Data Extract: Skills, Tasks and Technologies: Implications for Employment and Earnings (Handbook of Labor Economics, 2011)

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1. Introduction

2. An Overview of Labor Market Trends

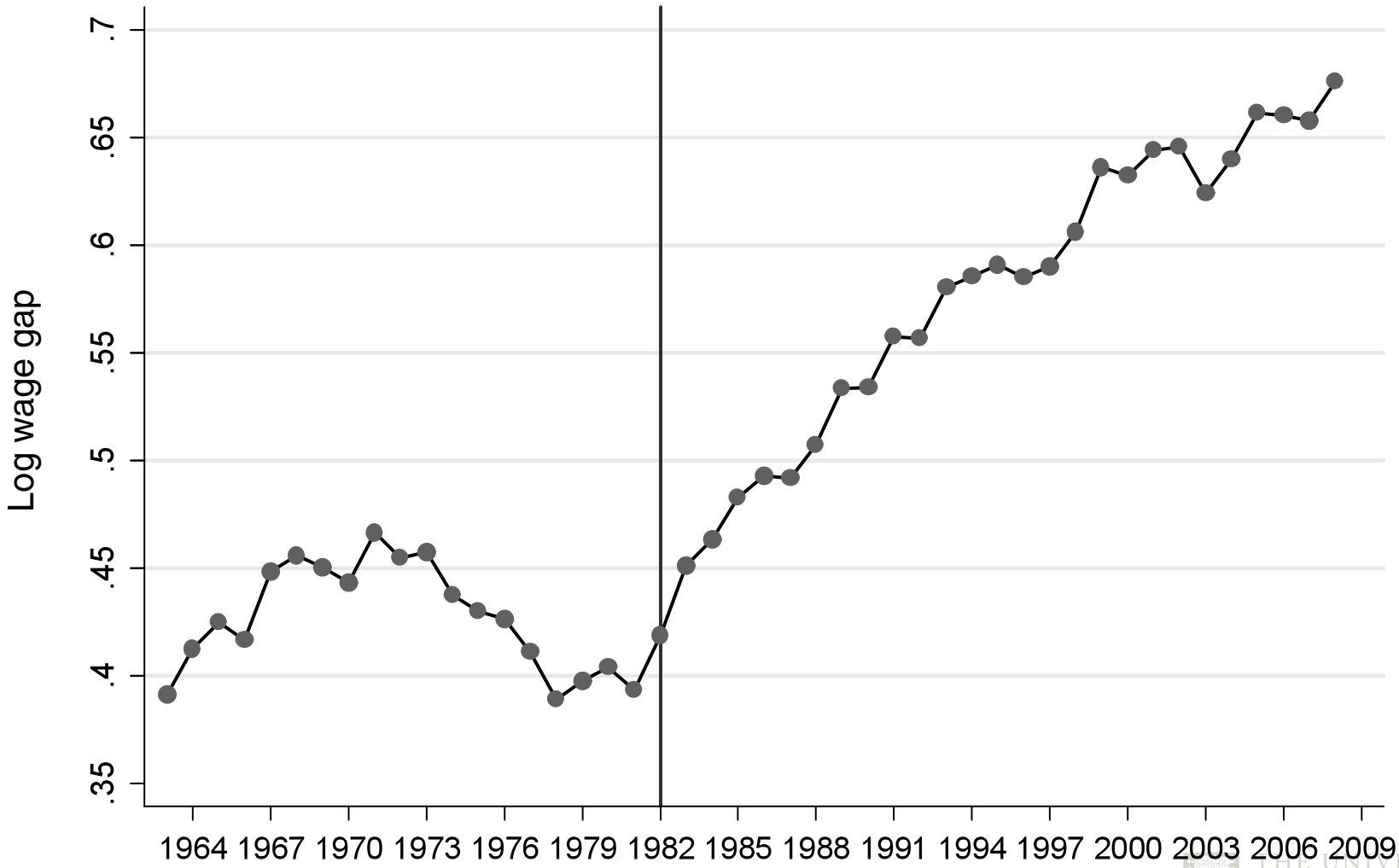
2.1. A brief overview of data sources

- To summarize the basic changes in the US wage structure over the last five decades, we draw on four large and representative household data sources:
  - the March Current Population Survey (March CPS),
  - the combined Current Population Survey May and Outgoing Rotation Group samples (May/ORG CPS),
  - the Census of Populations (Census), and
  - the American Community Survey (ACS).

- We describe these sources briefly here and provide additional details on the construction of samples in the Data Appendix.
- The March Annual Demographic Files of the Current Population Survey offer the longest high-frequency data series enumerating labor force participation and earnings in the US economy.
- These data provide reasonably comparable measures of the prior year's annual earnings, weeks worked, and hours worked per week for more than four decades.
- We use the March files from 1964 to 2009 (covering earnings from 1963 to 2008) to form a sample of real weekly earnings for workers aged 16 to 64 who participate in the labor force on a full-time, full-year (FTFY) basis, defined as working 35-plus hours per week and 40-plus weeks per year.

2.2. The college/high school wage premium

Figure 1: Composition adjusted college/high-school log weekly wage ratio, 1963–2008



- Figure 1 plots the *composition-adjusted* log college/high school weekly wage premium in the US labor market for years 1963 through 2008 for **full-time, full-year workers**.
- This composition adjustment holds constant the relative employment shares of demographic group, as defined by gender, education, and potential experience, across all years of the sample.
- In particular, we first compute mean (predicted) log real weekly wages in each year for 40 sex-education-experience groups.
- Mean wages for broader groups shown in the figures are then calculated as fixed-weighted averages of the relevant sub-group means (using the average share of total hours worked for each group over 1963 to 2008 as weights).
- This adjustment ensures that the estimated college premium is not mechanically affected by shifts in the experience, gender composition, or average level of completed schooling within the broader categories of college and high school graduates.

Figure 2: College/high-school log relative supply, 1963–2008

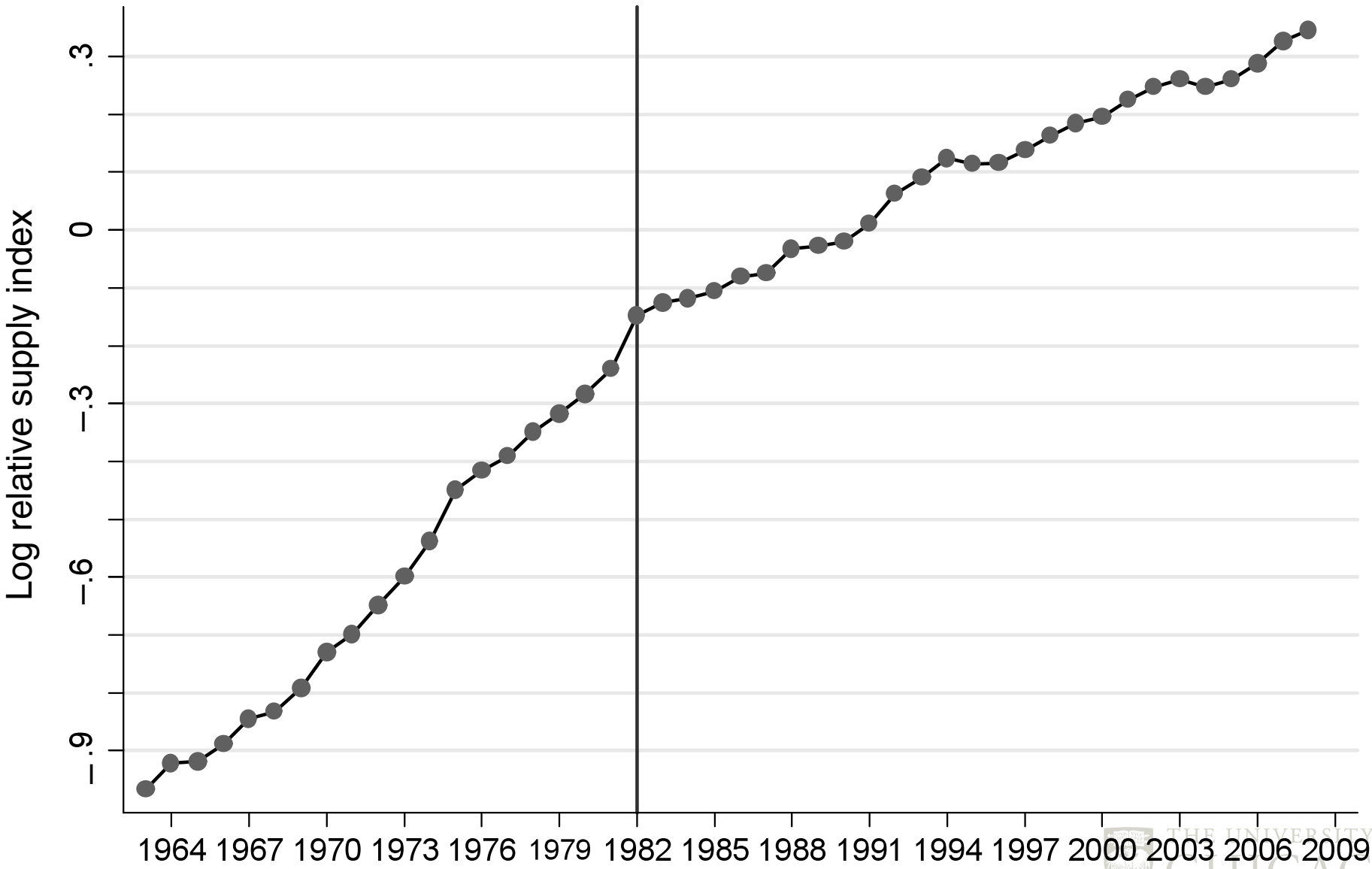
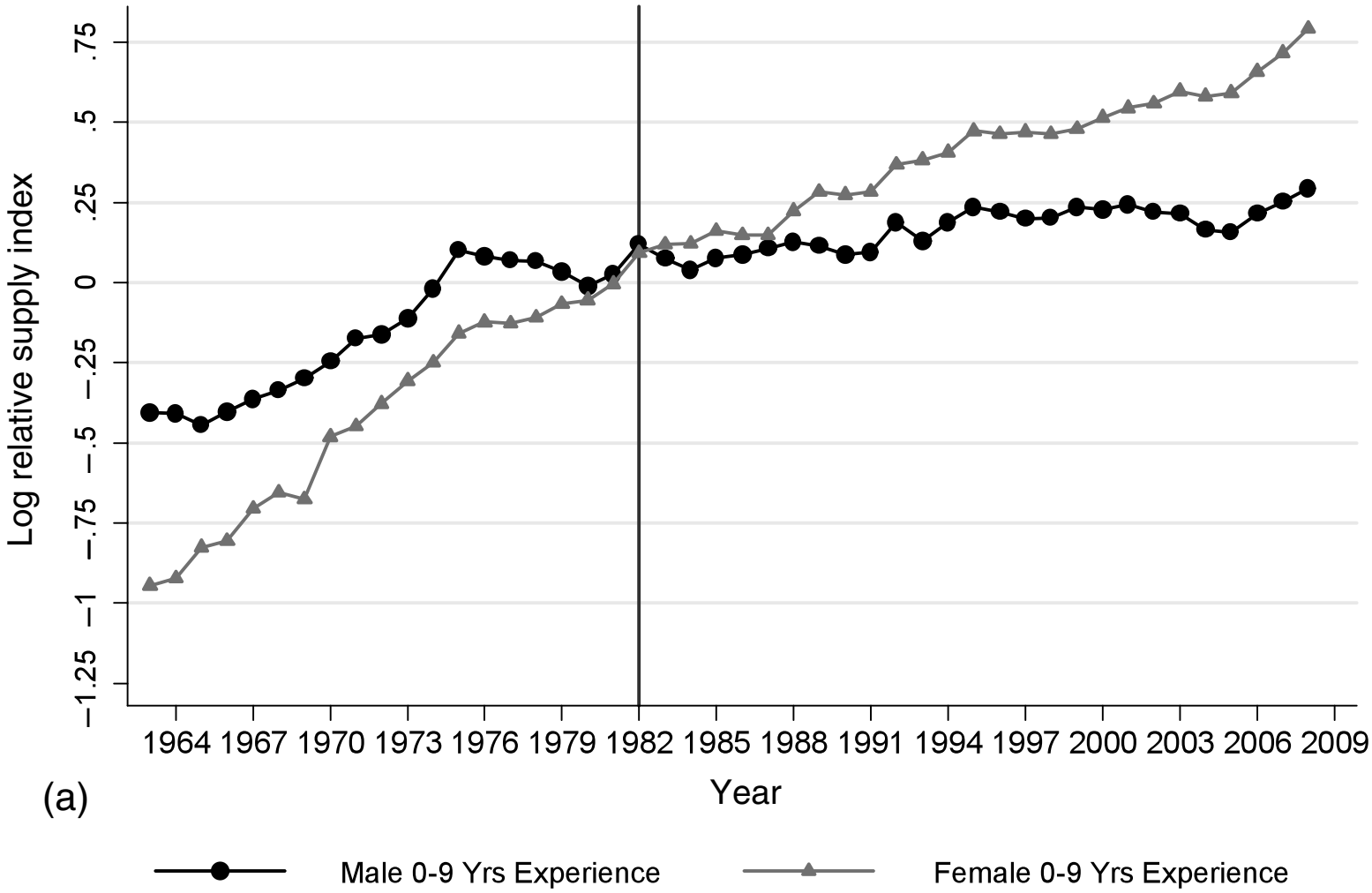
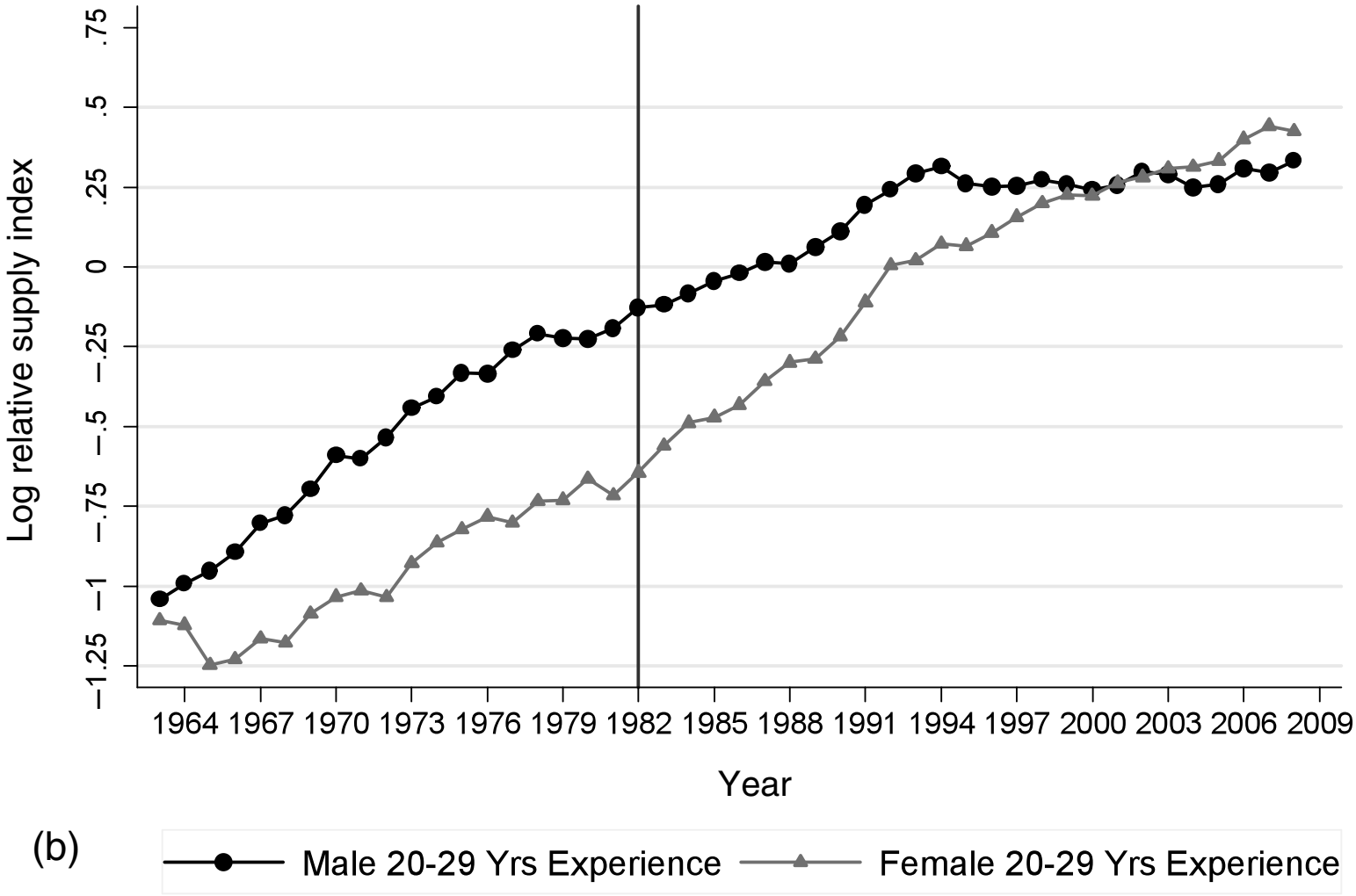


Figure 3: College/high-school log relative supply, 1963–2008



Source: March CPS data for earnings years 1963–2008. See note to Fig. 2. Log relative supply for 0–9 and 20–29 years of potential experience is plotted for males and females.

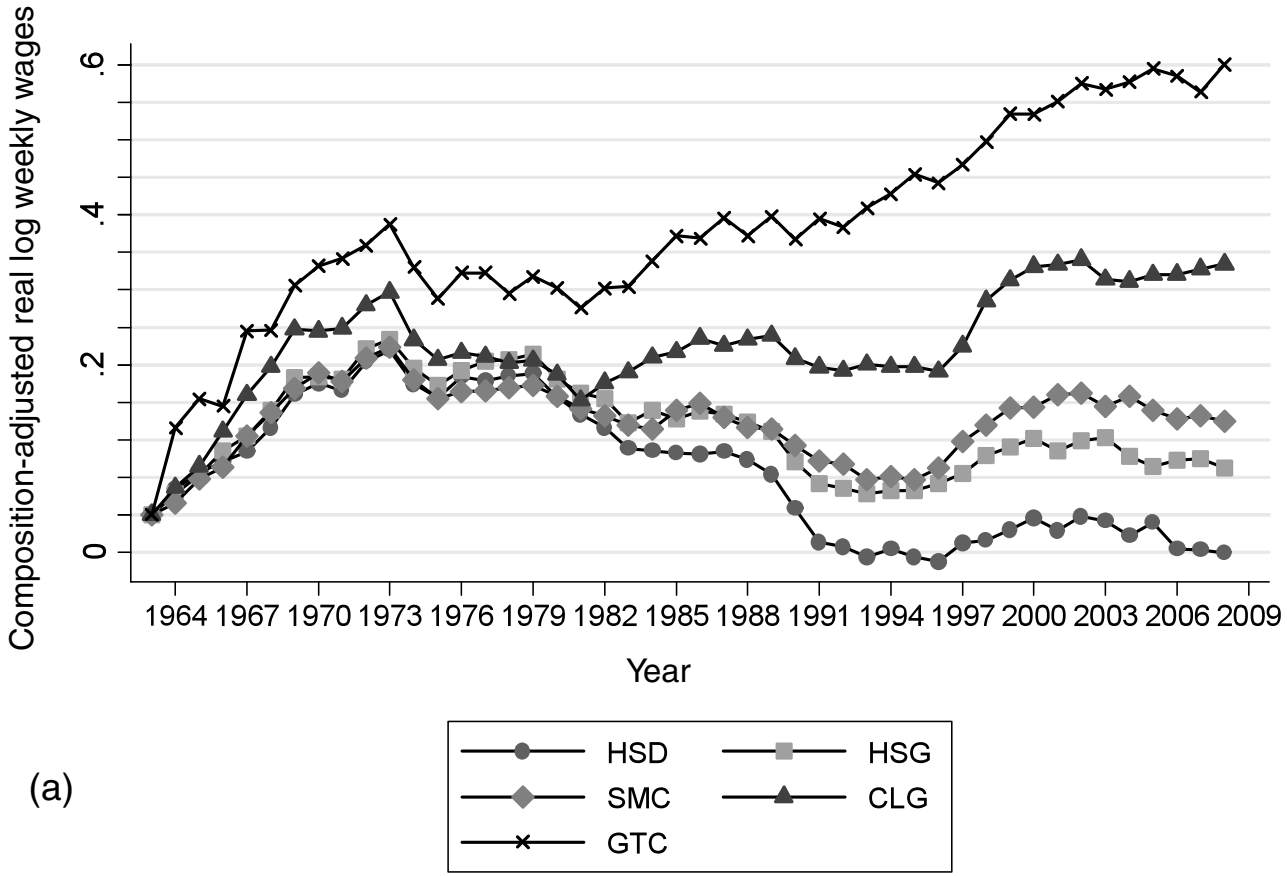
Figure 3: College/high-school log relative supply, 1963–2008, Cont.



Source: March CPS data for earnings years 1963–2008. See note to Fig. 2. Log relative supply for 0–9 and 20–29 years of potential experience is plotted for males and females.

2.3. Real wage levels by skill group

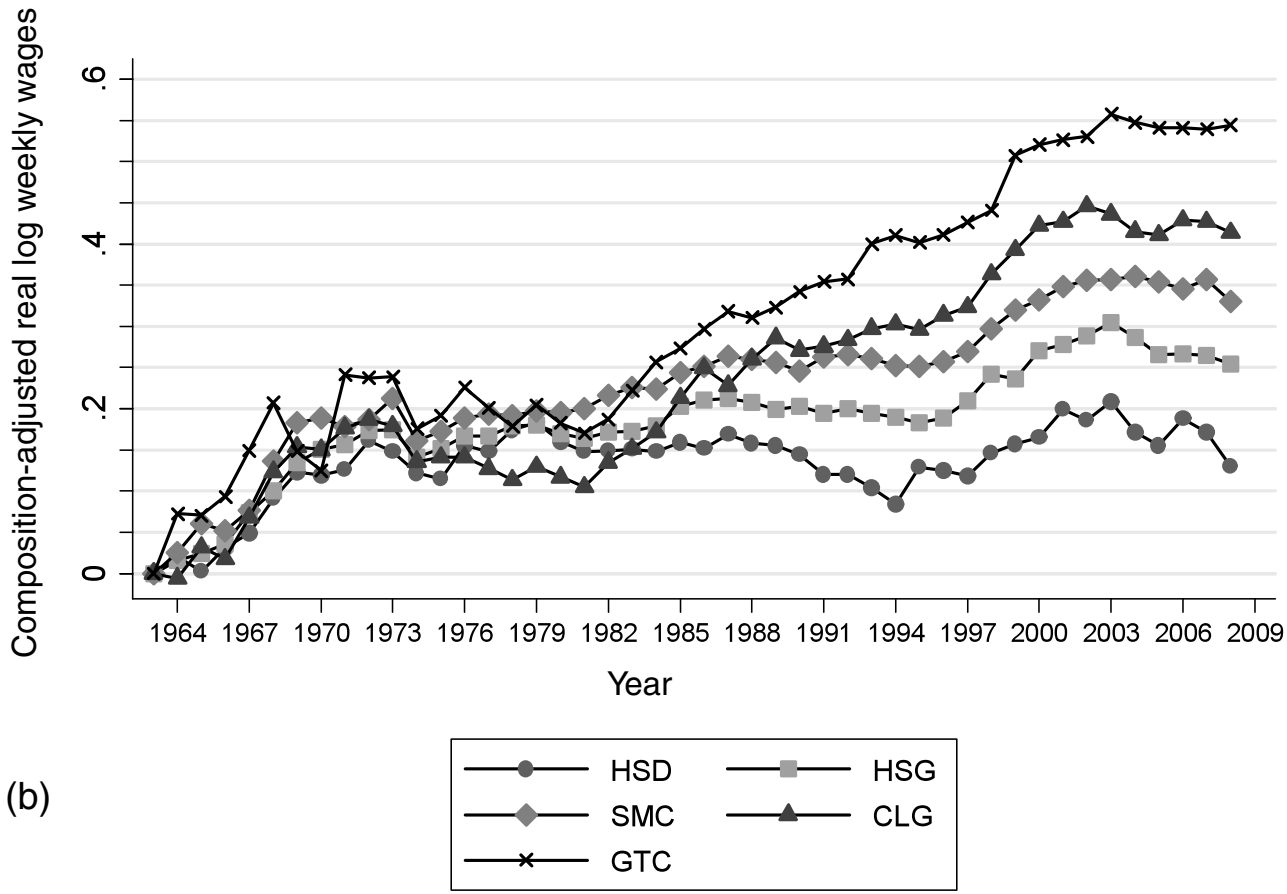
Figure 4: Real, composition-adjusted log weekly wages for full-time full-year workers, 1963–2008 males



(a)

Source: March CPS data for earnings years 1963–2008. See note to Fig. 1. The real log weekly wage for each education group is the weighted average of the relevant composition adjusted cells using a fixed set of weights equal to the average employment share of each group. Nominal wage values are deflated using the Personal Consumption Expenditure (PCE) deflator.

Figure 4: Real, composition-adjusted log weekly wages for full-time full-year workers, 1963–2008 females



(b)

Source: March CPS data for earnings years 1963–2008. See note to Fig. 1. The real log weekly wage for each education group is the weighted average of the relevant composition adjusted cells using a fixed set of weights equal to the average employment share of each group. Nominal wage values are deflated using the Personal Consumption Expenditure (PCE) deflator.

Figure 5: Changes in real, composition-adjusted log weekly wages for full-time, full-year workers, 1963–2008: by educational category and sex (100 × change in mean log real weekly wages)

	1963-1972	1972-1979	1979-1989	1989-1999	1999-2008	1963-2008
All	21.1	−1.7	−1.7	2.7	−0.3	20.1
Males	23.4	−2.8	−6.6	0.5	−1.2	13.3
Females	18.1	−0.2	4.9	5.8	1.0	29.6
Education (years)						
0-11						
Men	20.4	−1.5	−13.4	−7.4	−3.1	−5.1
Women	16.2	2.1	−2.7	0.2	−2.8	13.0
12						
Men	22.2	−0.7	−10.3	−2.1	−2.9	6.2
Women	17.3	0.7	1.9	3.7	1.8	25.4
13-15						
Men	20.9	−3.7	−5.8	2.8	−1.8	12.4
Women	18.7	1.0	5.8	6.4	1.0	33.0
16+						
Men	30.6	−6.3	4.9	9.5	3.6	42.2
Women	20.1	−5.0	14.6	12.8	2.5	44.9
16-17						
Men	28.0	−7.4	3.3	7.4	2.2	33.4
Women	18.7	−5.7	15.6	10.7	2.1	41.4
18+						
Men	36.0	−4.2	8.0	13.7	6.6	60.1
Women	23.7	−3.3	11.9	18.4	3.7	54.4

Figure 6: Changes in real, composition-adjusted log weekly wages for full-time, full-year workers, 1963–2008: by experience, educational category, and sex (100 × change in mean log real weekly wages)

	1963-1972	1972-1979	1979-1989	1989-1999	1999-2008	1963-2008
Experience						
5 years						
Men	20.8	−5.1	−10.0	4.7	−2.6	7.8
Women	18.9	−2.3	−0.6	5.6	−0.9	20.6
25-35 years						
Men	25.0	−0.9	−3.4	−2.1	−2.4	16.3
Women	17.2	2.1	8.5	5.4	1.7	34.8
Education and experience						
Education 12						
Experience 5						
Men	23.2	−3.1	−19.1	2.2	−4.4	−1.1
Women	17.3	−1.8	−6.3	3.2	0.5	12.8
Experience 25-35						
Men	20.5	1.6	−4.3	−4.2	−3.5	10.1
Women	16.9	2.7	6.4	5.2	1.8	33.0
Education 16+						
Experience 5						
Men	23.1	−11.6	8.6	10.4	0.6	31.2
Women	20.5	−5.6	14.7	9.3	−0.8	38.0
Experience 25-35						
Men	35.5	−0.1	4.4	6.8	2.9	49.6
Women	18.6	−2.3	12.7	14.5	4.2	47.6

Figure 7: Predicted log hourly wages by years of education, education quadratic: Males

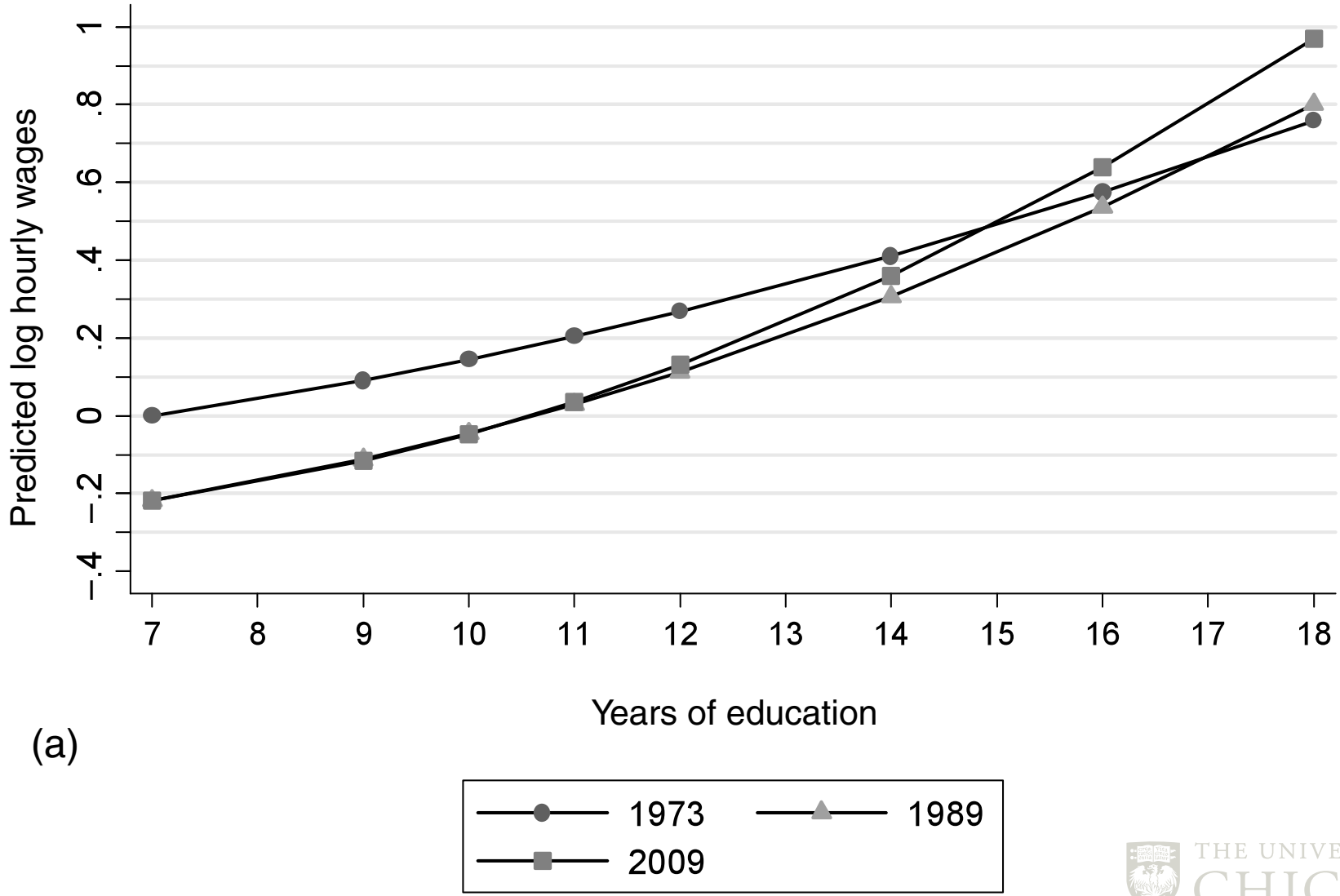
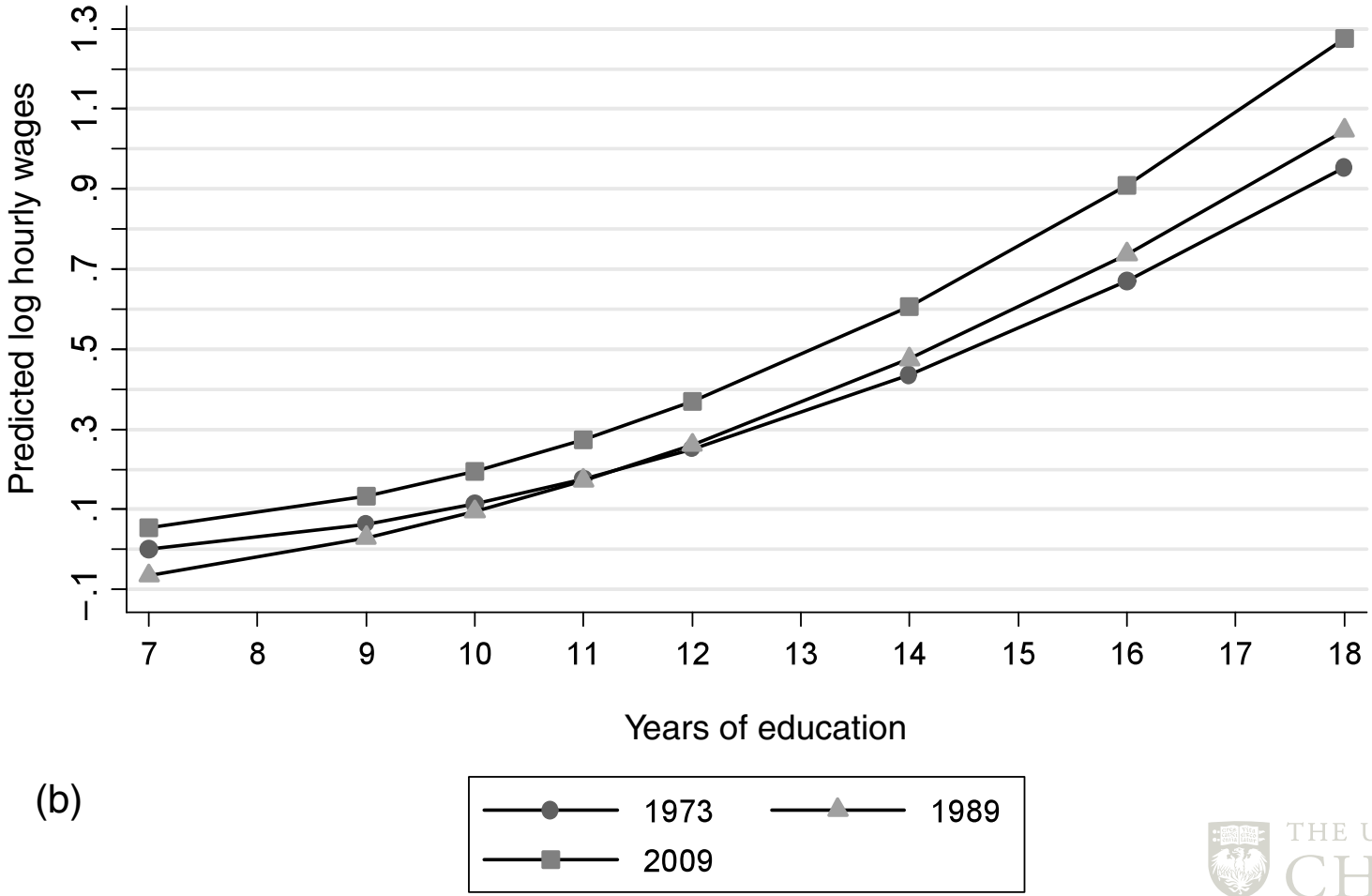
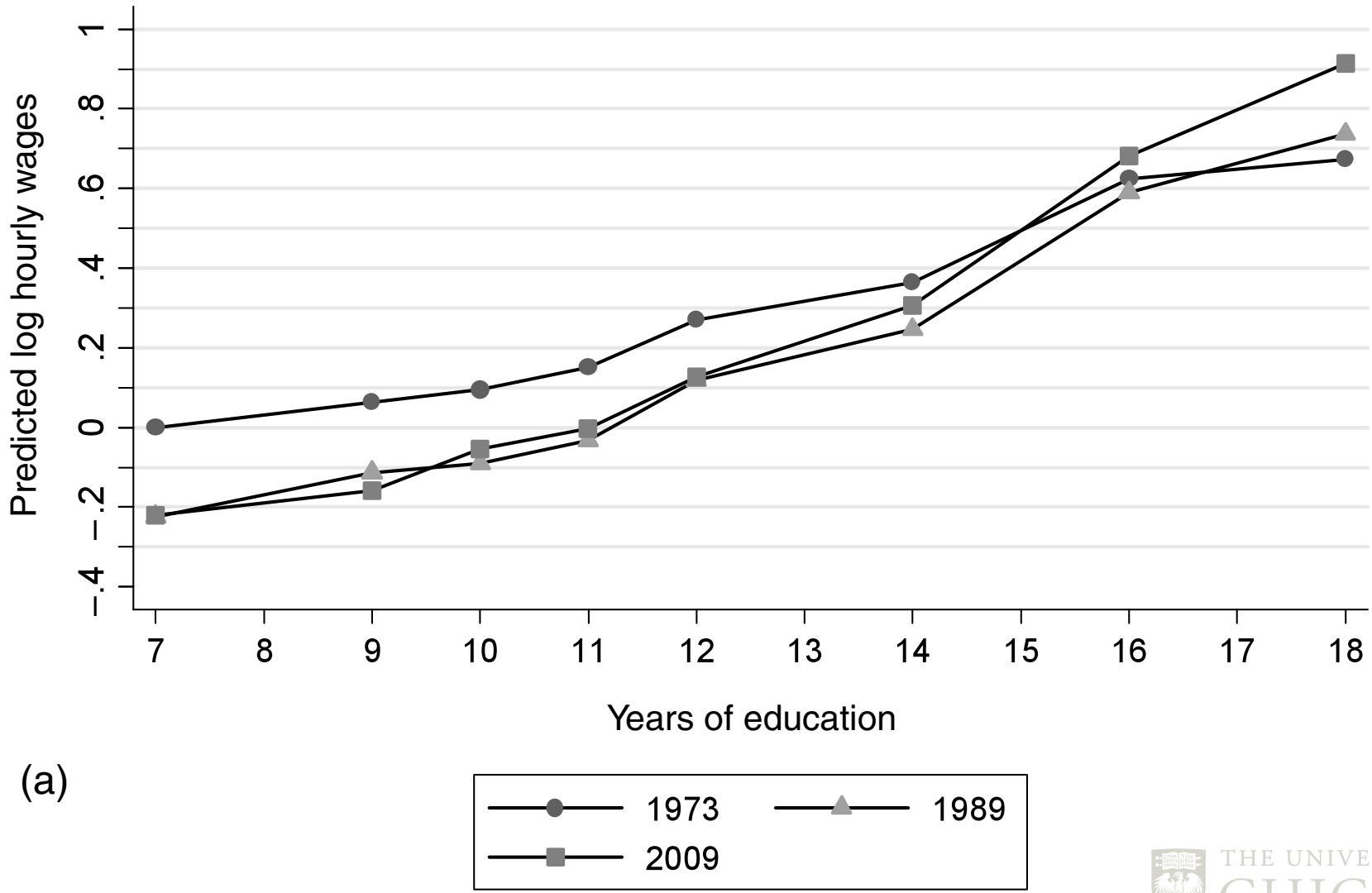


Figure 7: Predicted log hourly wages by years of education, education quadratic: Females



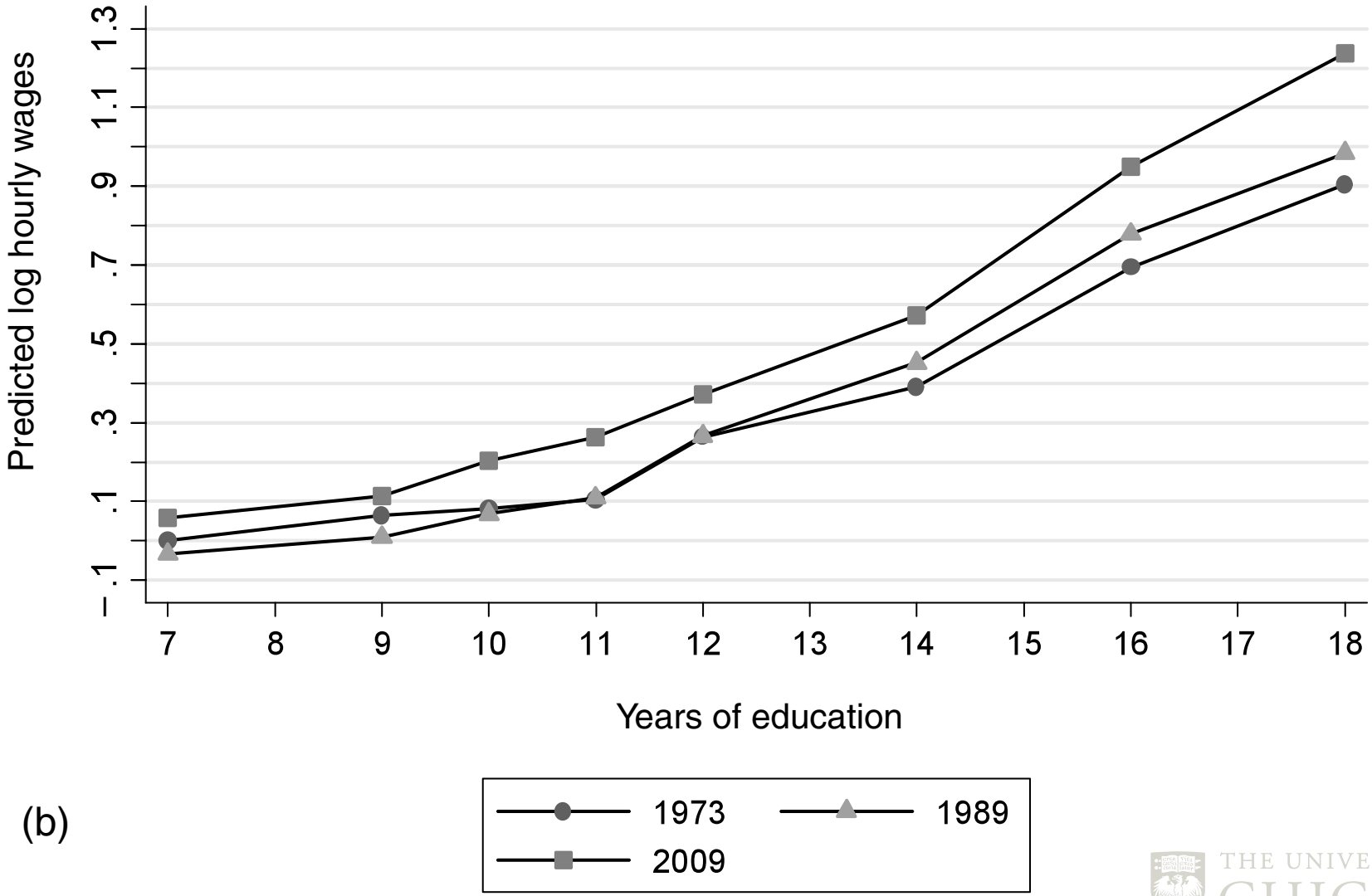
(b)

Figure 8: Predicted log hourly wages by years of education, education dummies: Males



(a)

Figure 8: Predicted log hourly wages by years of education, education dummies: Females

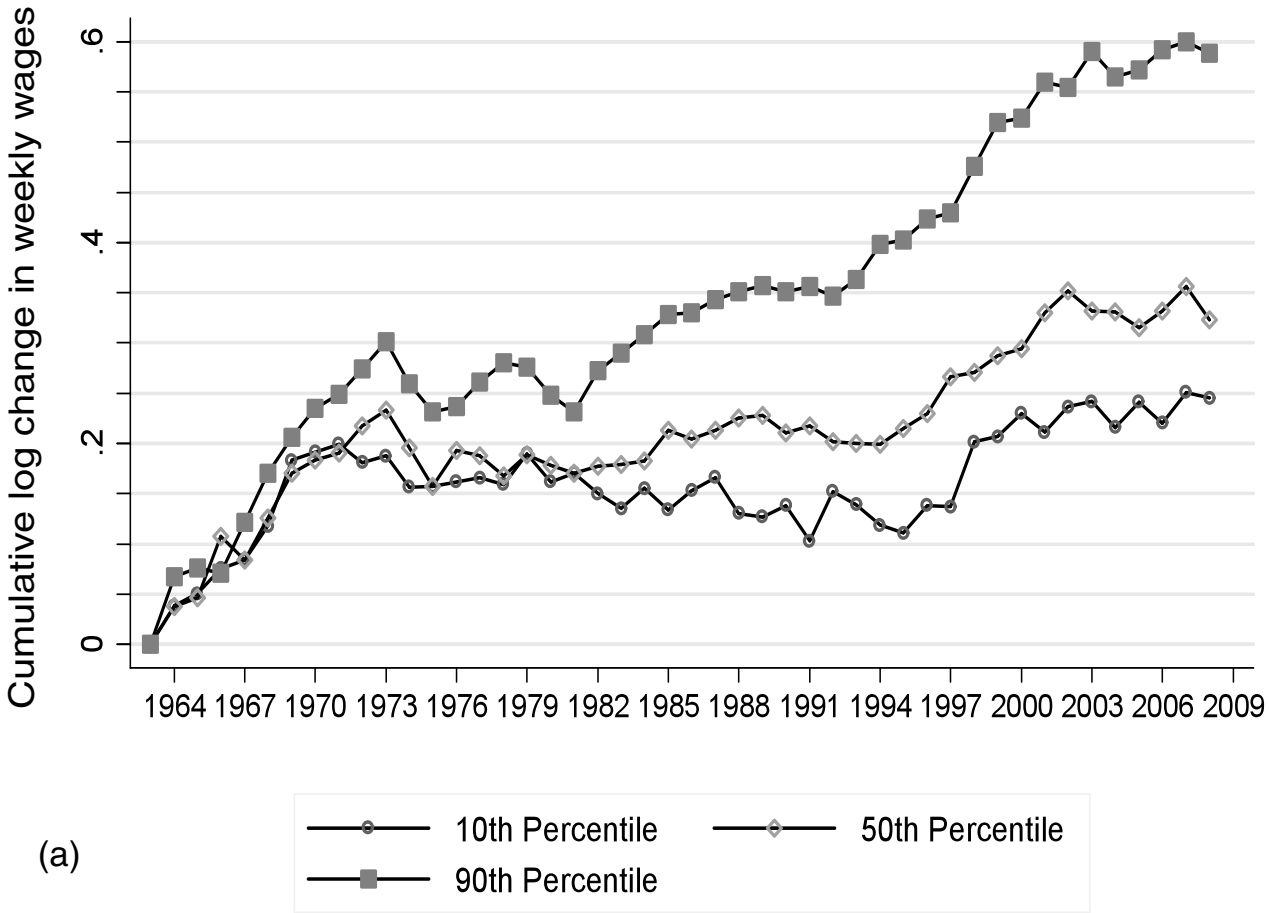


(b)

2.4. Overall wage inequality

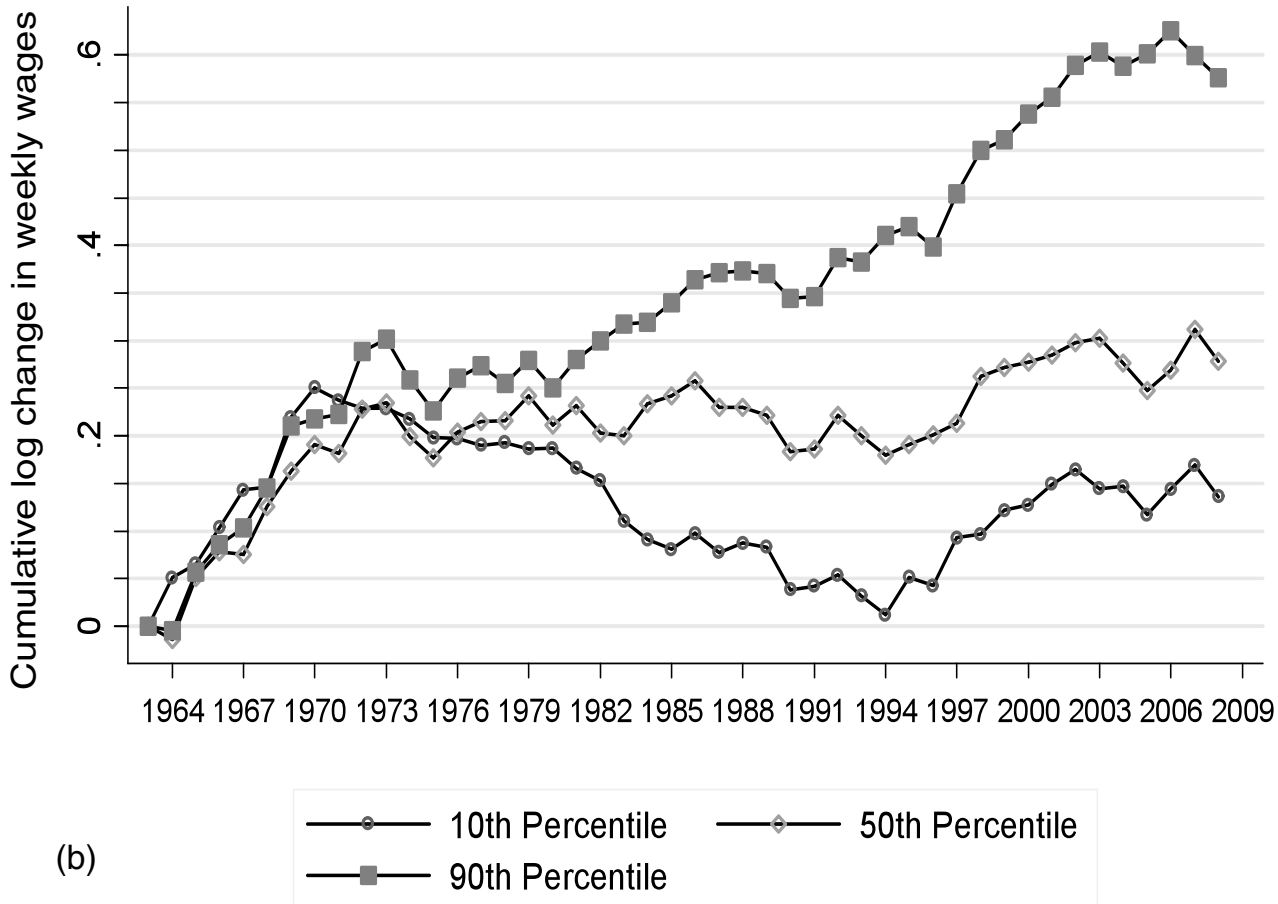
- Figure 9 plots the evolution of real log weekly wages of full-time, full-year workers at the 10th, 50th and 90th percentiles of the earnings distribution from 1963 through 2008.

Figure 9: Cumulative log change in real weekly earnings at the 90th, 50th and 10th wage percentiles, 1963–2008: full-time full-year males and females



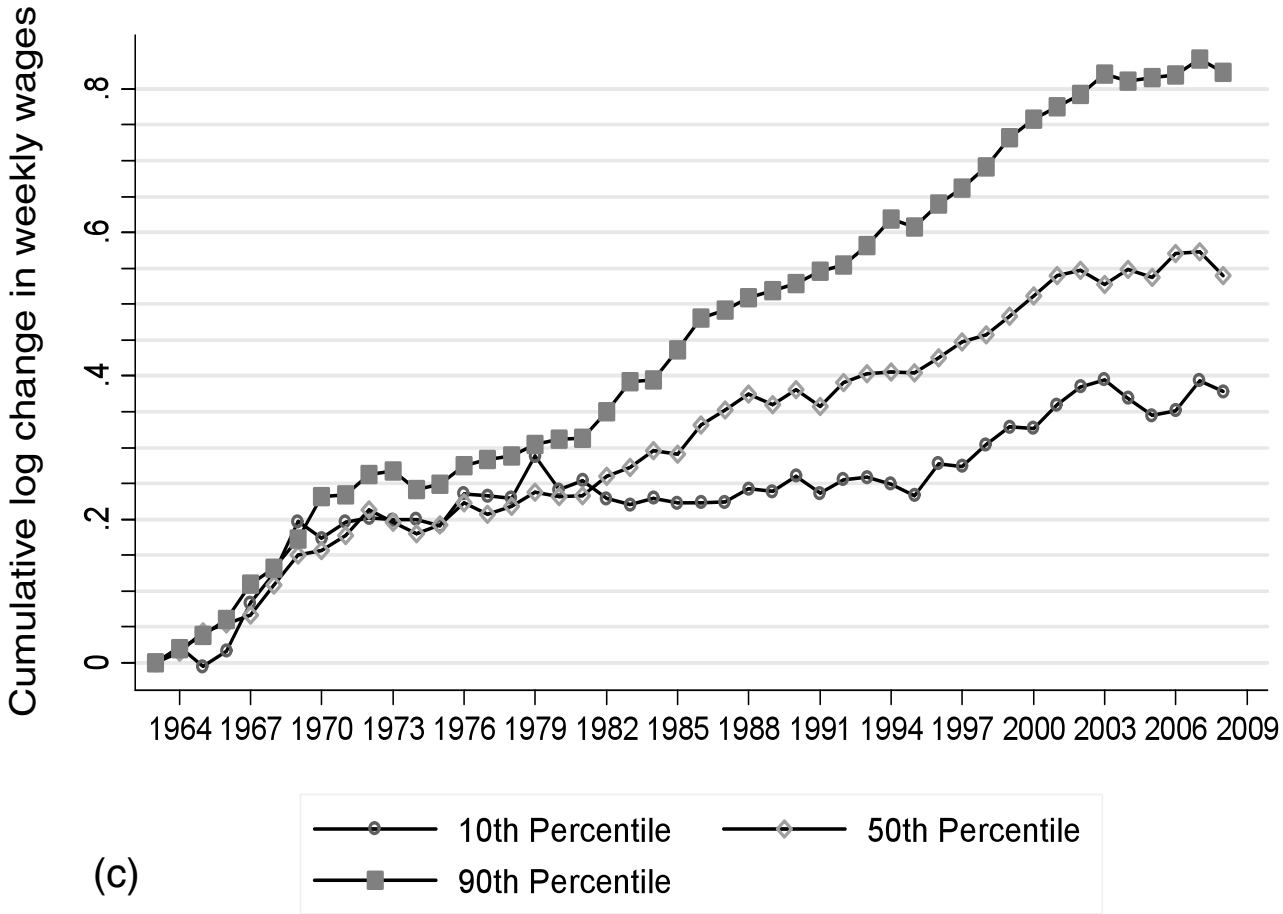
Source: March CPS data for earnings years 1963–2008. For each year, the 10th, median and 90th percentiles of log weekly wages are calculated for full-time, full-year workers.

Figure 9: Cumulative log change in real weekly earnings at the 90th, 50th and 10th wage percentiles, 1963–2008: full-time full-year males



Source: March CPS data for earnings years 1963–2008. For each year, the 10th, median and 90th percentiles of log weekly wages are calculated for full-time, full-year workers.

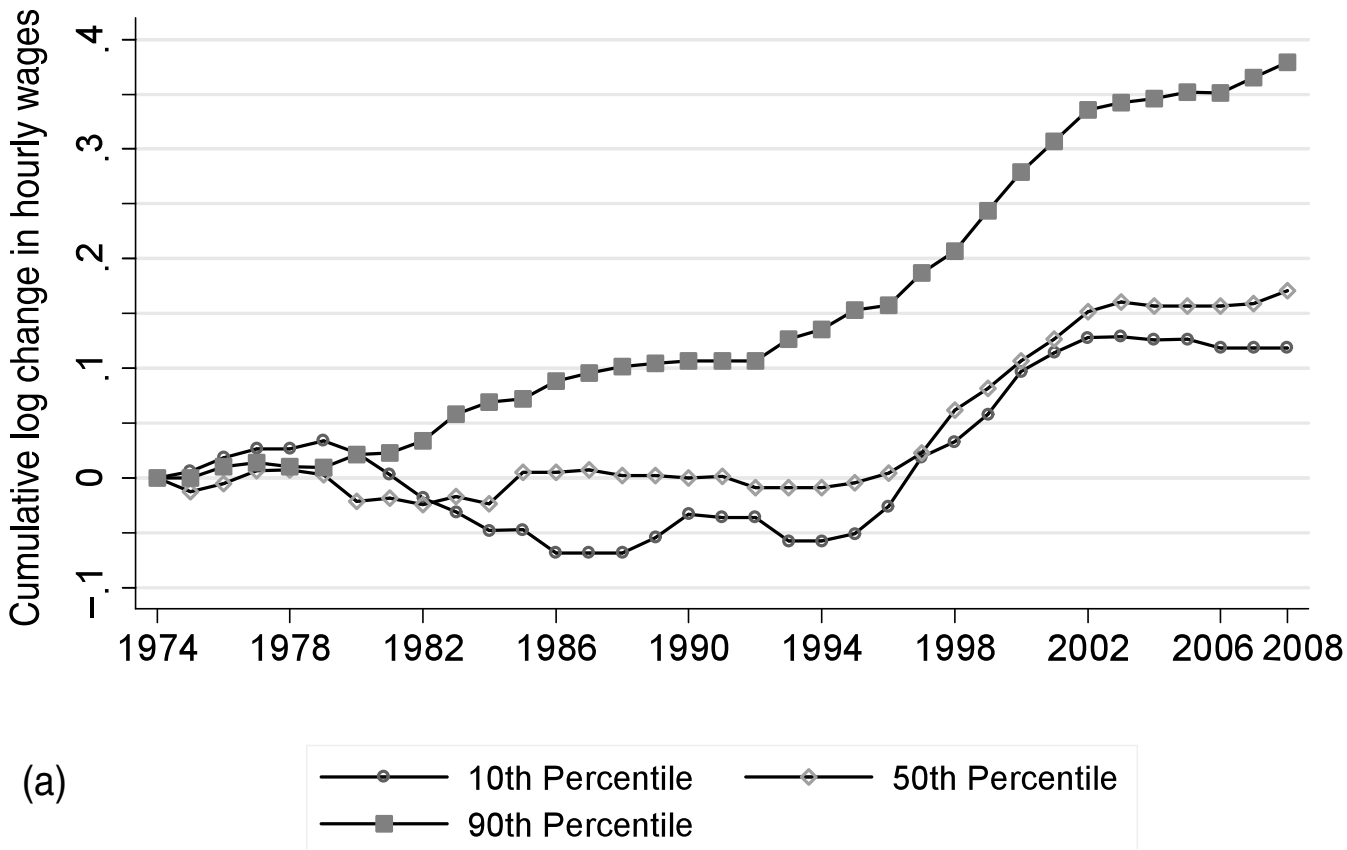
Figure 9: Cumulative log change in real weekly earnings at the 90th, 50th and 10th wage percentiles, 1963–2008: full-time full-year females



Source: March CPS data for earnings years 1963–2008. For each year, the 10th, median and 90th percentiles of log weekly wages are calculated for full-time, full-year workers.

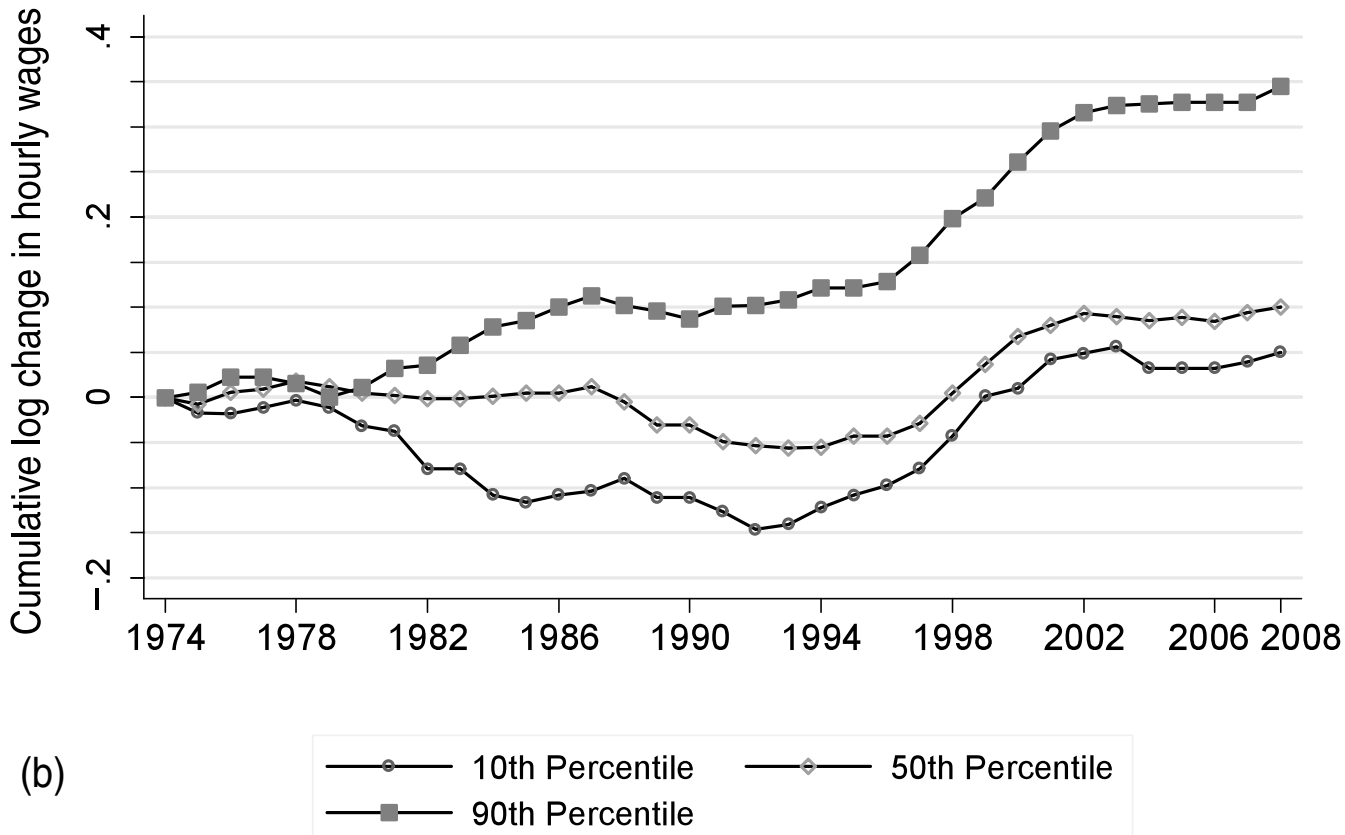
- Figure 10 plots the corresponding trends in real indexed hourly wages of all employed workers at the 10th, 50th, and 90th percentiles.

Figure 10: Cumulative log change in real hourly earnings at the 90th, 50th and 10th wage percentiles, 1974–2008: males and females



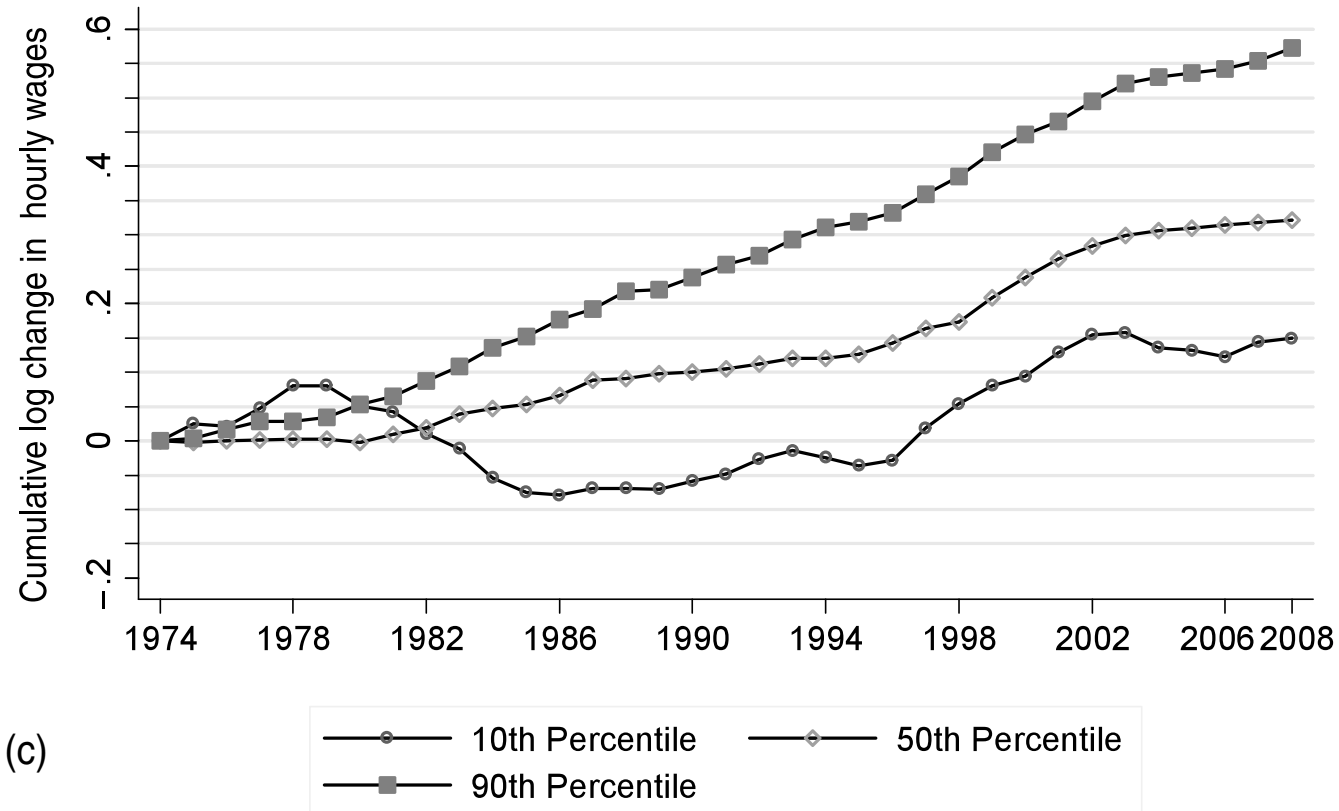
Source: May/ORG CPS data for earnings years 1973–2009. The data are pooled using three-year moving averages (i.e. the year 1974 includes data from years 1973, 1974 and 1975). For each year, the 10th, median and 90th percentiles of log weekly wages are calculated for all workers, excluding the self-employed and those employed in military occupations.

Figure 10: Cumulative log change in real hourly earnings at the 90th, 50th and 10th wage percentiles, 1974–2008: males



Source: May/ORG CPS data for earnings years 1973–2009. The data are pooled using three-year moving averages (i.e. the year 1974 includes data from years 1973, 1974 and 1975). For each year, the 10th, median and 90th percentiles of log weekly wages are calculated for all workers, excluding the self-employed and those employed in military occupations.

Figure 10: Cumulative log change in real hourly earnings at the 90th, 50th and 10th wage percentiles, 1974–2008: females



Source: May/ORG CPS data for earnings years 1973–2009. The data are pooled using three-year moving averages (i.e. the year 1974 includes data from years 1973, 1974 and 1975). For each year, the 10th, median and 90th percentiles of log weekly wages are calculated for all workers, excluding the self-employed and those employed in military occupations.

Figure 11: Changes in male & female log hourly wages by percentile relative to the median

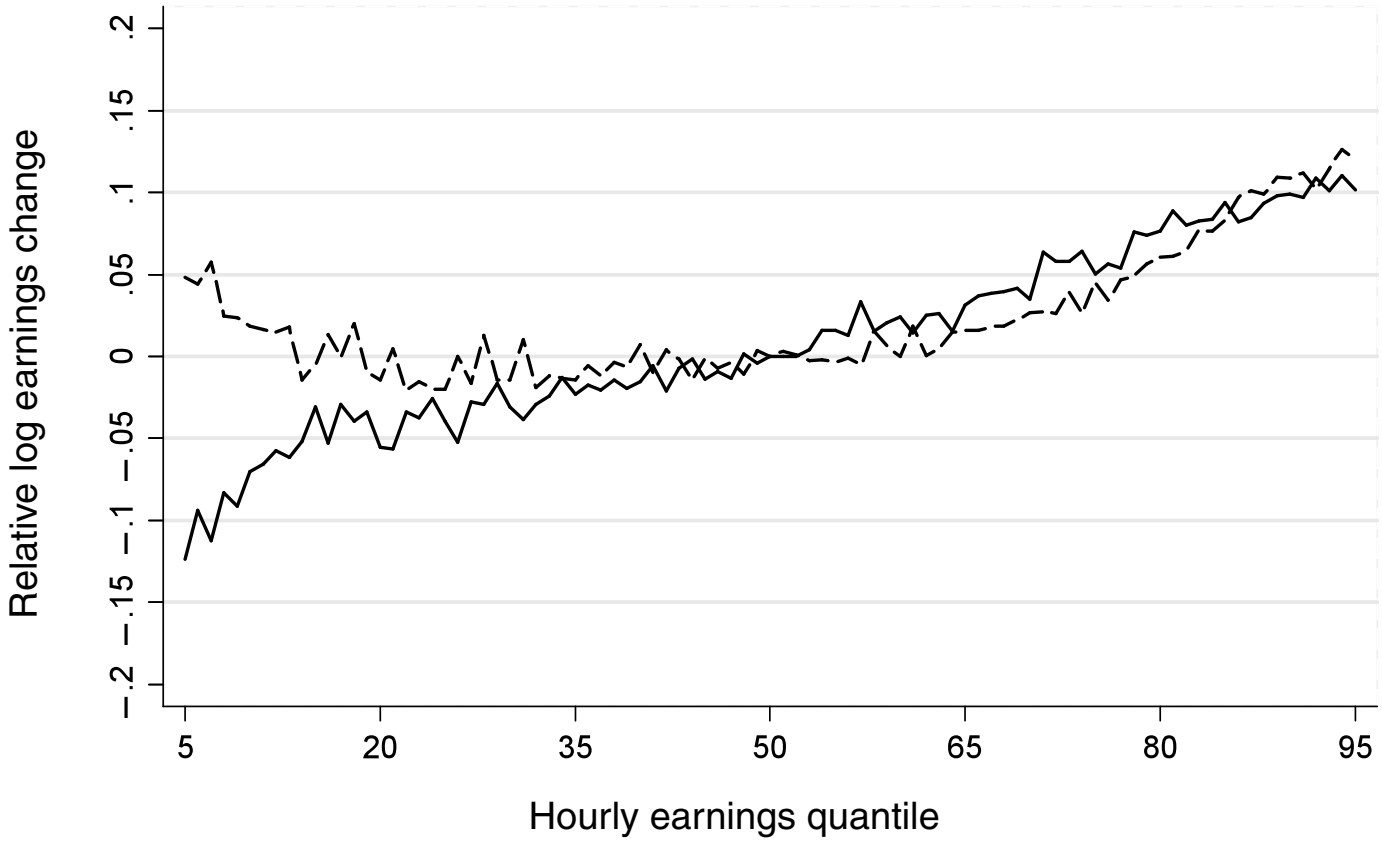


Figure 11: Changes in male log hourly wages by percentile relative to the median

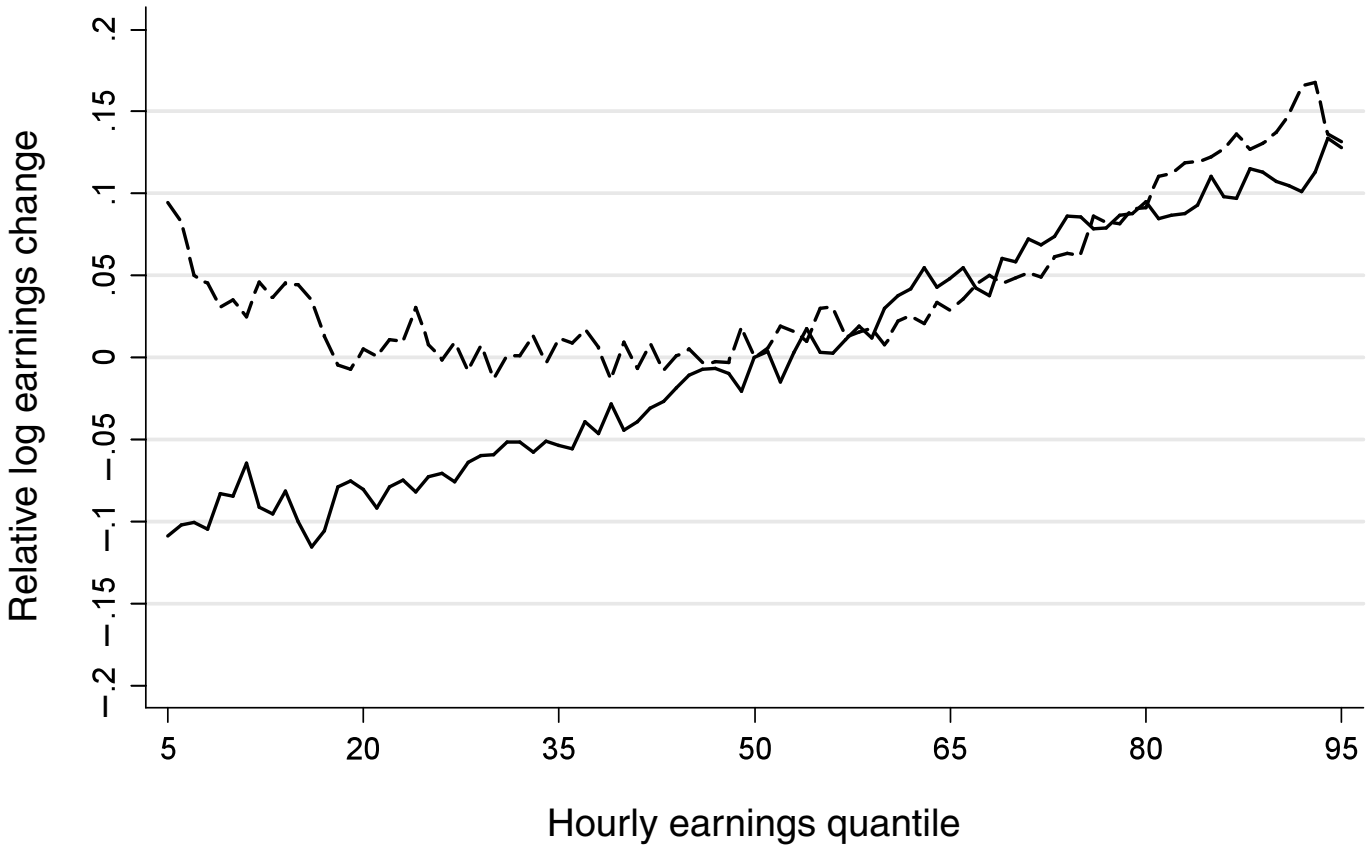


Figure 11: Changes in female log hourly wages by percentile relative to the median

2.5. Job polarization

Changes in occupational structure

Figure 12: Smoothed changes in employment by occupational skill percentile 1979–2007

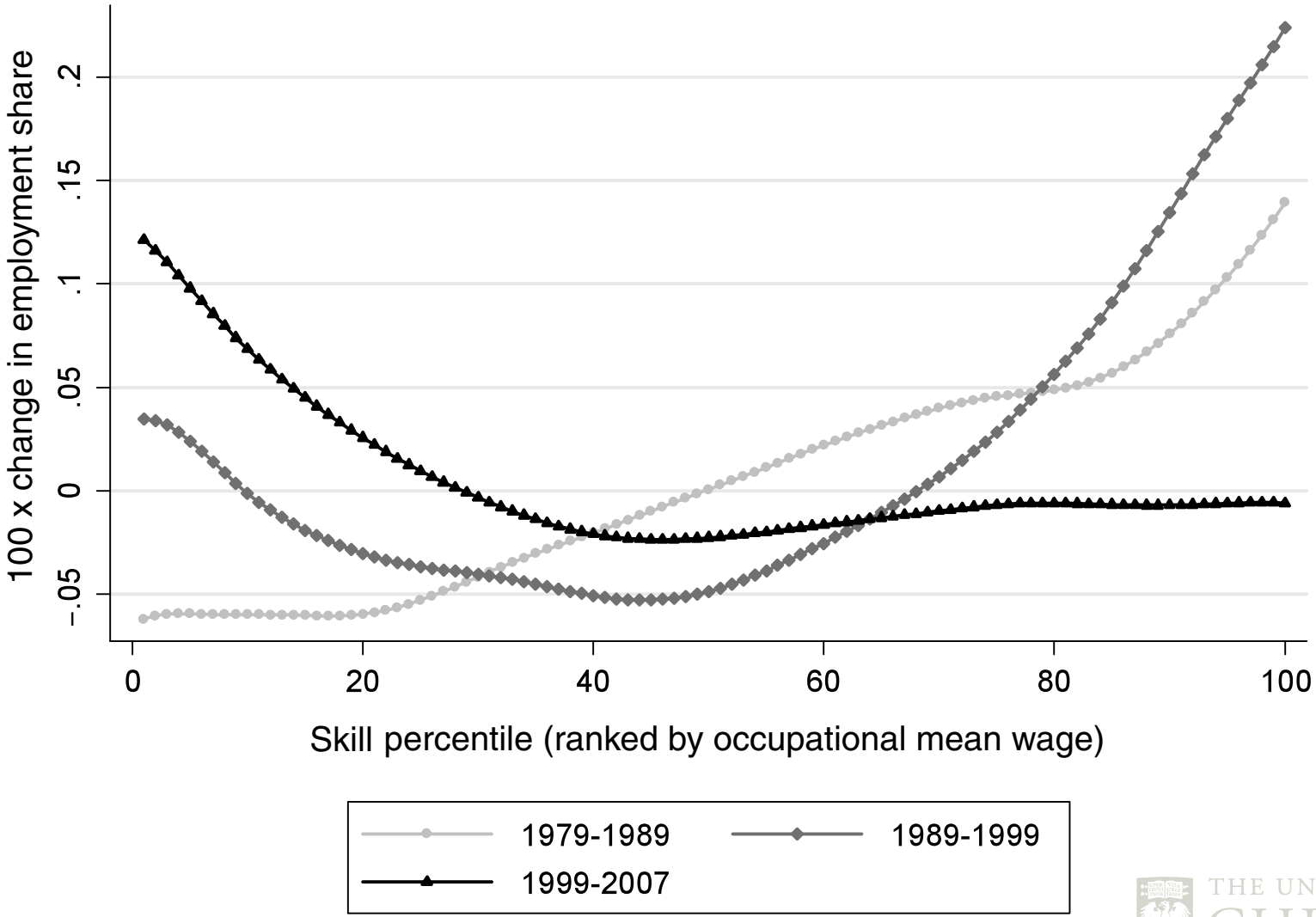


Figure 13: Change in employment shares by occupation 1993–2006 in 16 European countries

Occupations grouped by wage tercile: Low, Middle, High

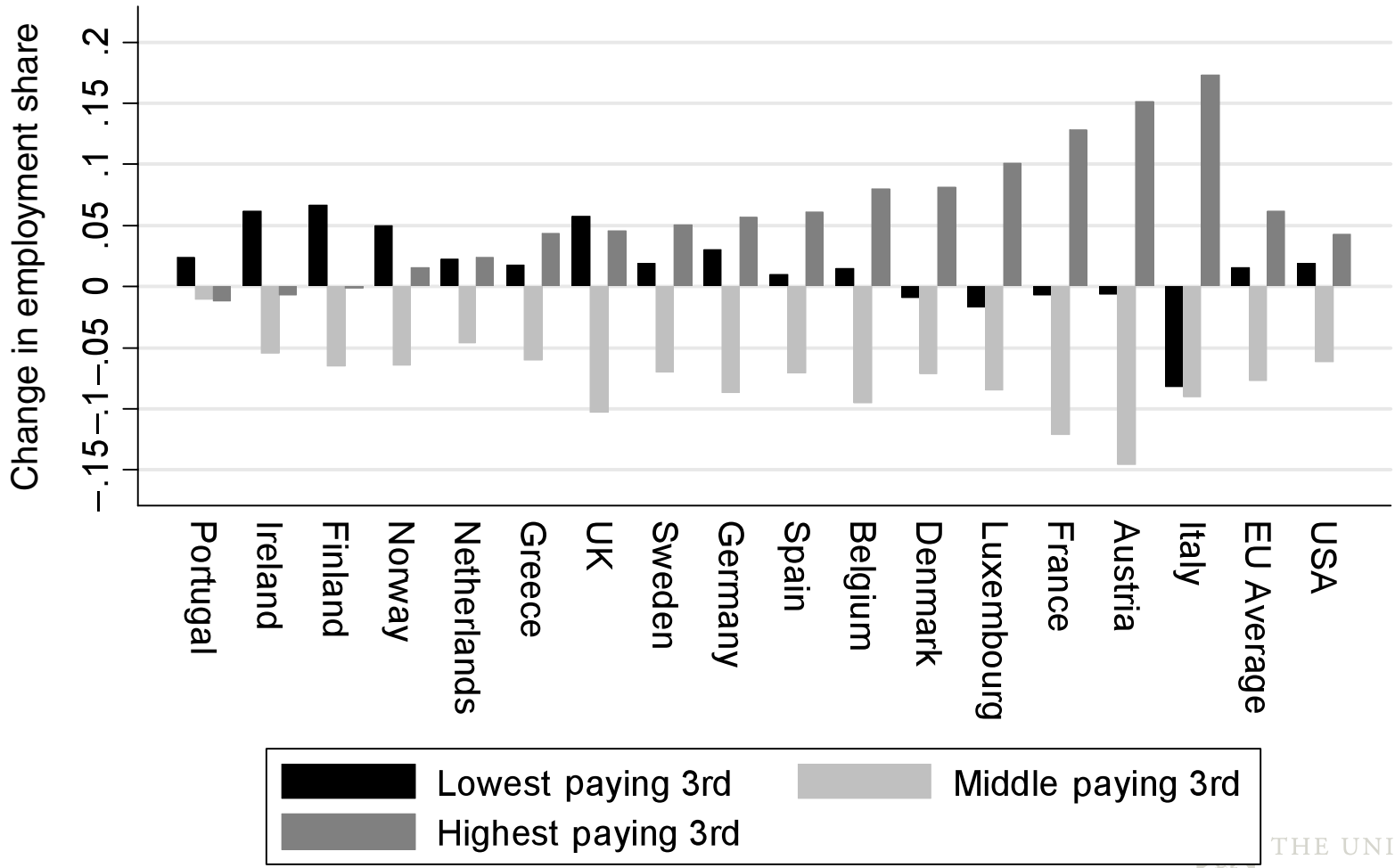
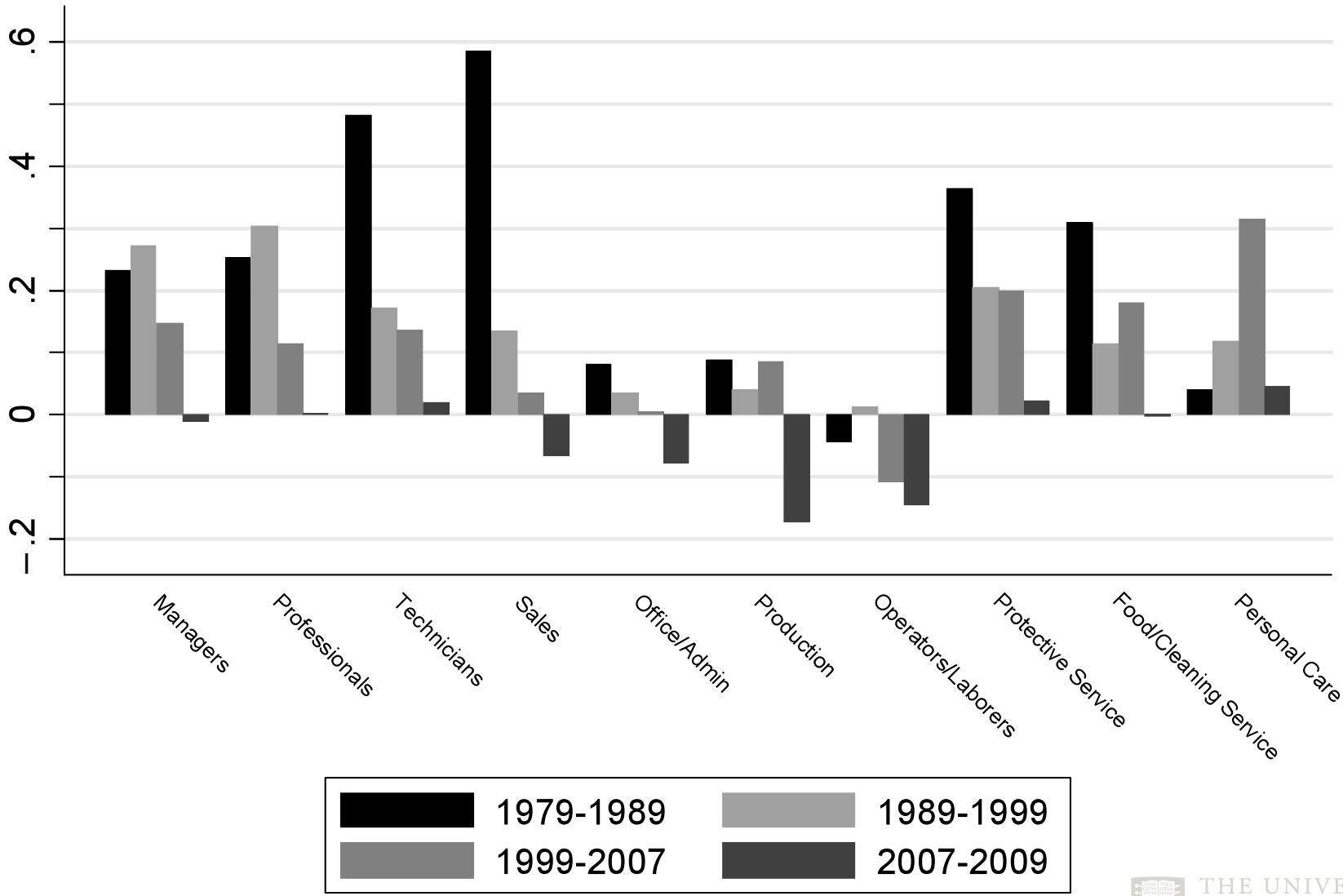


Figure 14: Percent change in employment by occupation, 1979–2009



Sources of job polarization: The "routinization" hypothesis

- Autor et al. (2003) link job polarization to rapid improvements in the productivity – and declines in the real price – of information and communications technologies and, more broadly, symbolic processing devices.

Linking occupational changes to job tasks

- Characterize the "task content" of jobs.
- ALM used the US Department of Labor's *Dictionary of Occupational Titles* (DOT) to impute to workers the task measures associated with their occupations.
- To keep categories manageable and self-explanatory, we use broad occupational groupings, either at the level of the ten categories as in Fig. 14 – ranging from Managers to Personal Care workers – or even more broadly, at the level of the four clusters that are suggested by the figure:
  1. managerial, professional and technical occupations;
  2. sales, clerical and administrative support occupations;
  3. production, craft, repair, and operative occupations; and
  4. service occupations.

- Table 28 shows that the intensity of use of non-routine cognitive ("abstract") tasks is highest in professional, technical and managerial occupations, and lowest in service and laborer occupations.
- Set of O*NET-based measures of abstract task input.
- Our O*NET task measures also make a further distinction between non-routine cognitive analytic tasks (e.g., mathematics and formal reasoning) and non-routine cognitive interpersonal and managerial tasks.

The evolution of job tasks

Figure 15: Employment shares by major occupation groups, 1959–2007: Males and females

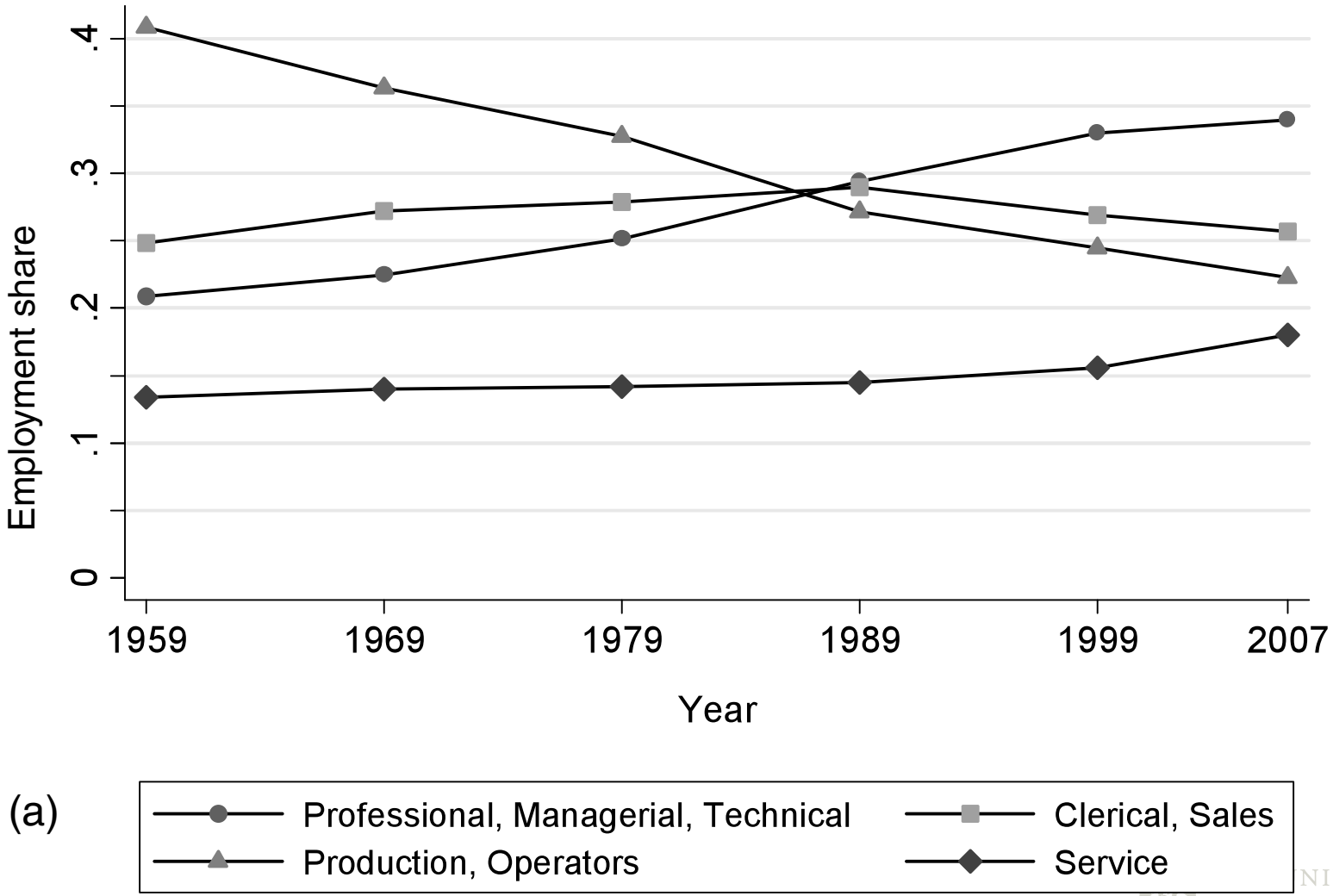


Figure 15: Employment shares by major occupation groups, 1959–2007: Males

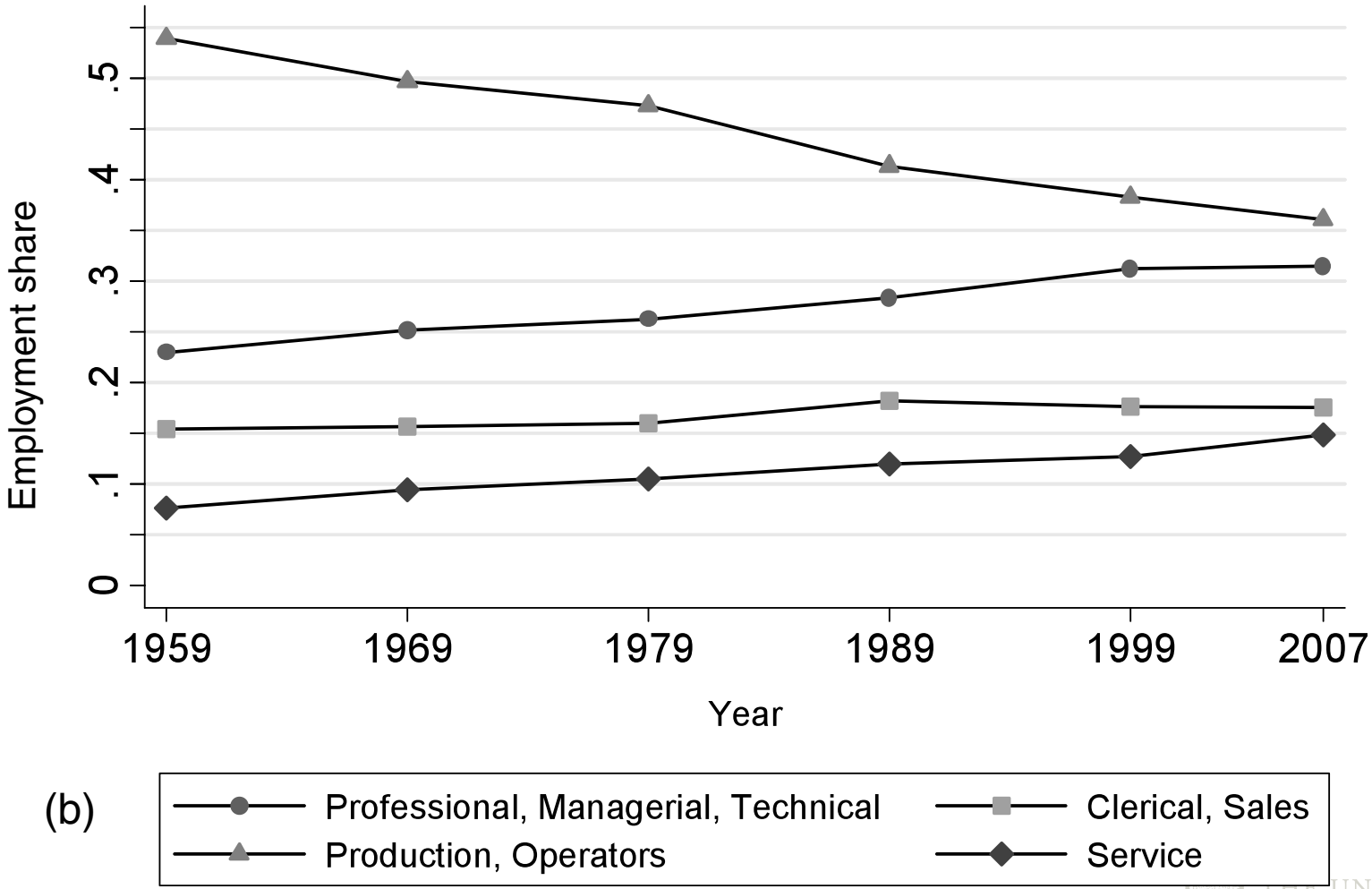
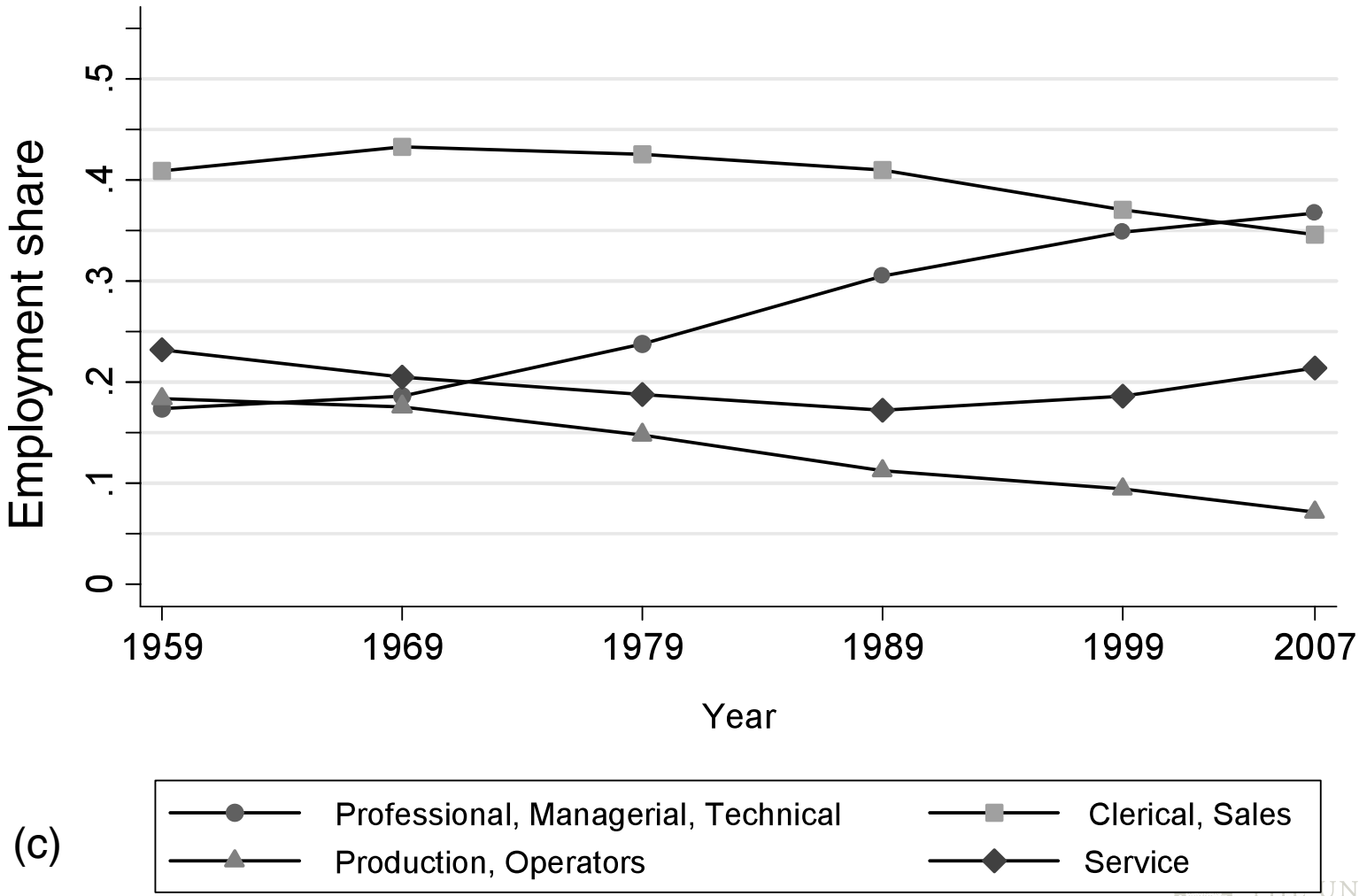


Figure 15: Employment shares by major occupation groups, 1959–2007: Females



(c)

Figure 16: Changes in employment shares 1959 to 2007 in major occupations by educational category: Males

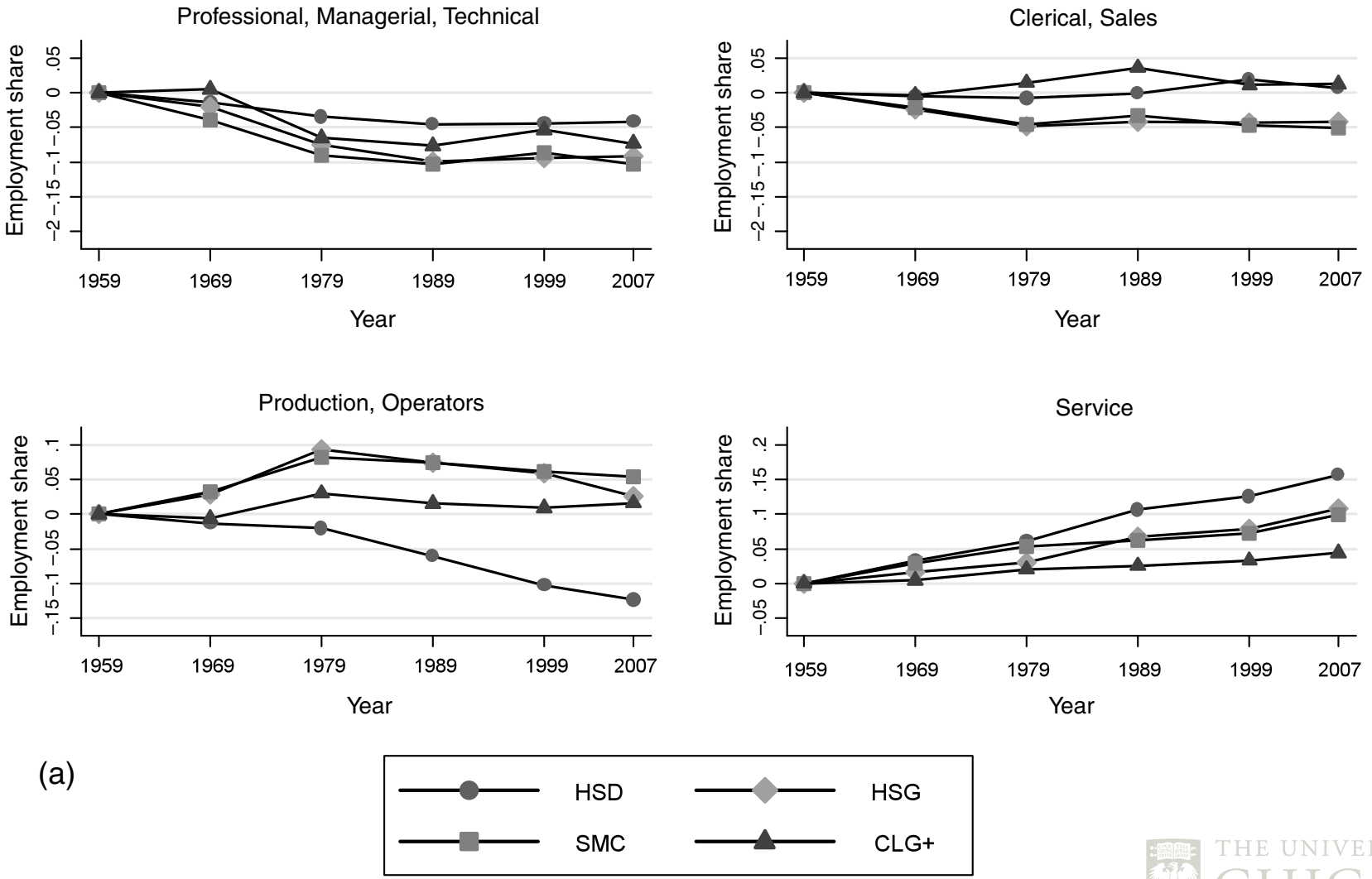
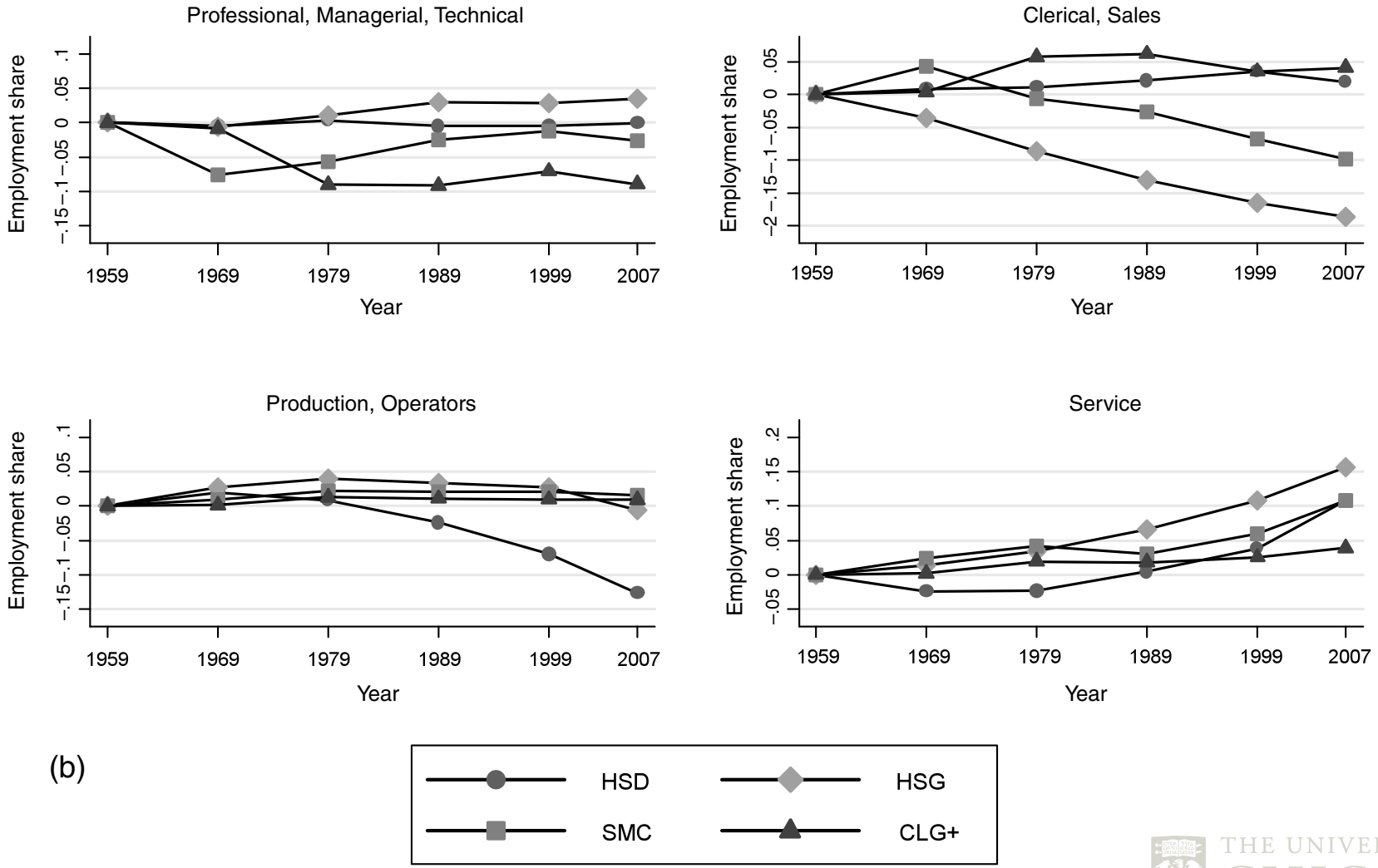


Figure 16: Changes in employment shares 1959 to 2007 in major occupations by educational category: Females



Cross-national evidence on employment polarization

Figure 17: US and European Union occupational employment shares (% points) Age 39 or less

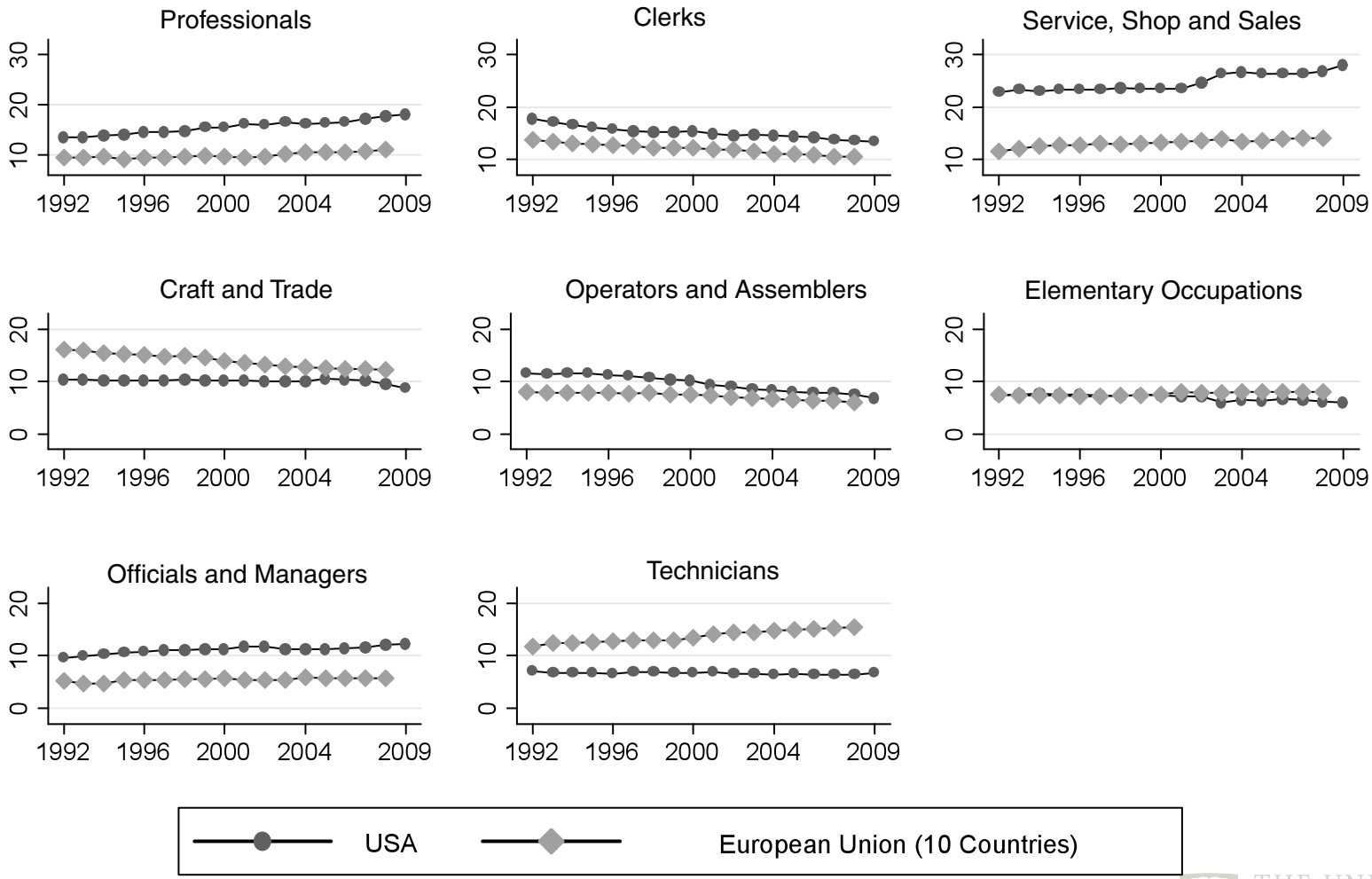


Figure 18: Change in employment shares of young male workers (age $<$ 40) by country, 1992–2008

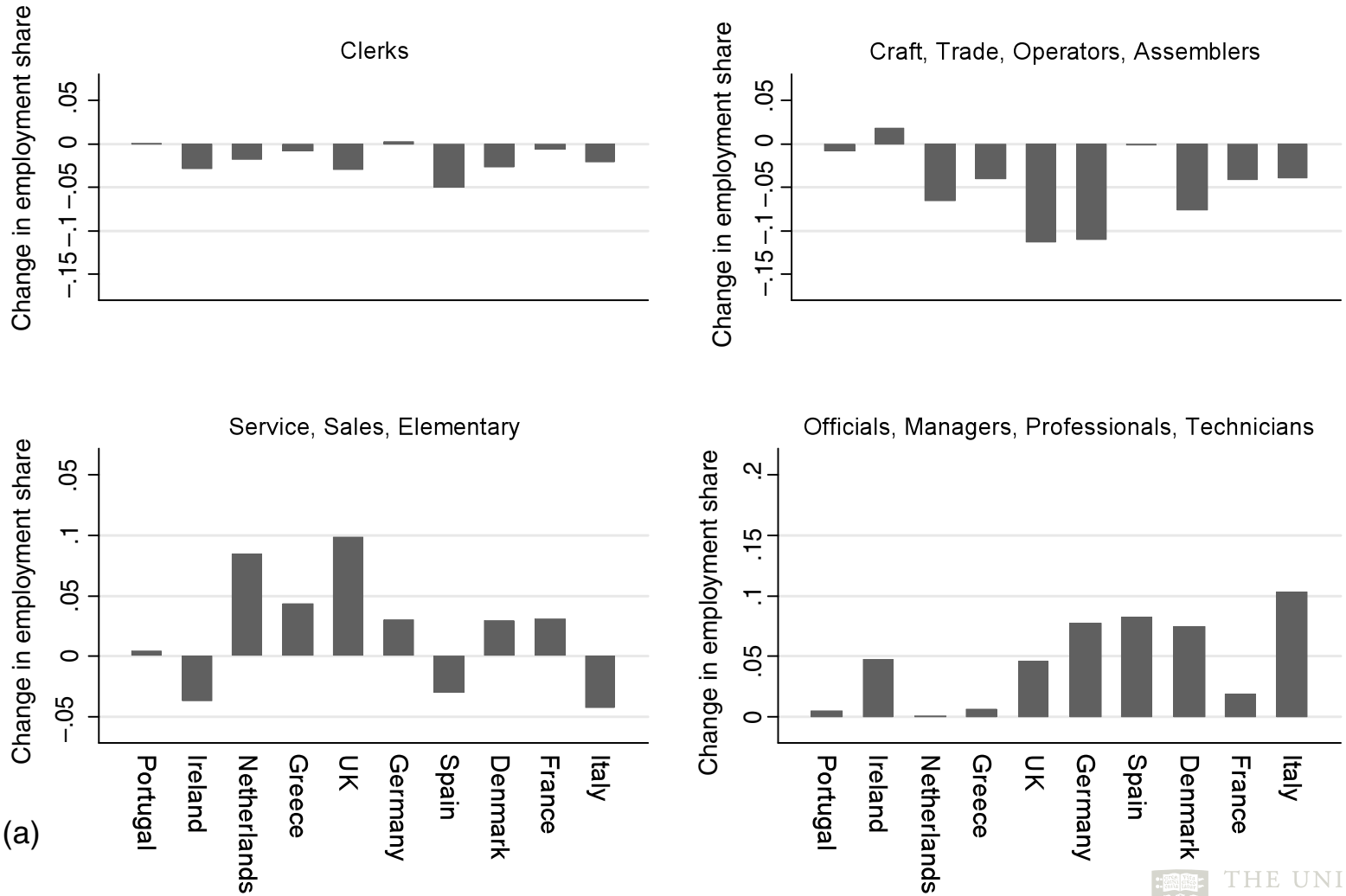
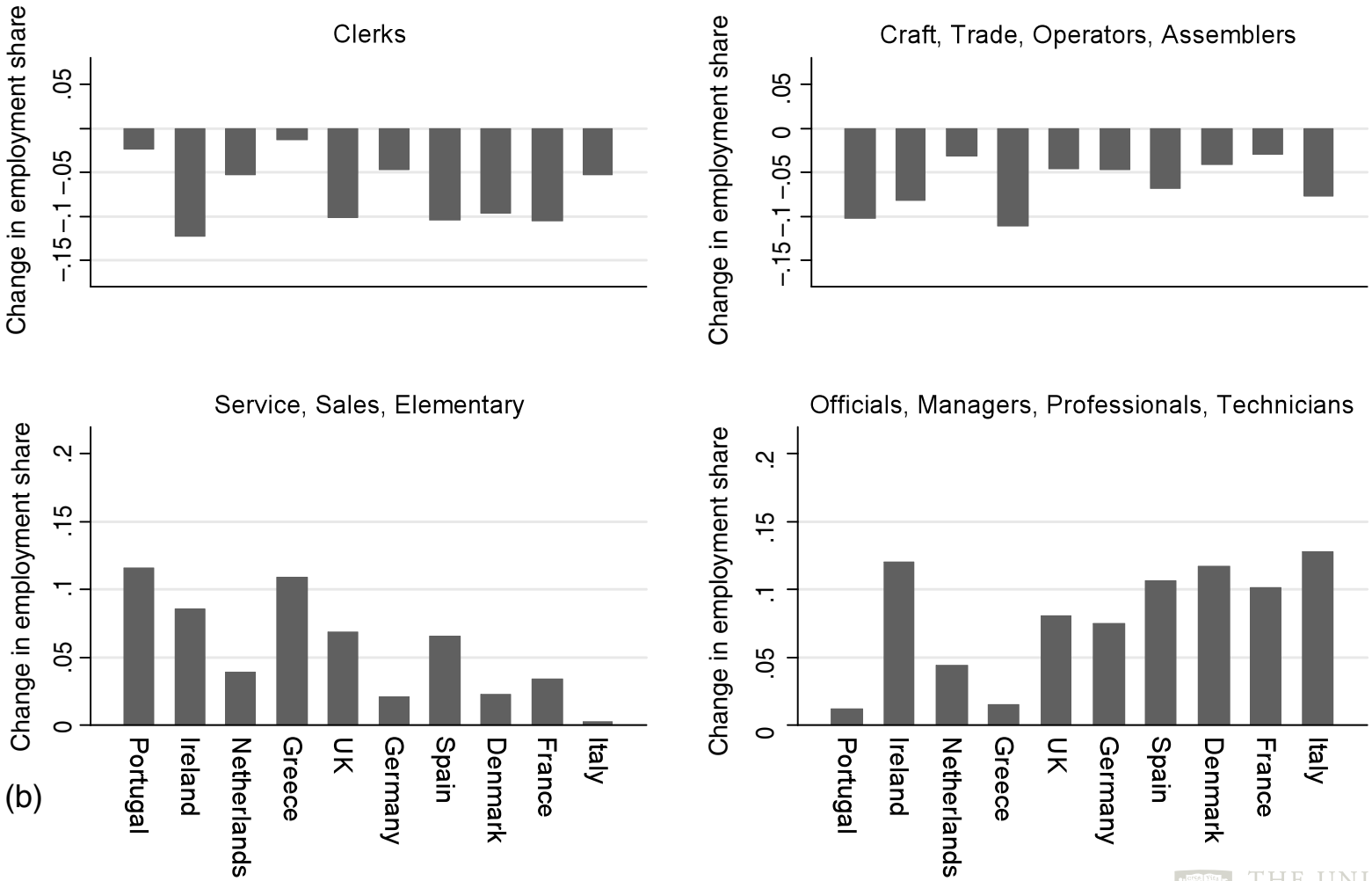


Figure 18: Change in employment shares of young female workers (age < 40) by country, 1992–2008



Is job polarization explained by industrial composition?

$$\begin{aligned}\Delta E_{jt} &= \sum_k \Delta E_{kt}\lambda_{jk} + \sum_j \Delta\lambda_{jkt}E_k \\ &\equiv \Delta E_t^B + \Delta E_t^W. \end{aligned} \tag{1}$$

- Here, ΔE_{jt} is the change in the overall share of employment in occupation j over time interval t,
- ΔE_t^B is the change in occupation j's share of employment attributable to changes in industrial composition and
- Conversely, ΔE_t^W is the change in occupation j's employment share attributable to within-industry shifts.

Figure 19: Employment and wages in ten broad occupations, 1959–2007

	1959	1969	1979	1989	1999	2007
	A. Employment shares					
Managers	8.9	8.5	9.8	11.8	14.1	14.4
Professionals	8.6	10.7	11.7	13.4	14.9	15.7
Technicians	2.2	2.6	3.1	3.6	3.6	3.5
Sales	8.3	8.3	10.0	11.9	11.3	11.4
Office and admin	15.1	18.1	17.3	16.6	15.3	14.0
Production, craft and repair	13.8	12.7	12.7	11.1	11.2	10.1
Operators, fabricators and laborers	24.7	22.6	19.2	15.6	13.0	11.9
Protective service	1.1	1.1	1.5	1.8	2.0	2.2
Food prep, buildings and grounds, cleaning	4.8	6.0	7.4	7.6	7.5	8.8
Personal care and personal services	6.7	6.6	5.0	4.9	5.9	6.8
	B. 100*log weekly full-time, full-year wages relative to the 1959 mean					
Managers	47.9	67.3	60.9	67.5	80.8	88.5
Professionals	27.4	54.1	49.3	62.9	72.2	75.5
Technicians	16.5	33.5	34.3	45.6	64.3	68.5
Sales	−6.2	10.5	9.8	20.5	28.3	27.9
Office and admin	−6.5	7.6	7.1	13.8	19.3	17.5
Production, craft and repair	23.1	41.1	42.3	42.1	43.1	39.9
Operators, fabricators and laborers	−4.7	11.1	15.7	15.1	22.5	17.3
Protective service	15.3	41.4	34.3	40.6	49.1	50.3
Food prep, buildings and grounds, cleaning	−54.7	−31.5	−29.5	−23.1	−15.3	−22.0
Personal care and personal services	−76.9	−46.7	−29.2	−18.8	−5.8	−10.4

Figure 20: Employment and wages in ten broad occupations, 1959–2007, Cont.

	C. 100*log hourly wages (May/ORG) relative to the 1973 mean					
	1973	**1979**	**1989**	**1999**	**2007**	**2009**
Managers	36.8	33.7	39.4	49.9	58.7	60.7
Professionals	33.0	31.8	38.4	49.7	54.1	56.4
Technicians	15.3	13.7	23.9	27.7	53.6	52.5
Sales	−18.9	−17.4	−18.5	−4.2	−0.3	−1.1
Office and admin	−8.8	−9.8	−10.8	−5.8	−1.1	1.6
Production, craft and repair	21.9	21.3	14.7	19.0	18.3	21.6
Operators, fabricators and laborers	−7.5	−5.7	−16.1	−11.7	−6.1	−2.0
Protective service	8.4	5.7	3.3	13.0	25.9	23.2
Food prep, buildings and grounds, cleaning	−49.0	−49.2	−55.2	−44.8	−39.6	−38.3
Personal care and personal services	−44.1	−39.3	−43.5	−31.4	−23.7	−22.7

Figure 21: Males: Partial R-squared net of experience quartic, 1959–2007

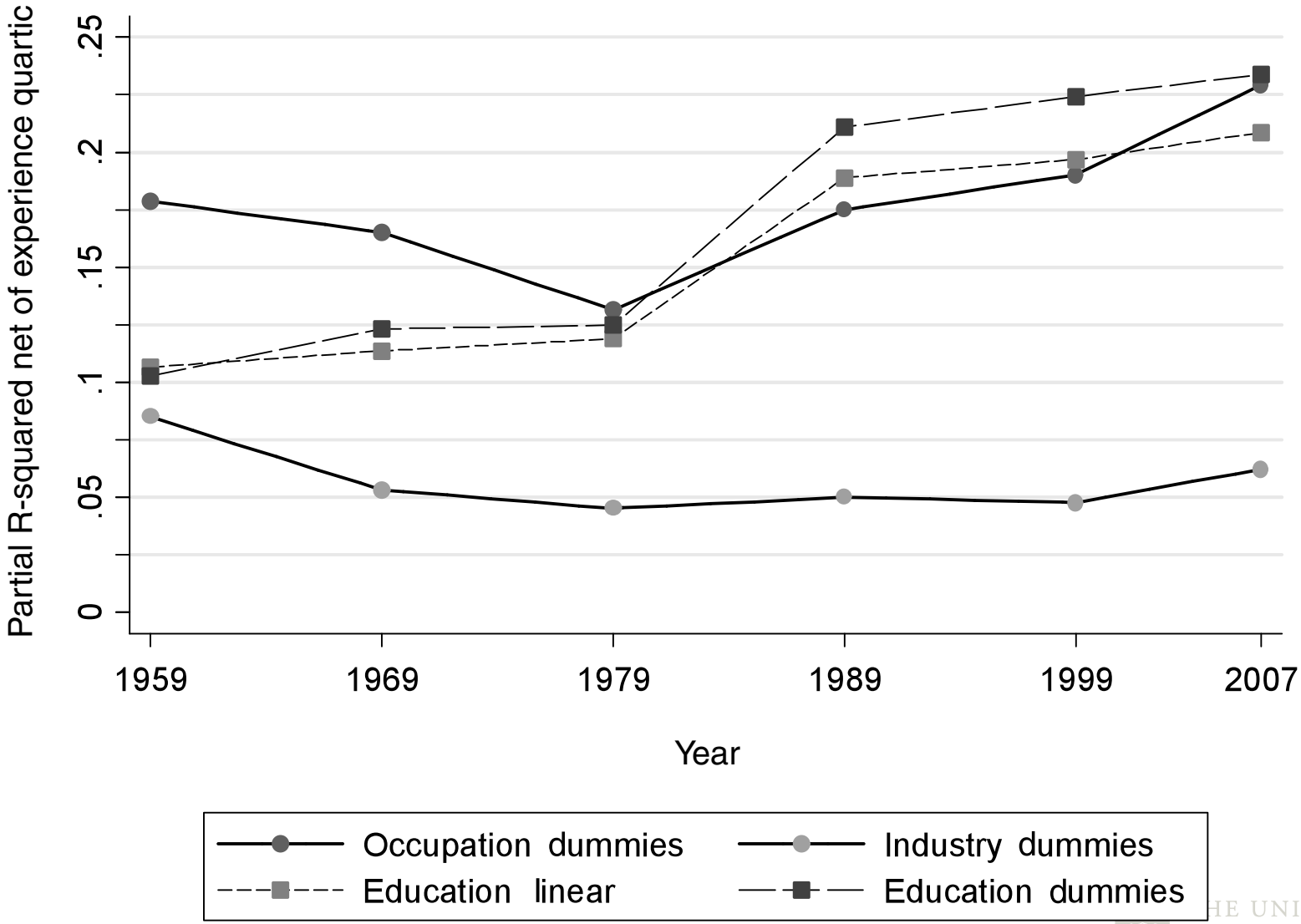


Figure 21: Females: Partial R-squared net of experience quartic, 1959–2007

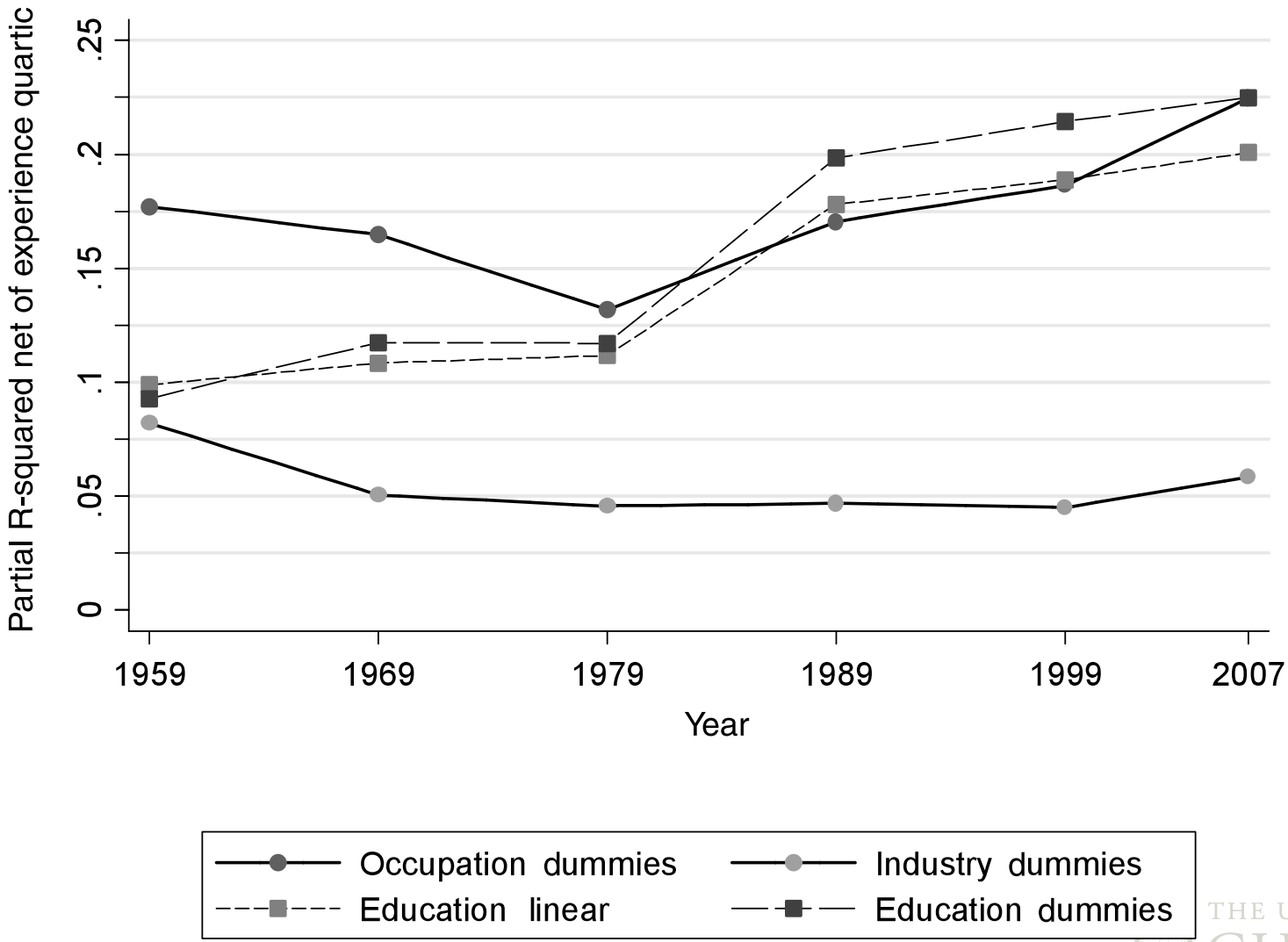


Figure 22: Males: Partial R-squared net of experience quartic, 1959–2007

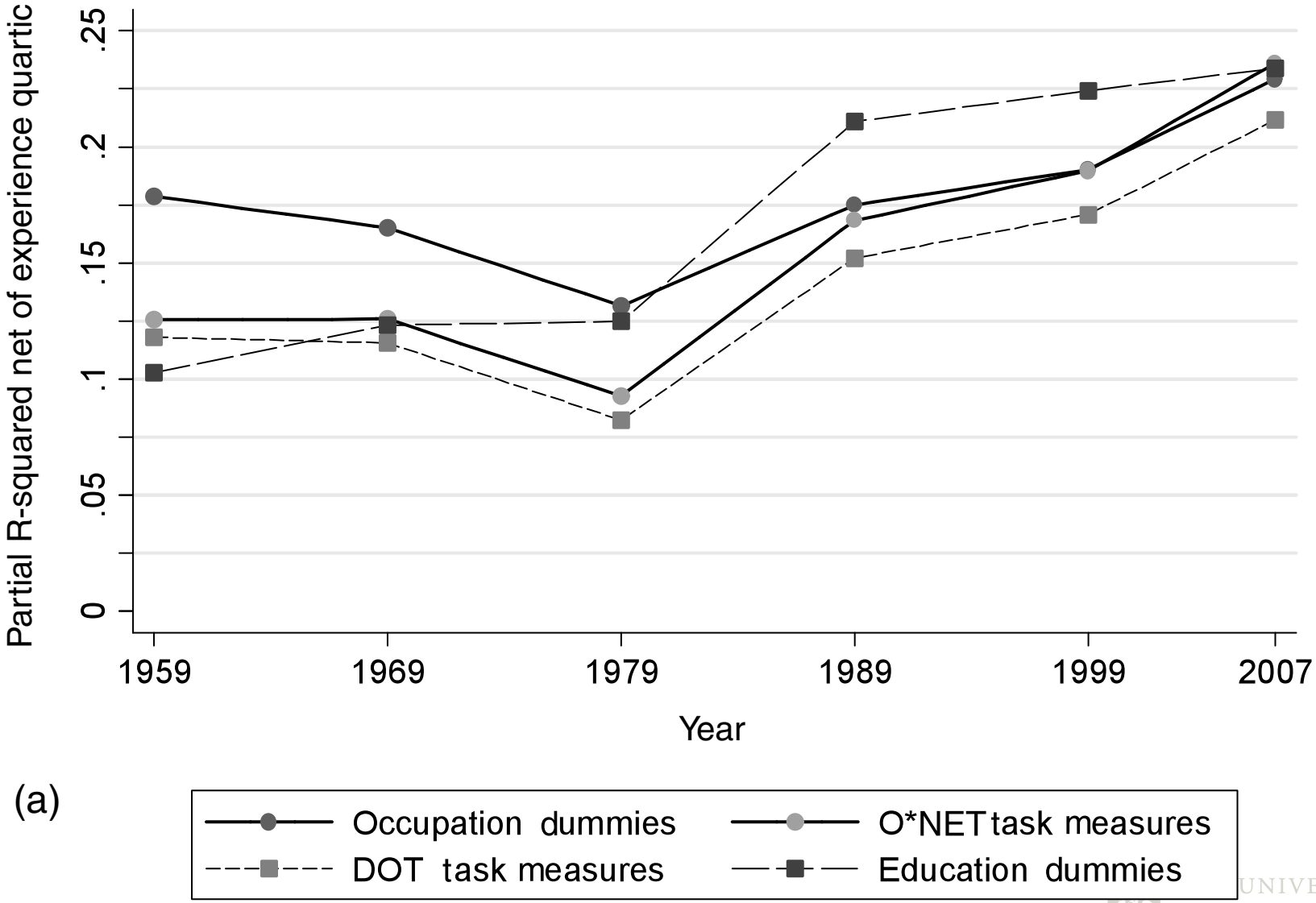


Figure 22: Females: Partial R-squared net of experience quartic, 1959–2007

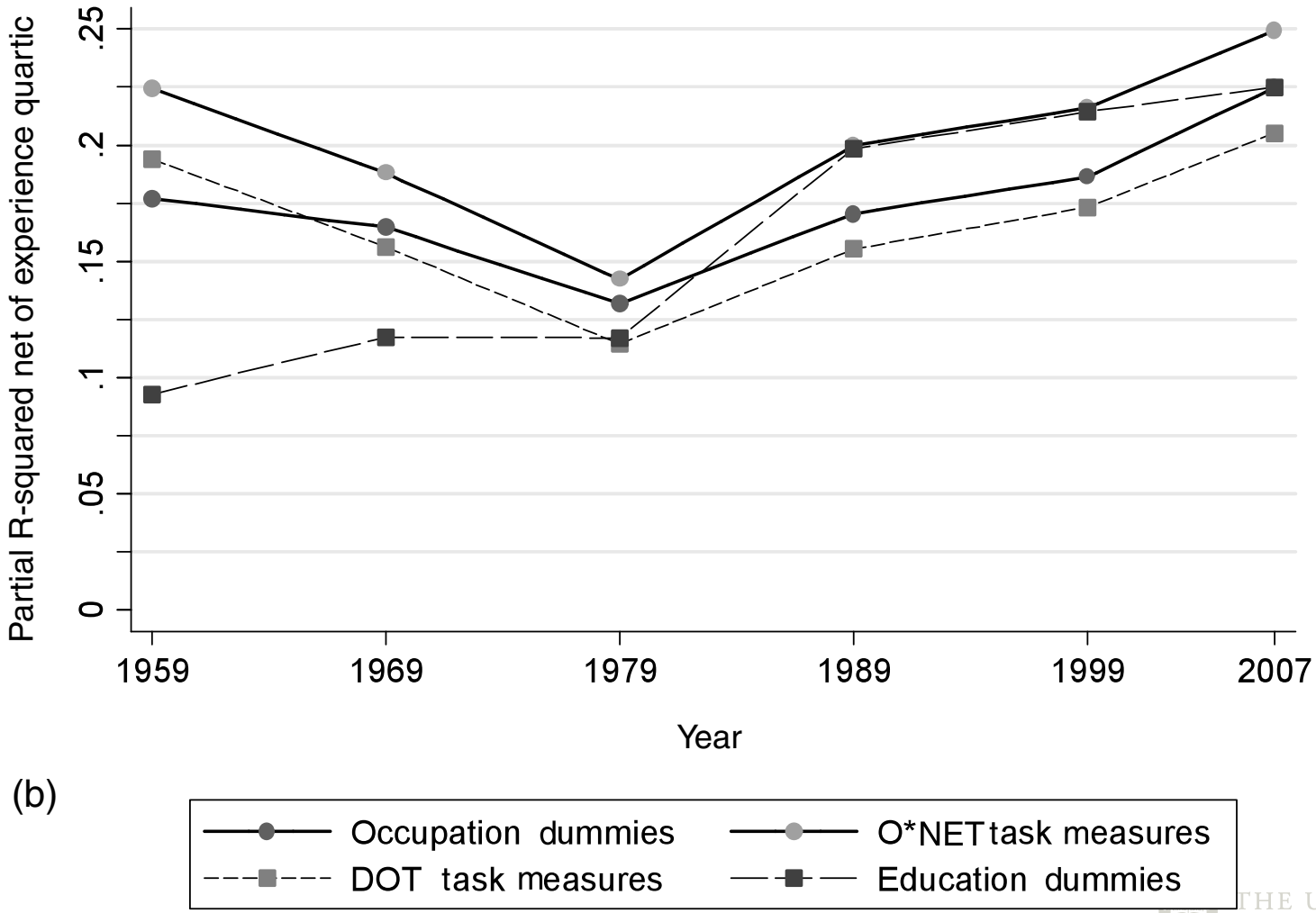


Figure 23: Employment shares in four broad occupational categories (%), 1959–2007

	1959	1969	1979	1989	1999	2007
All						
Professional, Managerial, Technical	20.9	22.4	25.1	29.4	33.0	34.0
Clerical, Sales	24.9	27.2	27.9	29.0	26.9	25.7
Production, Operators	40.8	36.3	32.8	27.1	24.5	22.3
Service	13.4	14.0	14.2	14.5	15.6	18.0
Males						
Professional, Managerial, Technical	22.9	25.2	26.2	28.4	31.3	31.5
Clerical, Sales	15.4	15.7	16.0	18.2	17.7	17.6
Production, Operators	54.0	49.7	47.3	41.4	38.3	36.1
Service	7.7	9.4	10.5	12.0	12.8	14.9
Females						
Professional, Managerial, Technical	17.4	18.6	23.8	30.5	34.9	36.8
Clerical, Sales	41.0	43.3	42.6	41.0	37.1	34.6
Production, Operators	18.4	17.6	14.8	11.2	9.4	7.1
Service	23.2	20.5	18.8	17.2	18.6	21.4

Source: Census IPUMS 5 percent samples for years 1960, 1970, 1980, 1990, and 2000, and Census American Community Survey for 2008. See note to Fig. 15.

Figure 24: Mean log full-time, full-year weekly and all hourly earnings in four broad occupation categories, 1959–2007 (Census) and 1973–2009 (May/ORG)

	A. 100 × Log weekly full-time, full-year wages relative to 1959 mean					
	1959	**1969**	**1979**	**1989**	**1999**	**2007**
All						
Professional, Managerial, Technical	34.1	56.3	51.7	62.4	75.0	80.1
Clerical, Sales	−6.4	8.4	8.0	16.4	22.9	21.9
Production, Operators	5.4	22.3	25.7	25.6	31.6	27.2
Service	−58.7	−30.7	−22.2	−13.3	−3.0	−8.3
Males						
Professional, Managerial, Technical	31.4	53.4	53.1	62.8	73.4	78.1
Clerical, Sales	1.1	23.3	22.7	25.0	24.9	21.2
Production, Operators	−7.0	12.3	16.9	14.7	19.2	13.3
Service	−34.7	−13.7	−16.8	−15.0	−6.7	−13.6
Females						
Professional, Managerial, Technical	34.5	61.7	63.2	80.6	95.7	102.1
Clerical, Sales	10.8	25.9	30.5	40.4	49.3	49.0
Production, Operators	2.7	17.3	24.1	30.7	40.9	37.3
Service	−50.6	−20.2	−2.2	9.3	21.5	17.3

Figure 25: Mean log full-time, full-year weekly and all hourly earnings in four broad occupation categories, 1959–2007 (Census) and 1973–2009 (May/ORG)

	B. 100*Log hourly wages relative to 1973 mean					
	1973	**1979**	**1989**	**1999**	**2007**	**2009**
All						
Professional, Managerial, Technical	32.8	30.6	37.0	47.4	56.0	57.8
Clerical, Sales	−11.6	−11.9	−13.8	−5.1	−0.8	0.5
Production, Operators	3.0	4.4	−3.8	0.7	5.4	8.9
Service	−40.5	−39.4	−43.7	−32.4	−24.9	−24.3
Males						
Professional, Managerial, Technical	16.0	12.1	12.3	17.2	26.4	28.7
Clerical, Sales	−6.8	−6.9	−12.4	−11.0	−8.6	−9.6
Production, Operators	−5.9	−0.8	−13.7	−7.9	−7.0	−8.8
Service	−28.6	−31.8	−36.3	−32.3	−22.7	−23.9
Females						
Professional, Managerial, Technical	30.2	28.4	32.7	41.4	50.9	51.5
Clerical, Sales	−3.0	2.9	3.9	13.2	17.0	16.2
Production, Operators	−4.4	2.4	−1.4	9.5	12.9	20.7
Service	−19.9	−11.4	−12.8	−6.0	7.9	6.4

Figure 26: Education distribution by occupation and gender in 1979 (Census data)

	< High school	High school	Some college	4-year college	Post-college
	A. Ten occupations				
All					
Managers	8.5	25.2	27.9	27.3	11.1
Professionals	3.1	8.5	20.7	36.6	31.1
Technicians	7.1	25.6	42.7	17.1	7.6
Sales	19.3	34.3	30.3	13.5	2.6
Office and admin	11.1	46.4	33.1	7.7	1.7
Production, craft and repair	31.2	43.5	20.1	4.2	1.0
Operators, fabricators and laborers	42.3	40.3	15.0	1.9	0.5
Protective service	17.6	34.0	37.0	9.1	2.3
Food prep, buildings and grounds, cleaning	45.0	30.5	21.2	2.5	0.7
Personal care and personal services	35.4	36.3	23.2	4.0	1.2

Figure 27: Education distribution by occupation and gender in 1979 (Census data), Cont.

	< High school	High school	Some college	4-year college	Post-college
	B. Four occupations				
All					
Professional, Managerial, Technical	5.8	17.3	26.3	30.5	20.2
Clerical, Sales	14.1	42.0	32.1	9.8	2.0
Production, Operators	37.9	41.5	17.1	2.8	0.7
Service	38.6	33.0	23.6	3.8	1.1
Males					
Professional, Managerial, Technical	5.9	15.9	24.5	29.7	24.1
Clerical, Sales	14.9	30.6	33.2	17.2	4.1
Production, Operators	36.2	41.4	18.5	3.1	0.7
Service	37.8	28.2	27.3	5.0	1.7
Females					
Professional, Managerial, Technical	5.7	19.2	28.7	31.4	14.9
Clerical, Sales	13.7	47.3	31.5	6.4	1.1
Production, Operators	44.3	42.1	11.4	1.8	0.4
Service	39.1	36.3	21.1	2.9	0.6

3. The Canonical Model

- Tinbergen (1974, 1975)
- Welch (1973)
- Murphy (1992)

Figure 28: Means and standard deviations of DOT and O*NET task measures for four broad occupational groups in 1980 Census

	Professional, Managerial, Technical	Clerical, Sales	Production, Operators	Service
	Males and females combined			
Non-routine cognitive				
DOT abstract (non-routine cognitive)	1.12	−0.27	−0.53	−0.71
	(0.81)	(0.61)	(0.68)	(0.28)
O*NET non-routine cognitive analytic	1.19	−0.30	−0.38	−0.93
	(0.43)	(0.69)	(0.67)	(0.98)
O*NET non-routine cognitive interpersonal	1.03	−0.34	−0.38	−0.42
	(0.87)	(0.65)	(0.82)	(0.75)
Routine cognitive and manual				
DOT routine	−0.41	0.27	0.41	−0.65
	(0.91)	(1.10)	(0.84)	(0.58)
O*NET routine cognitive	−0.23	0.45	0.19	−0.52
	(0.81)	(1.09)	(0.69)	(0.91)
O*NET routine manual	−0.86	−0.48	0.98	0.05
	(0.57)	(0.64)	(0.66)	(0.69)
Non-routine manual				
DOT Non-routine manual	−0.28	−0.77	0.62	0.40
	(0.70)	(0.24)	(1.10)	(0.99)
O*NET Non-routine manual	−0.81	−0.59	0.95	0.14
	(0.55)	(0.51)	(0.76)	(0.47)
Offshorability				
O*NET offshorability	0.24	0.61	−0.58	−0.35
	(1.04)	(0.81)	(0.83)	(0.78)
# of Detailed occupations	106	51	127	34

Figure 29: Means and standard deviations of DOT and O*NET task measures by education level in 1979 Census

	All	< High school	High school	Some college	4-year college	Post-college
			A. Males			
Non-routine cognitive						
DOT abstract (non-routine cognitive)	0.08 (1.05)	−0.43 (0.79)	−0.18 (0.91)	0.15 (1.02)	0.84 (1.02)	1.01 (0.93)
O*NET non-routine cognitive analytic	0.09 (0.98)	−0.44 (0.83)	−0.15 (0.84)	0.16 (0.91)	0.78 (0.81)	1.20 (0.72)
O*NET non-routine cognitive interpersonal	0.07 (1.03)	−0.34 (0.89)	−0.13 (0.96)	0.13 (1.01)	0.63 (1.00)	0.86 (0.91)
Routine cognitive and manual						
DOT routine	−0.06 (0.94)	0.09 (0.90)	0.09 (0.94)	−0.09 (0.96)	−0.36 (0.89)	−0.51 (0.83)
O*NET routine cognitive	−0.06 (0.85)	0.02 (0.82)	0.04 (0.83)	−0.02 (0.88)	−0.22 (0.84)	−0.45 (0.81)
O*NET routine manual	0.09 (1.03)	0.63 (0.87)	0.39 (0.95)	−0.06 (0.96)	−0.70 (0.77)	−0.91 (0.68)
Non-routine manual						
DOT Non-routine manual	0.15 (1.09)	0.50 (1.14)	0.31 (1.14)	0.03 (1.06)	−0.32 (0.80)	−0.32 (0.70)
O*NET Non-routine manual	0.21 (1.06)	0.72 (0.92)	0.52 (0.99)	0.09 (0.99)	−0.61 (0.77)	−0.77 (0.69)
Offshorability						
O*NET Offshorability	−0.17 (0.99)	−0.40 (0.79)	−0.37 (0.94)	−0.12 (1.05)	0.37 (1.00)	0.20 (0.96)

Figure 30: Means and standard deviations of DOT and O*NET task measures by education level in 1979 Census, Cont.

	All	< High school	High school	Some college	4-year college	Post-college
B. Females						
Non-routine cognitive						
DOT abstract (non-routine cognitive)	−0.19 (0.84)	−0.57 (0.68)	−0.31 (0.75)	−0.10 (0.81)	0.36 (0.91)	0.67 (0.94)
O*NET non-routine cognitive analytic	−0.12 (1.02)	−0.71 (0.98)	−0.31 (0.87)	0.01 (0.91)	0.78 (0.86)	1.12 (0.72)
O*NET non-routine cognitive interpersonal	−0.06 (0.95)	−0.42 (0.79)	−0.29 (0.79)	0.00 (0.92)	0.75 (1.01)	1.02 (0.87)
Routine cognitive and manual						
DOT routine	0.17 (1.07)	0.05 (0.96)	0.34 (1.05)	0.33 (1.09)	−0.30 (1.06)	−0.64 (0.87)
O*NET routine cognitive	0.25 (1.02)	0.11 (0.99)	0.42 (1.01)	0.41 (0.99)	−0.13 (0.99)	−0.51 (0.83)
O*NET routine manual	−0.20 (0.92)	0.38 (1.00)	−0.12 (0.88)	−0.36 (0.73)	−0.79 (0.71)	−1.01 (0.60)
Non-routine manual						
DOT Non-routine manual	−0.31 (0.76)	−0.05 (0.82)	−0.44 (0.71)	−0.40 (0.74)	−0.16 (0.77)	−0.15 (0.73)
O*NET non-routine manual	−0.44 (0.68)	−0.03 (0.63)	−0.40 (0.67)	−0.52 (0.60)	−0.84 (0.61)	−0.98 (0.58)
Offshorability						
O*NET offshorability	0.25 (1.00)	0.20 (0.87)	0.37 (0.95)	0.20 (1.13)	0.12 (1.04)	0.09 (0.84)

Figure 31: Decomposition of changes in the share of employment in four occupational categories by decade (percentage points) due to changes in industry shares and changes in occupational shares within industries, 1959–2007

	Changes by decade				Long changes (decadal means)		
	1959-1969	1969-1979	1979-1989	1989-1999	1999-2007	1959-1979	1979-2007
A. Males							
Professional, Managerial, and Technical Occs (non-routine cognitive)							
Total Δ	2.21	1.06	2.14	2.92	0.18	1.63	2.28
Industry Δ	1.81	0.90	0.49	0.80	0.13	1.35	0.61
Occupation Δ	0.40	0.16	1.65	2.12	0.05	0.28	1.68
Clerical, Administrative, and Sales Occs (routine cognitive)							
Total Δ	0.26	0.29	2.23	−0.56	−0.07	0.28	0.95
Industry Δ	0.23	0.05	0.72	−0.16	−0.03	0.14	0.31
Occupation Δ	0.03	0.25	1.51	−0.40	−0.05	0.14	0.63
Production, Craft, Repair and Operative Occs (routine manual)							
Total Δ	−4.21	−2.41	−5.92	−3.10	−2.22	−3.31	−5.10
Industry Δ	−2.59	−1.28	−1.89	−0.70	−0.81	−1.94	−1.56
Occupation Δ	−1.62	−1.13	−4.03	−2.39	−1.41	−1.37	−3.54
Service occupations (non-routine manual)							
Total Δ	1.74	1.06	1.55	0.74	2.11	1.40	1.88
Industry Δ	0.55	0.33	0.68	0.06	0.70	0.44	0.64
Occupation Δ	1.19	0.72	0.87	0.68	1.41	0.96	1.24

Figure 32: Decomposition of changes in the share of employment in four occupational categories by decade (percentage points) due to changes in industry shares and changes in occupational shares within industries, 1959–2007, Cont.

	Changes by decade				Long changes (decadal means)		
	1959-1969	1969-1979	1979-1989	1989-1999	1999-2007	1959-1979	1979-2007
B. Females							
Professional, Managerial, and Technical Occs (non-routine cognitive)							
Total Δ	1.23	5.19	6.70	4.34	1.90	3.21	5.86
Industry Δ	3.13	1.40	1.10	1.61	0.60	2.27	1.40
Occupation Δ	−1.91	3.79	5.60	2.73	1.30	0.94	4.46
Clerical, Administrative, and Sales Occs (routine cognitive)							
Total Δ	2.32	−0.73	−1.55	−3.95	−2.42	0.79	−3.18
Industry Δ	0.85	2.07	0.63	−0.55	−0.30	1.46	0.02
Occupation Δ	1.46	−2.80	−2.18	−3.40	−2.12	−0.67	−3.20
Production, Craft, Repair and Operative Occs (routine manual)							
Total Δ	−0.75	−2.79	−3.57	−1.81	−2.29	−1.77	−3.40
Industry Δ	−2.11	−1.95	−2.27	−1.36	−1.48	−2.03	−2.25
Occupation Δ	1.36	−0.83	−1.30	−0.44	−0.81	0.26	−1.15
Service occupations (non-routine manual)							
Total Δ	−2.79	−1.68	−1.59	1.41	2.81	−2.23	0.72
Industry Δ	−1.88	−1.51	0.54	0.30	1.18	−1.70	0.83
Occupation Δ	−0.91	−0.16	−2.12	1.11	1.63	−0.54	−0.11

Figure 33: Partial R-squared values of DOT and O*NET task and offshorability measures, net of quartic in potential experience

	Offshorability (O*NET)	O*NET Tasks (5 Vars)	O*NET Tasks + Offshorability	DOT Tasks (3 Vars)	DOT Tasks + Offshorability
A. Males					
1959	0.027	0.126	0.128	0.118	0.119
1969	0.035	0.126	0.129	0.116	0.116
1979	0.026	0.093	0.095	0.082	0.083
1989	0.055	0.168	0.172	0.152	0.152
1999	0.066	0.190	0.193	0.171	0.171
2007	0.079	0.236	0.239	0.212	0.212
B. Females					
1959	0.025	0.224	0.225	0.194	0.198
1969	0.003	0.188	0.188	0.156	0.157
1979	0.000	0.142	0.142	0.115	0.115
1989	0.001	0.200	0.202	0.155	0.162
1999	0.001	0.216	0.217	0.173	0.180
2007	0.000	0.249	0.250	0.205	0.214