finance and insurance



Reweighting method (DFL, 1996)

$$\int f(e|h, x_f, x_p) \psi_{h|x_f, x_p} dF(h|x_f, x_p, t=0) \psi_{x_f|x_p} dF(x_f|x_p, t=0) \psi_{x_p} dF(x_p|t=0)$$

$$\psi_{h|x_f, x_p} = \frac{dF(h|x_f, x_p, t=1)}{dF(h|x_f, x_p, t=0)}, \psi_{x_f|x_p} = \frac{dF(x_f|x_p, t=1)}{dF(x_f|x_p, t=0)}, \psi_{x_p} = \frac{dF(x_p|t=1)}{dF(x_p|t=0)}$$

e = earnings, h = hours, x_p = person characteristics, x_f = firm characteristics

Counterfactual earnings distributions:

$f_{0100}(e)$ = shift only $h|x_f, x_p$ to level of $t = 1$

$f_{0010}(e)$ = shift only $x_f|x_p$ to level of $t = 1$

$f_{0110}(e)$ = shift $h|x_f, x_p$ and $x_f|x_p$ to level of $t = 1$ etc.



Decomposition of changes in inequality

$$\begin{aligned}
 I(f_{1111}) - I(f_{0000}) &= (I(f_{0001}) - I(f_{0000})) && \text{(contribution of } x_p) \\
 &+ (I(f_{0011}) - I(f_{0001})) && \text{(contribution of } x_f | x_p) \\
 &+ (I(f_{0111}) - I(f_{0011})) && \text{(contribution of } h | x_f, x_p) \\
 &+ (I(f_{1111}) - I(f_{0111})) && \text{(residual/other contributions)}
 \end{aligned}$$

(the increments represent contribution of added factor)

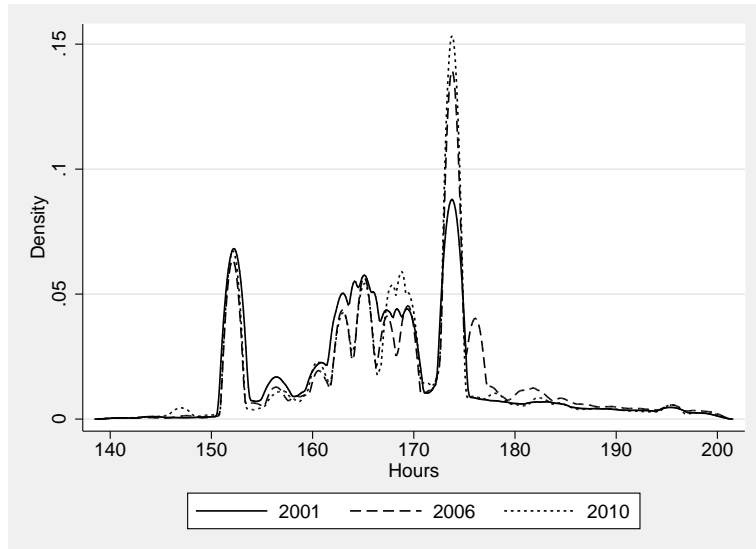


Specification

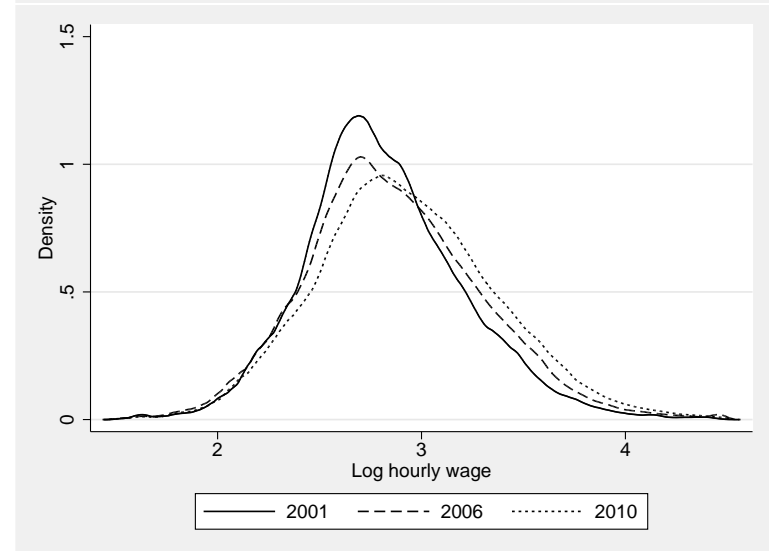
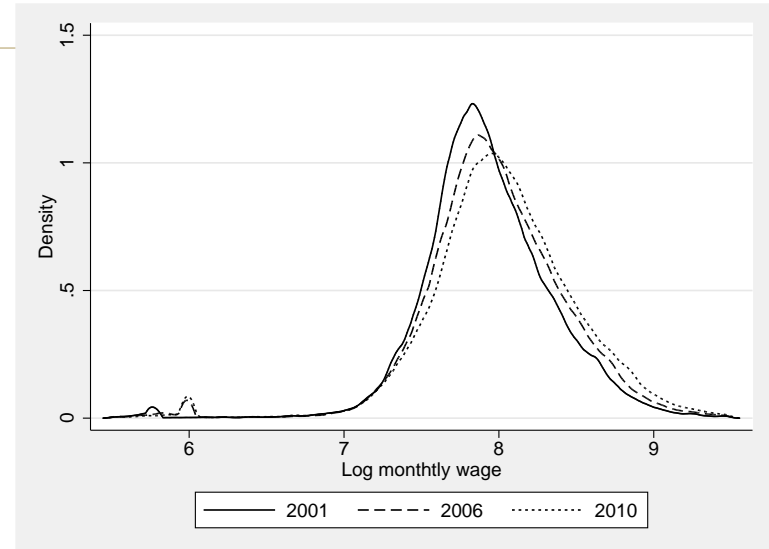
- e = monthly earnings
- h = monthly working hours (inc. overtime)
- Personal characteristics x_p
 - Age (7 brackets)
 - Education (5 categories)
 - Tenure (4 categories)
 - Occupation (52 categories)
- Firm characteristics x_f
 - Region (5 categories)
 - Industry/sector (12 categories)
 - Public ownership
 - Firm size (3 categories)
 - Union coverage (3 categories)



Empirical results: Men



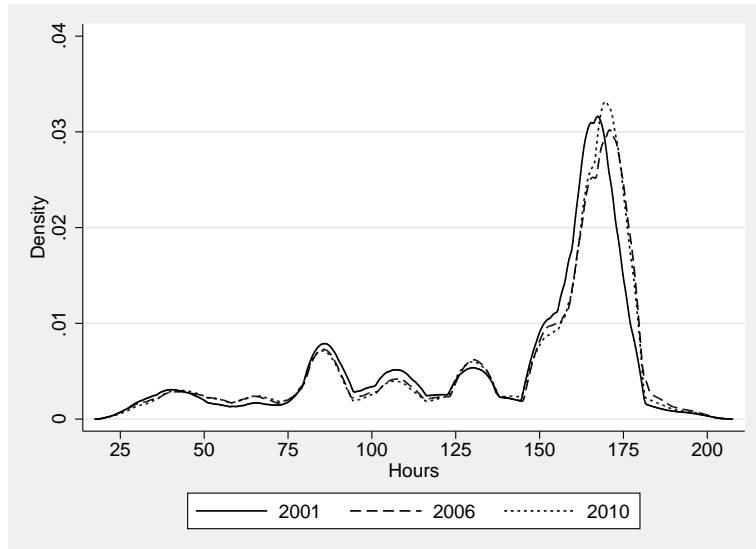
Hours, 2001-2010



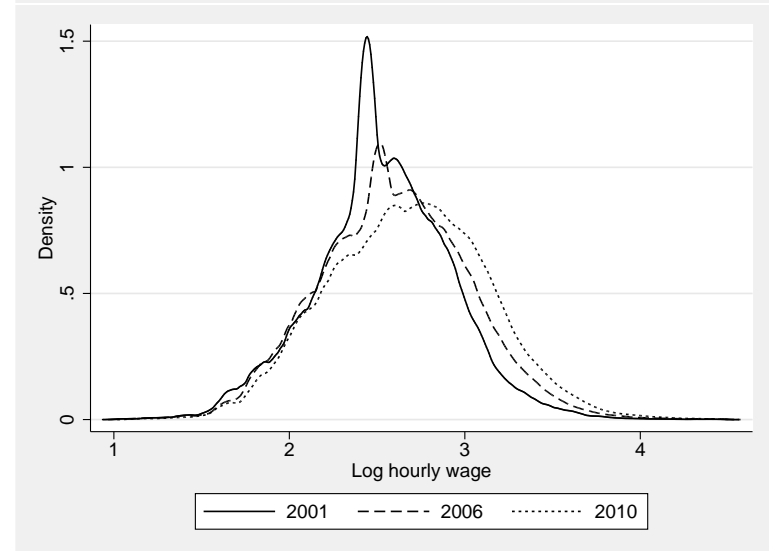
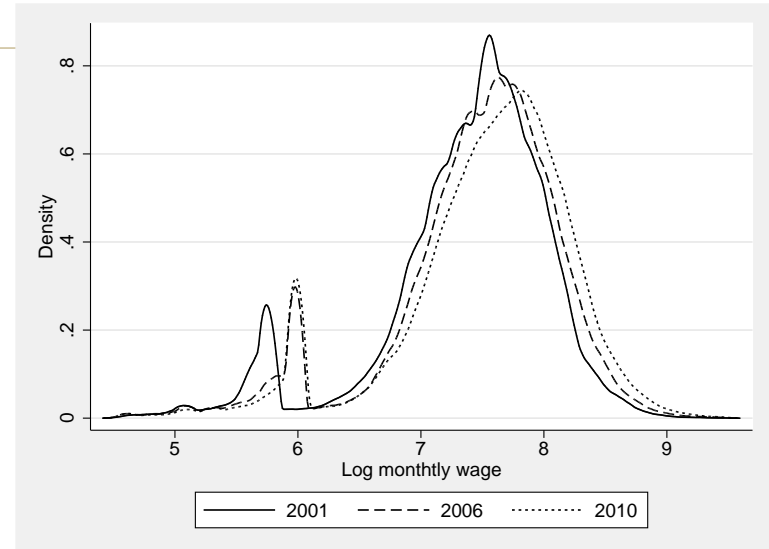
Earnings/hourly wage, 2001-2010



Empirical results: Women



Hours, 2001-2010



Earnings/hourly wage, 2001-2010



Reweighting decomposition, men

Index	Δ Index	Δx_p	$\Delta x_f x_p$	$\Delta h x_f, x_p$	Residual
Mean	354.86	-13.76	67.76	-26.08	326.94
	(28.06)	(6.20)	(10.23)	(1.39)	(31.15)
	[100]	[-3.88]	[19.09]	[-7.35]	[92.13]
Gini	0.024	0.010	0.010	0.004	-0.000
	(0.003)	(0.001)	(0.001)	(0.000)	(0.004)
	[100]	[41.90]	[41.49]	[17.93]	[-1.50]
p9050	0.092	0.037	0.046	0.001	0.009
	(0.020)	(0.004)	(0.006)	(0.001)	(0.022)
	[100]	[39.72]	[49.46]	[0.94]	[9.96]
p5010	0.141	0.036	0.044	0.206	0.040
	(0.011)	(0.007)	(0.005)	(0.002)	(0.016)
	[100]	[25.32]	[31.35]	[14.61]	[28.44]

GSES 2001, 2010, and own calculations. Percentages in square brackets.



Reweighting decomposition, women

Index	Δ Index	Δx_p	$\Delta x_f x_p$	$\Delta h x_f, x_p$	Residual
Mean	174.20	1.09	2.50	-78.49	249.09
	(22.16)	(6.68)	(10.35)	(1.97)	(23.04)
	[100]	[0.63]	[1.44]	[-45.06]	[142.99]
Gini	0.043	0.014	0.018	0.016	-0.006
	(0.004)	(0.002)	(0.002)	(0.000)	(0.004)
	[100]	[33.10]	[42.72]	[37.09]	[-13.03]
p9050	0.191	0.063	0.076	0.053	0.000
	(0.021)	(0.007)	(0.008)	(0.003)	(0.022)
	[100]	[32.83]	[39.74]	[27.44]	[0.000]
p5010	2.011	0.670	0.683	1.202	-0.544
	(0.080)	(0.127)	(0.076)	(0.158)	(0.064)
	[100]	[33.32]	[33.97]	[59.78]	[-27.07]

GSES 2001, 2010, and own calculations. Percentages in square brackets.



Determinants of hours changes

- **Oaxaca-Blinder decomposition of change in mean hours**

$$E[h_1] - E[h_0] = [E(x_1) - E(x_0)]\beta_1 + [\beta_1 - \beta_0]E(x_0)$$

$$E[h_t] = E[E(h_t|x_t)] = E[x_t\beta_t]$$

- **Summary**

- Monthly mean hours decline (-1.96 h men, -3.59 h women)
- Men: Tendency towards longer hours in some industries/regions/firmsizes
- Women: Longer hours in occupations, shifts towards long hours industries
- However, everything dominated by general, independent hours reduction



Determinants of hours changes

- **Oaxaca-Blinder decomposition of within-group hours variance**

$$E[\text{var}(h_1|x_1)] - E[\text{var}(h_0|x_0)] = [E(x_1) - E(x_0)] \gamma_1 + [\gamma_1 - \gamma_0] E(x_0)$$

(i.e. O-B decomposition with dependent variable $[h_t - E(h_t|x_t)]^2 = [h_t - x_t\beta_t]^2$)

- **Summary**

- General increase in within-group hours dispersion, esp. for women
- Men: Shift towards education/occupation groups with higher within-group dispersion, but also decreasing dispersion within occupations/industries
- Women: Education/de-unionization means shift towards higher within-group dispersions, but also decreasing within occupations/industries
- However, everything dominated by general unexplained increase of hours dispersion within groups



Determinants of hours changes

- **Oaxaca-Blinder decomposition of between-group hours variance**

$$E [(E(h_1|x_1) - E(h_1))^2 - E [E(h_0|x_0) - E(h_0)]^2] = [E(x_1) - E(x_0)] \alpha_1 + [\alpha_1 - \alpha_0] E(x_0)$$

(i.e. O-B decomposition with dep. var. $[E(h_t|x_t) - E(h_t)]^2 = [x_t\beta_t - E(h_t)]^2$)

- **Summary**

- General increase in between-group hours dispersion, esp. for women
- Men: Tendency towards lower between-group hours dispersion along occupation and tenure groups
- Women: Compositional changes in education raise between-group hours differences, reduction of between-group differences across regions
- However, everything compensated/amplified by general unexplained increase of between-group hours differences



Summary

- Paper studies influence of changes in working hours on inequality in monthly earnings
- For men, 10 to 30 percent of earnings inequality increase can be explained by changes in hours distribution
- For women, 37 to 47 percent can be explained by hours changes (higher incidence of part-time/marginal part-time)
- Changes in hours distribution are complex but overall hours worked decreased while hours heterogeneity increased
- Results suggest some role for education/occupation/industry changes for hours but general unexplained trends dominate
- Some of these effects are due to increasing part-time work
- Effects of part-time/marginal part-time work probably underestimated because of restricted sector coverage



The role of employment interruptions and part-time work for the rise in wage inequality



General idea

- Employment interruptions and part-time episodes are expected to have negative effects on future wages
- Potential mechanisms:
 - Human capital depreciation/lower accumulation
 - Scarring/signalling effects
 - Correlated unobserved heterogeneity/selection
- These effects may even influence the distribution of wages among those who currently work full-time



Literature

- **Patchier employment histories:** Tisch/Tophoven (2012), Potrafke (2012), Tamm et al. (2017)
- **Displacement:** Burda/Mertens (2001), Schmieder et al. (2015), Edler et al. (2015)
- **Part-time work (esp. women):** Manning/Petrongolo (2008), Edin/Gustavsson (2008), Connolly/Gregory (2009), Blundell et al. (2016), Fitzenberger et al. (2016), Paul (2016)
- **Scarring/signalling** Ruhm (1991), Arulampalam (2001), Gregory/Jukes (2001)



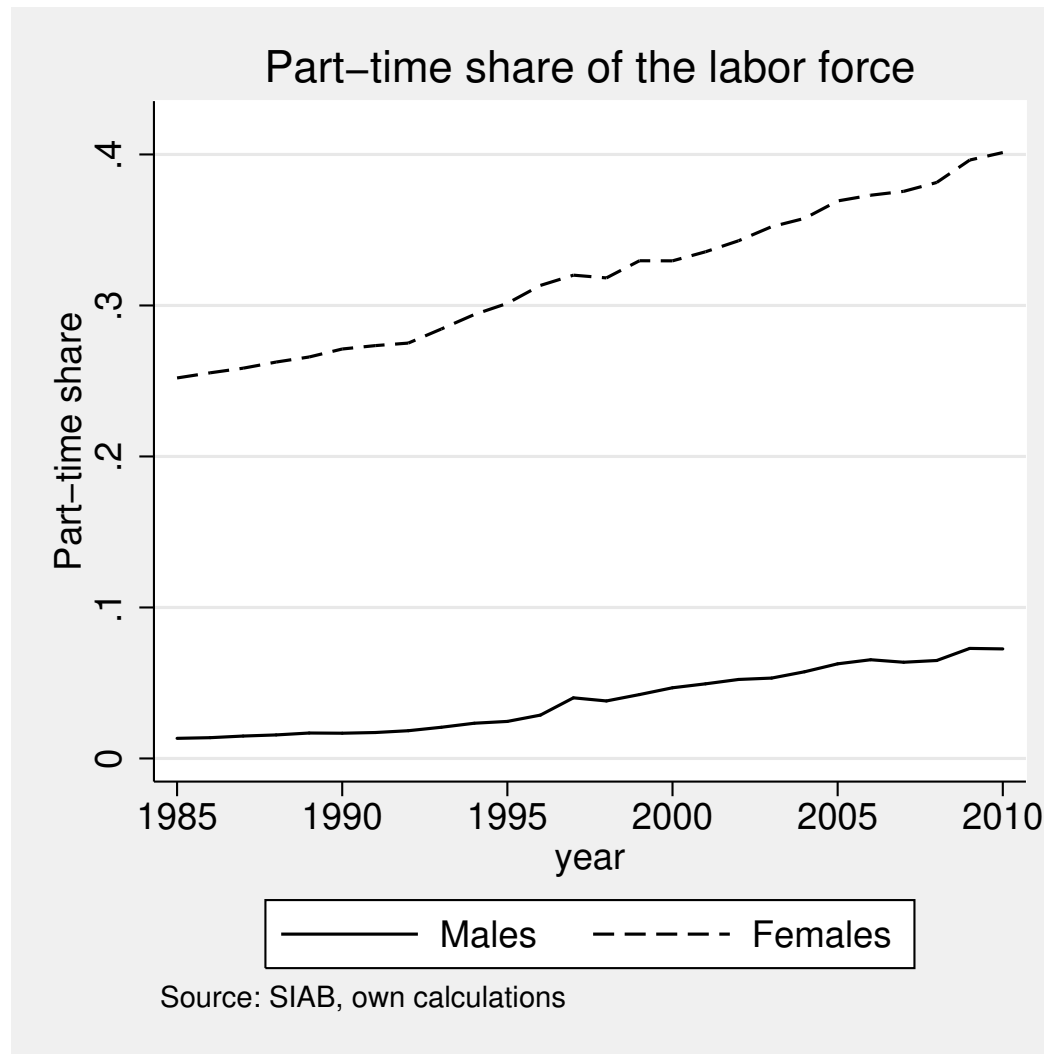
Data

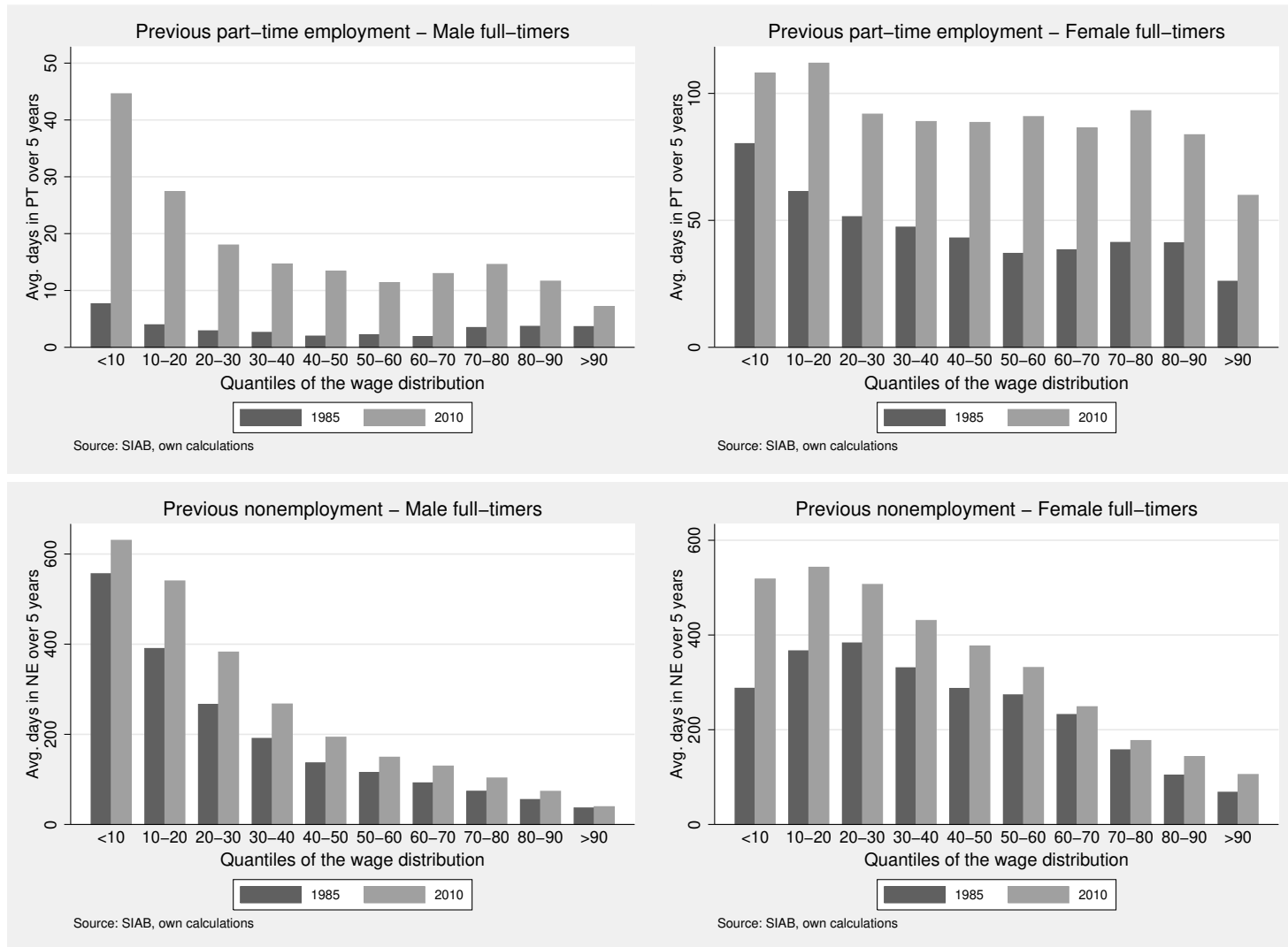
- ***Sample of Integrated Labor Market Histories (SIAB)***
- Administrative data from social security records
- Contains full individual employment/unemployment histories
- We consider period 1985-2010, male/female, only West
- We can only analyse wage distribution of full-timers in a meaningful way because data do not include working hours
- Wage measure = daily full-time wage
- Working age population 20-60 years
- Part-time does not include marginal part-time



Variables

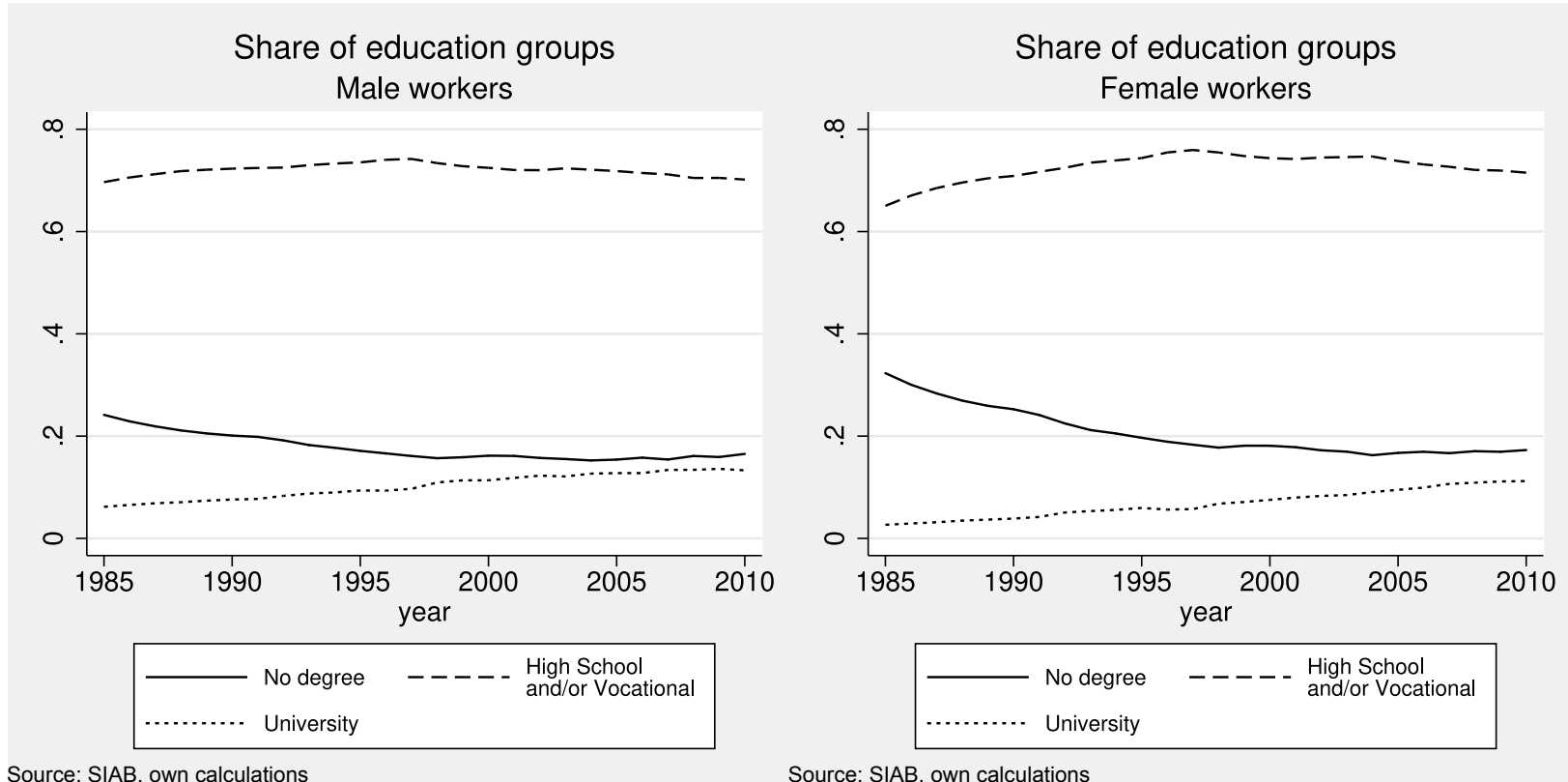
Variable group	Abbrev.	Variable list
Education	Ed	3 categories (<i>ed</i>): University, Upper secondary High-School and/or Vocational Training, No/Other Degree
Experience	Ex	Potential experience (age - years of schooling - 6) (<i>ex</i>)
Labor market history	Hist	Number of days in full-time (<i>ft5</i>), or part-time (<i>pt5</i>) over the last 5 years. Indicators for: full-time job in previous year (<i>ft</i>), part-time job in previous year (<i>pt</i>)
Occupation	Occ	Job classification by KldB 2-digit levels (<i>occ</i> , 63 categories)
Industry	Ind	Industry classification by WZ93 (<i>sec</i> , 14 categories)





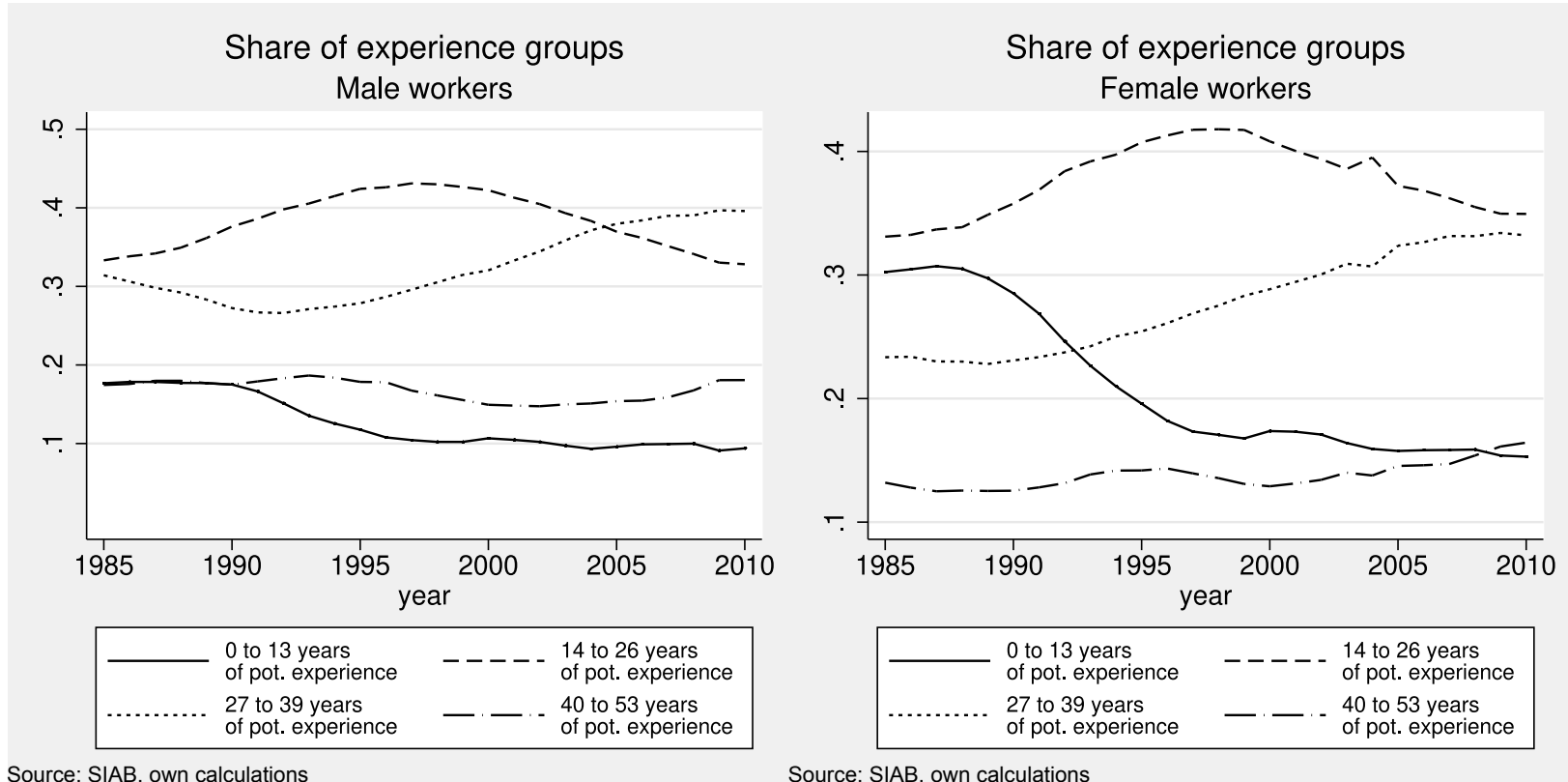


Share of education groups





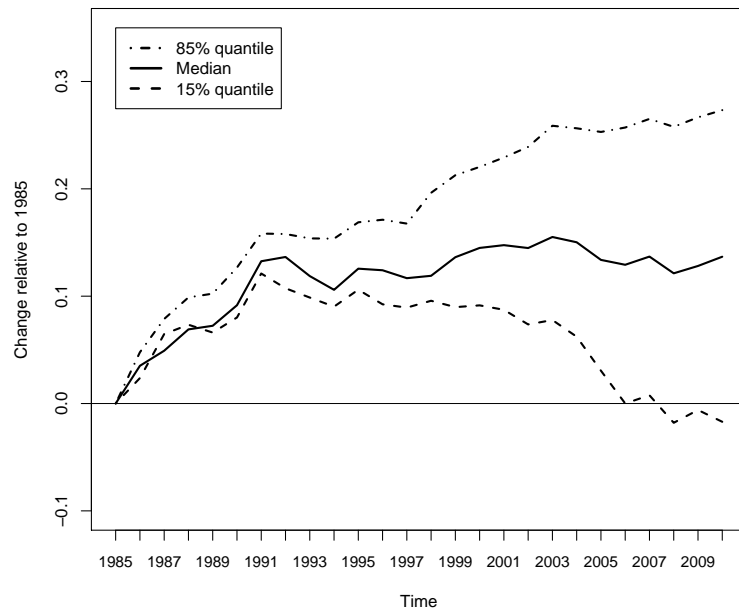
Share of experience groups



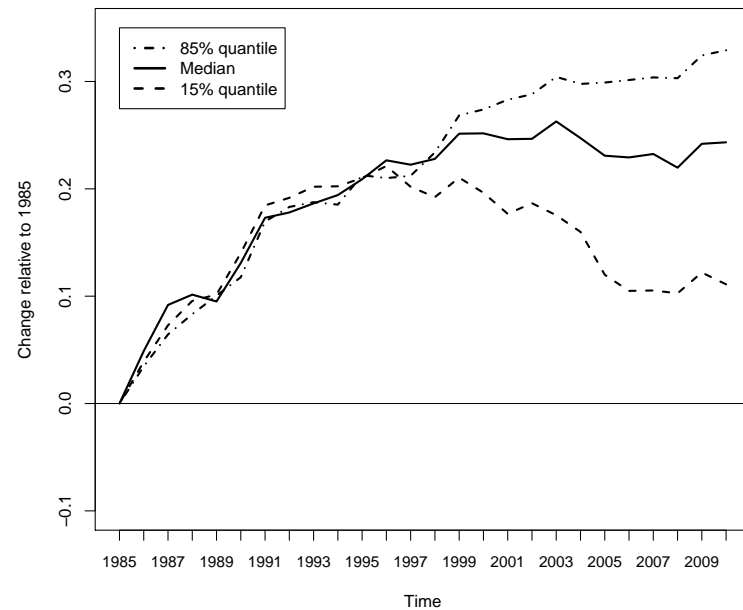


Wage quantiles relative to levels of 1985

Wage quantiles, indexed to 1985, male workers



Wage quantiles, indexed to 1985, female workers





Reweighting method (DFL, 1996)

- We sequentially add groups of characteristics to the reweighting procedure:
 - 1) Fix at level of base year 1985: *Ed*
 - 2) Fix at level of base year 1985: *Ed, Ex*
 - 3) Fix at level of base year 1985: *Ed, Ex, Hist*
 - 4) Fix at level of base year 1985: *Ed, Ex, Hist, Occ/Ind*
- The incremental effect represents the contribution of the added group of characteristics



Decomposition of overall inequality change

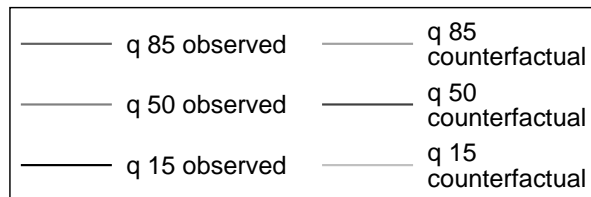
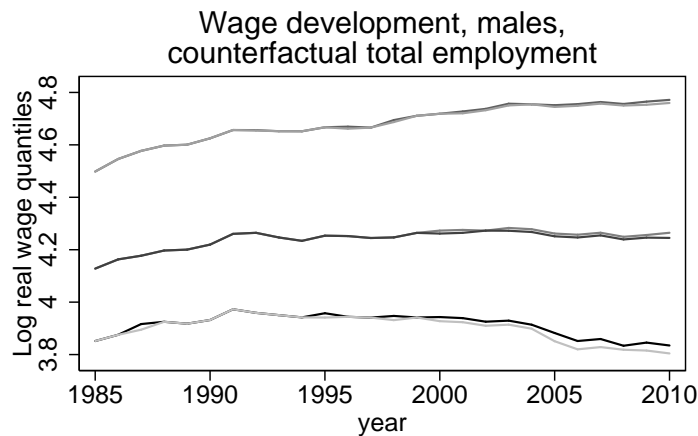
	<i>Ed</i>	<i>Ex</i>	<i>Hist</i>	<i>Occ/Ind</i>	Σ
Men					
85/15	17.11%	5.93%	16.92%	13.02%	52.97%
85/50	37.50%	1.32%	13.18%	2.64%	54.64%
50/15	-1.00%	10.02%	19.23%	22.24%	51.49%
Women					
85/10	9.91%	35.14%	18.59%	0.00%	63.64%
85/50	15.90 %	30.40%	15.59%	0.00%	61.89%
50/10	6.02%	38.2%	20.54%	0.00%	64.77%

Contributions based on incremental addition

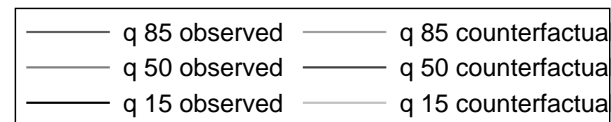
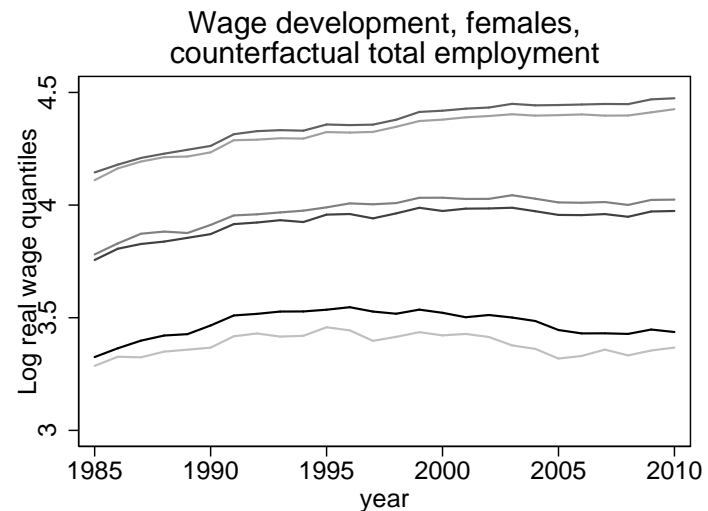


Extension to ‘total employment sample’

- Total employment = full-timers + part-timers
- We compute the wage distribution that would prevail if all part-timers were paid full-time wages



Source: SIAB, own calculations



Source: SIAB, own calculations



Summary

- Substantial effect of previous part-time/non-employment episodes on wage inequality among full-timers
- Explain around 18 percent of wage inequality increase, more at the bottom of the distribution
- Further important effects:
 - Men: shifts in educational qualifications/occ./industry
 - Women: changes in age/experience
- Compositional changes account for large share of inequality increase: $> 50\%$ men, $\approx 70\%$ women



General conclusion

- Changes in working hours distribution have substantially contributed to rising inequality in daily/monthly wages
- Only some of these effects were due to increased part-time
- Previous part-time/non-employment episodes have also substantially contributed to rising wage inequality
- Only part of this effect is due to previous part-time episodes
- Other compositional effects (education, experience, firm characteristics, unionization) were even more important
- Note that many of these changes (increased part-time, educational expansion etc.) were voluntary/desirable, but they increased inequality



Thank you!

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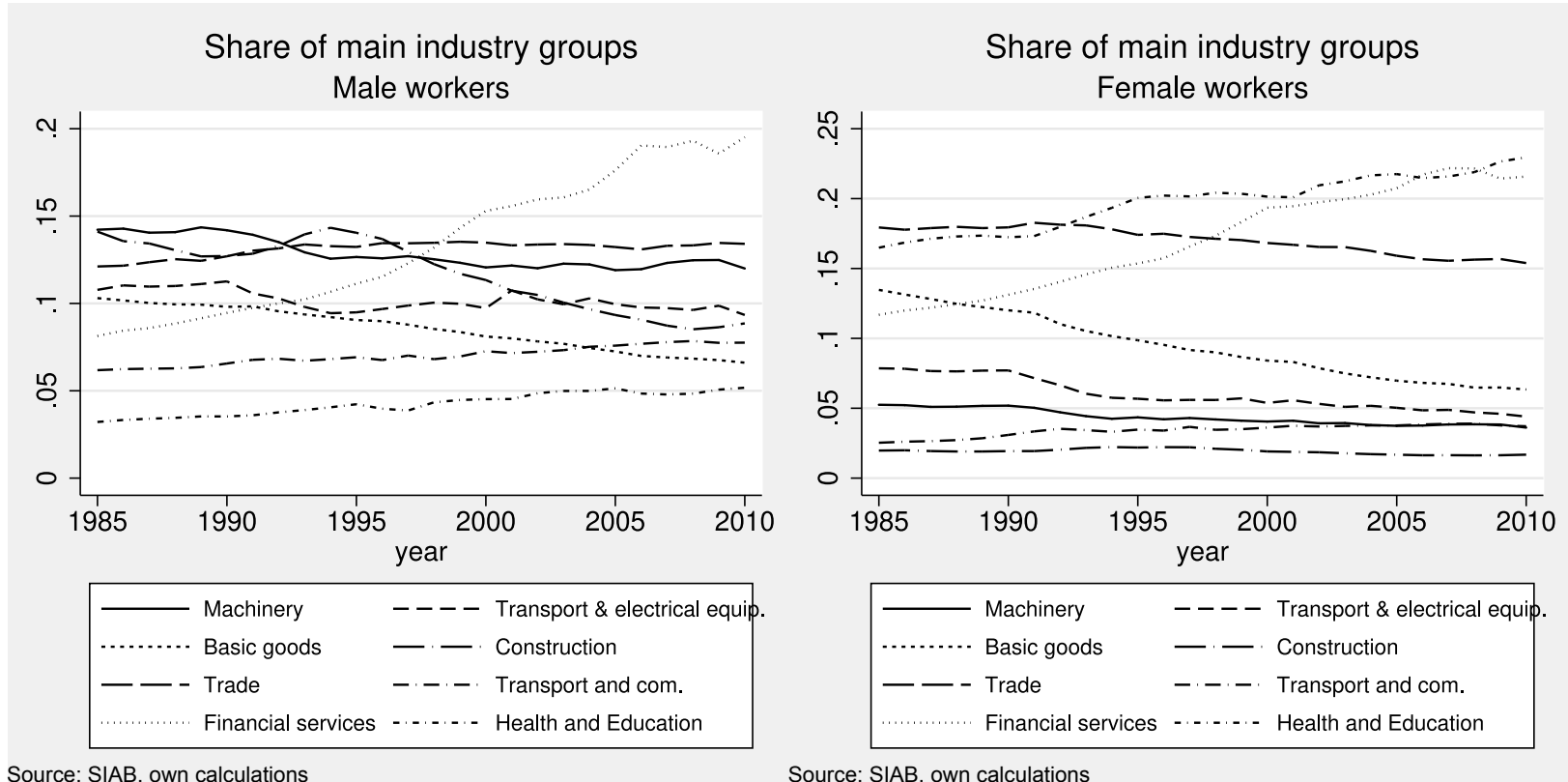
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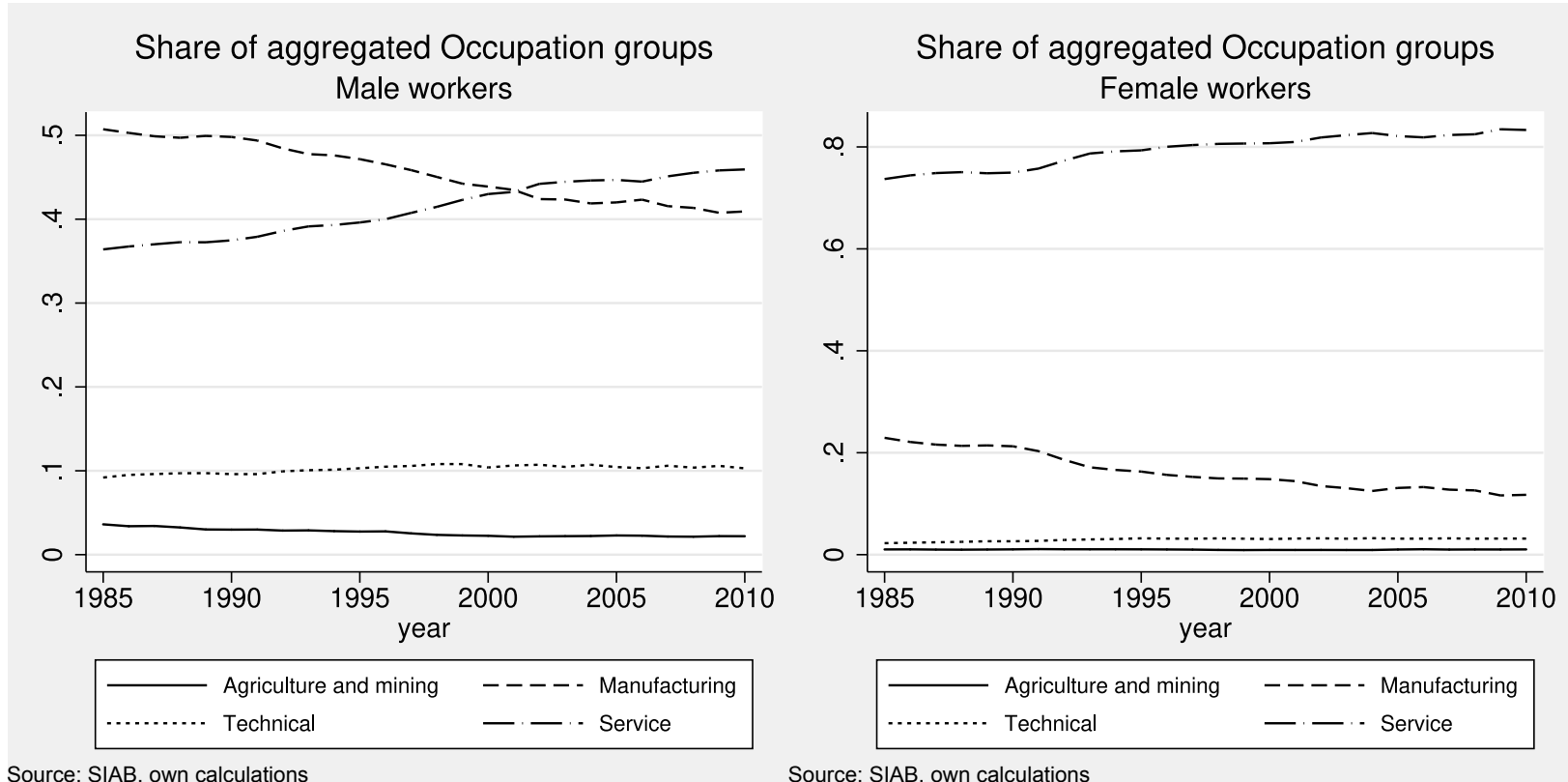


Share of industry sectors



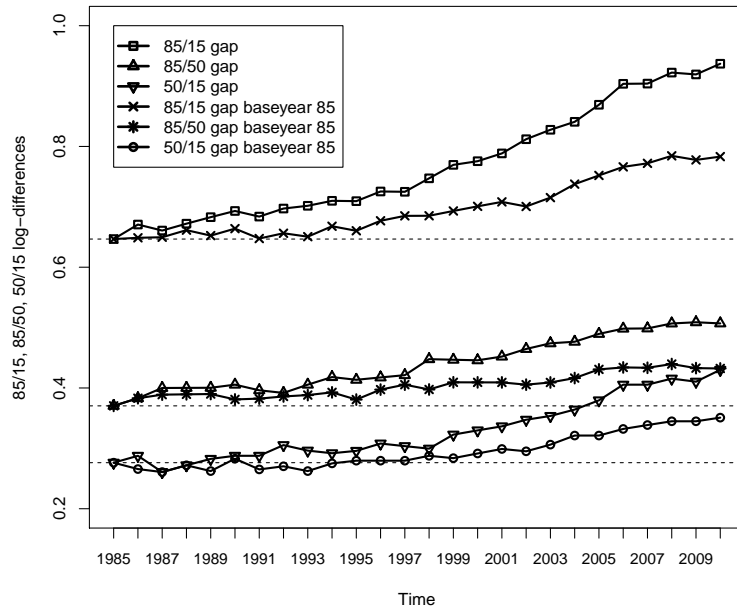


Share of occupation categories



Inequality development base year 1985, specification EEHOI (Education, Experience, Labor market history, Occupation, Industry sector)

Log-wage quantile gaps, males, baseyear 1985, keeping Ed, Ex, Hist, Occ, Ind fixed (EEHOI)



Log-wage quantile gaps, females, baseyear 1985, keeping Ed, Ex, Hist, Occ, Ind fixed (EEHOI)

