

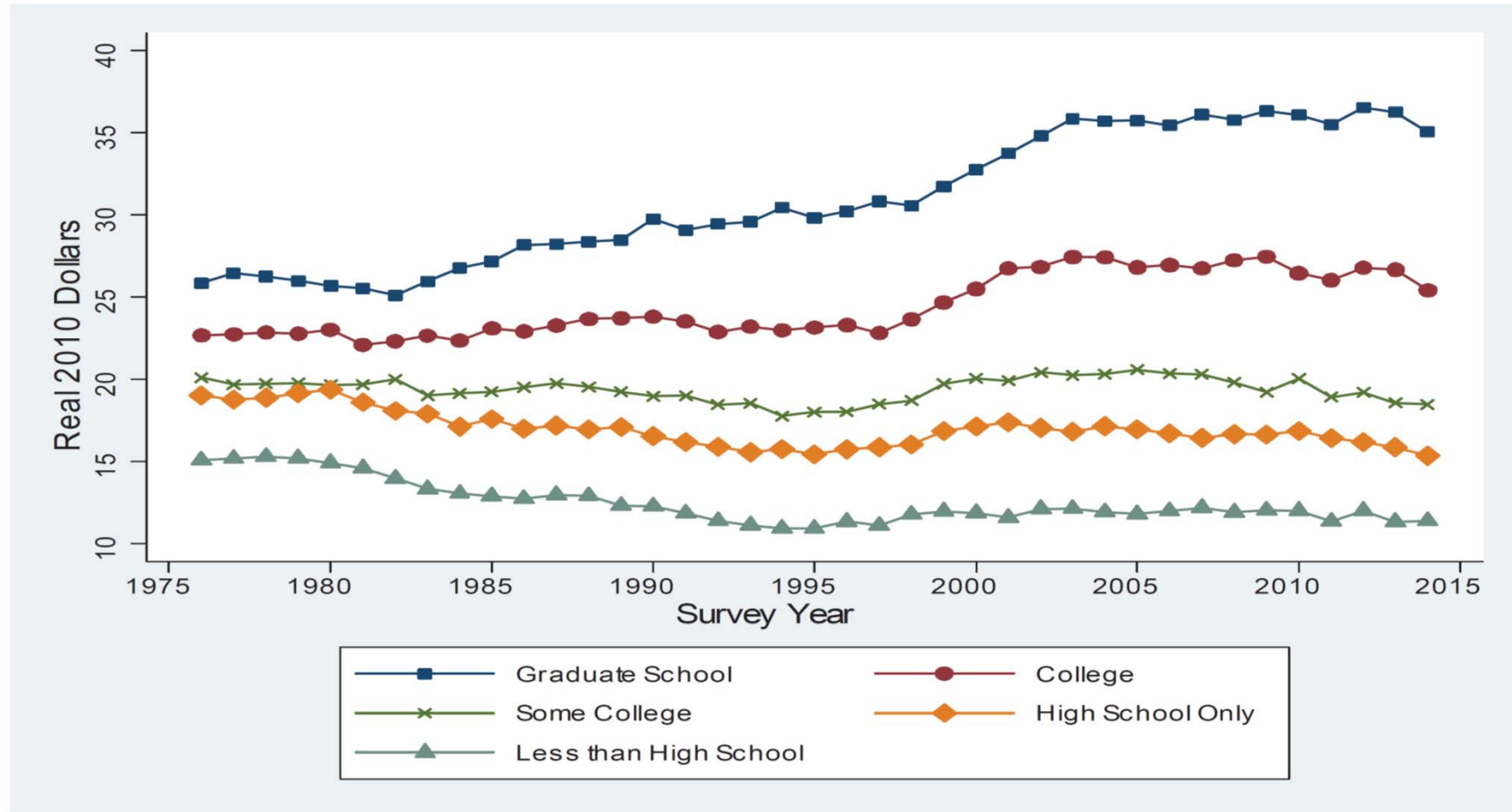
# Earnings inequality: Trends, explanations, implications

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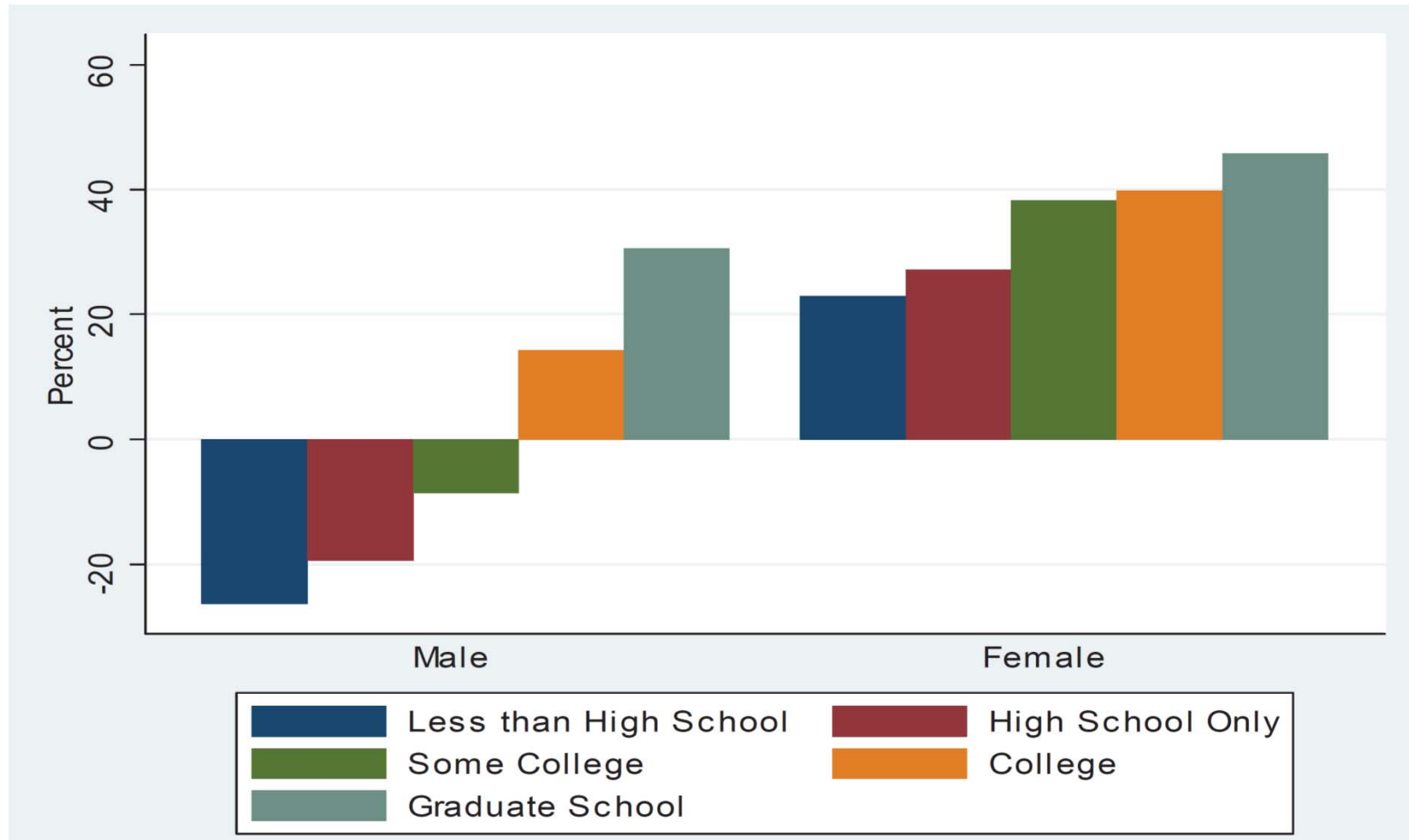
Winter School on Inequality  
and Social Welfare  
Canazei, January 8-11, 2018

# Median real wages by education: US, males



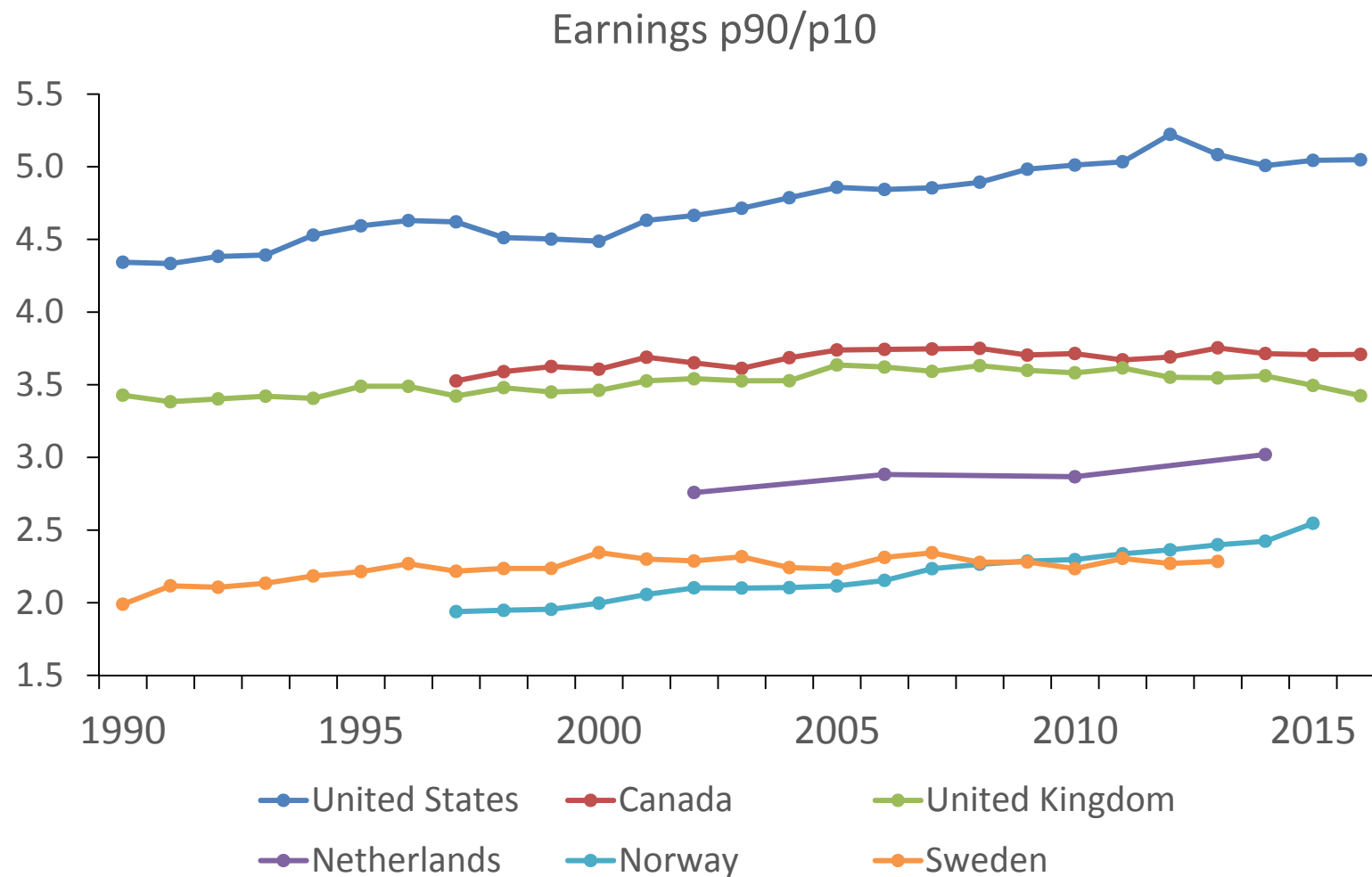
Source: Blundell, Norris-Keiler and Ziliak (2017)

# Earnings change by education: US, 1976-2014



Source: Blundell, Norris-Keiler and Ziliak (2017)

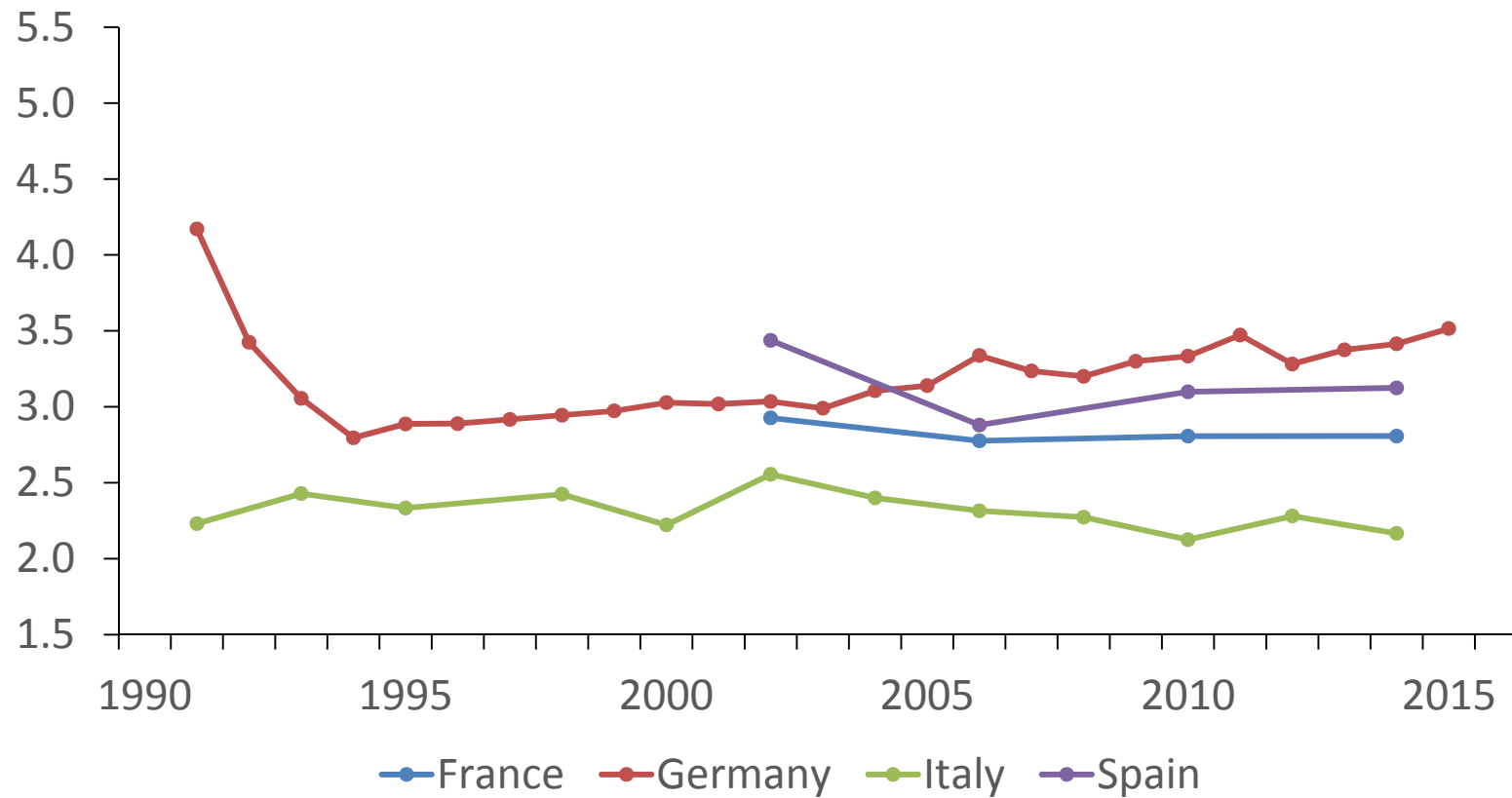
# Earnings inequality: D9/D1 ratio



Source: OECD

# Earnings inequality: D9/D1 ratio

Earnings p190/p10



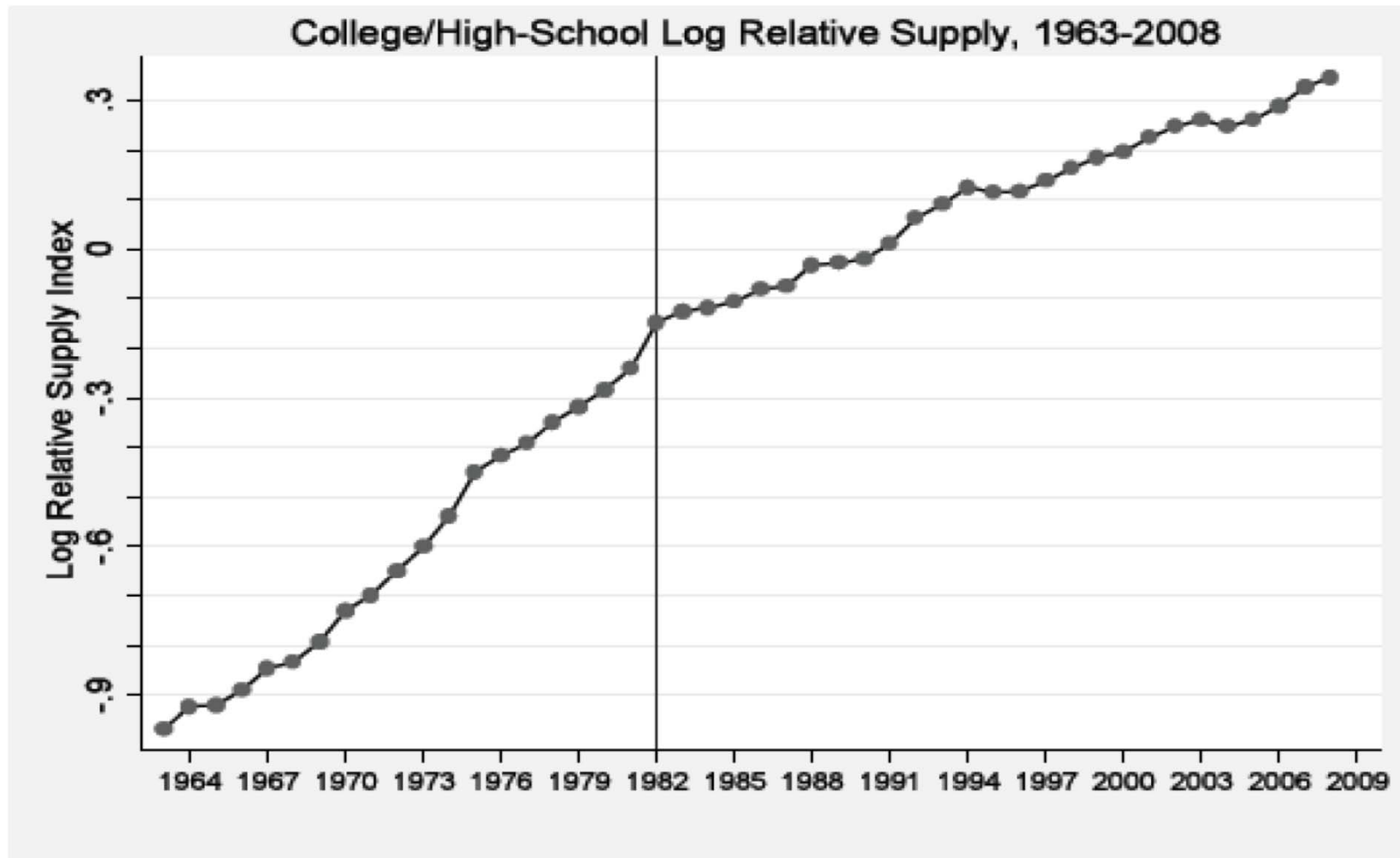
Source: OECD

# Plan of the talk

- Causes of earnings dispersion
  - Skill-biased technical change
  - Cyclical variations
- Consequences of earnings dispersion
  - Unusual shocks
  - Gender gaps
- Earnings and inequality in hours of work

**Biased technical change?**

# The supply of skills



Acemoglu and Autor (2011)



# The skill premium

Composition Adjusted College/High-School Log Weekly Wage Ratio, 1963-2008



Acemoglu and Autor (2011)

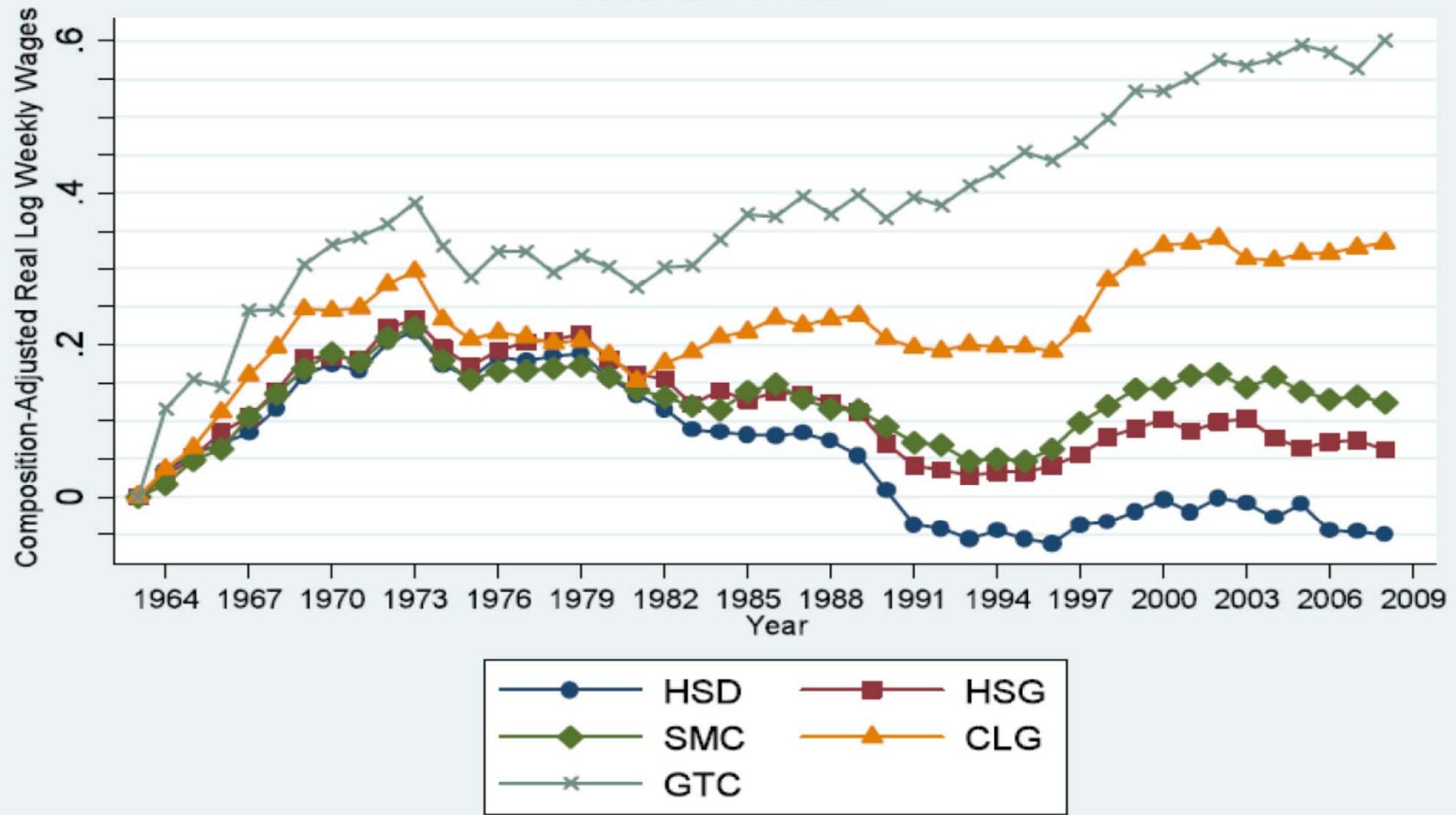
# Biased technical change?

Acemoglu and Autor (2011)

- Standard theory: biased technical change complements certain skill groups (factor-augmenting)
- Cannot explain certain patterns:
  1. Low skill workers have experienced a decline in real earnings
  2. The skill-premium has increased monotonically, yet there have been non-monotone changes in earnings across the distribution (polarization)
  3. Non-monotone shift in the composition of employment across occupations

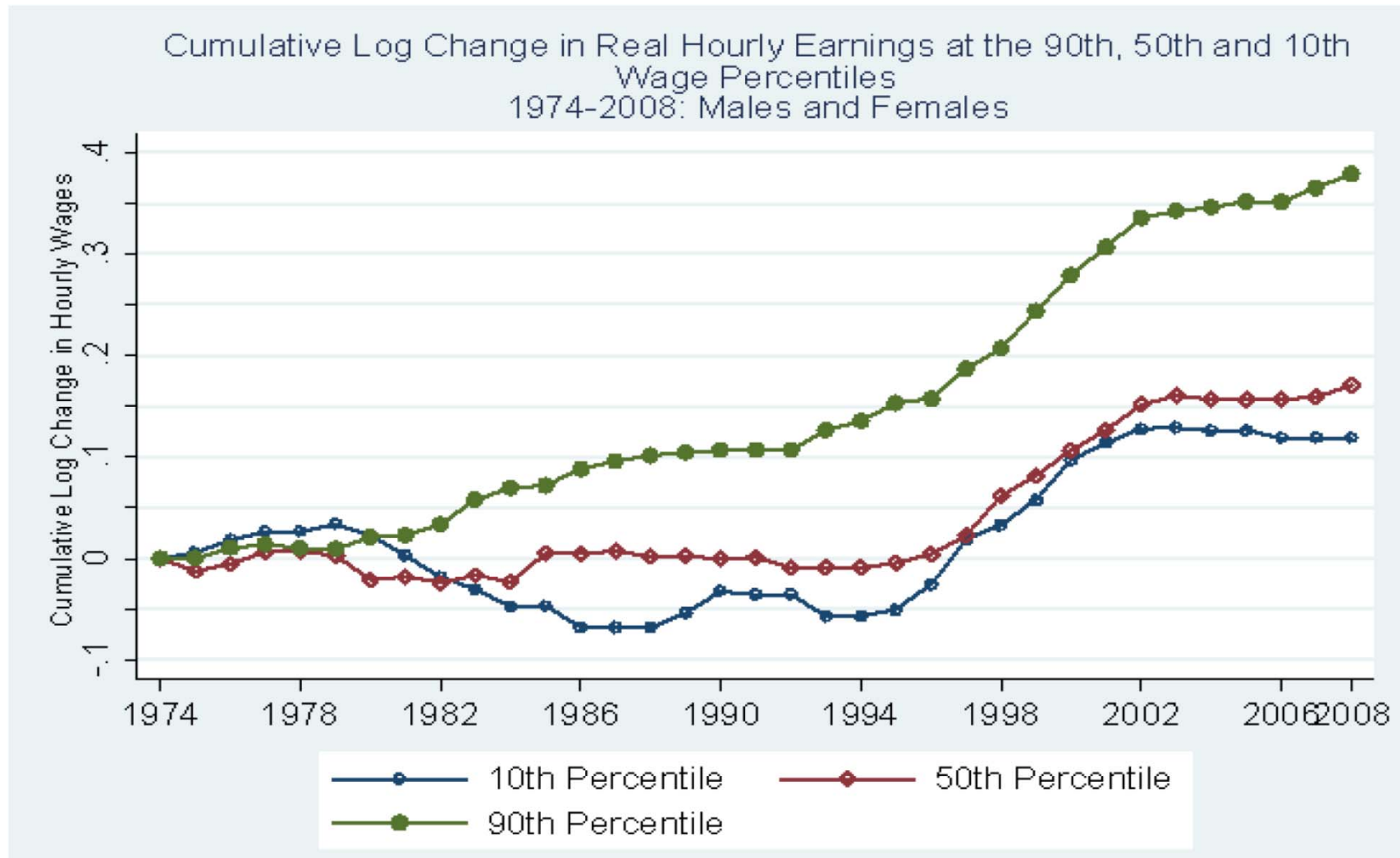
# The evolution of real hourly earning: US

Real, Composition-Adjusted Log Weekly Wages for Full-Time Full-Year Workers  
1963-2008 Males



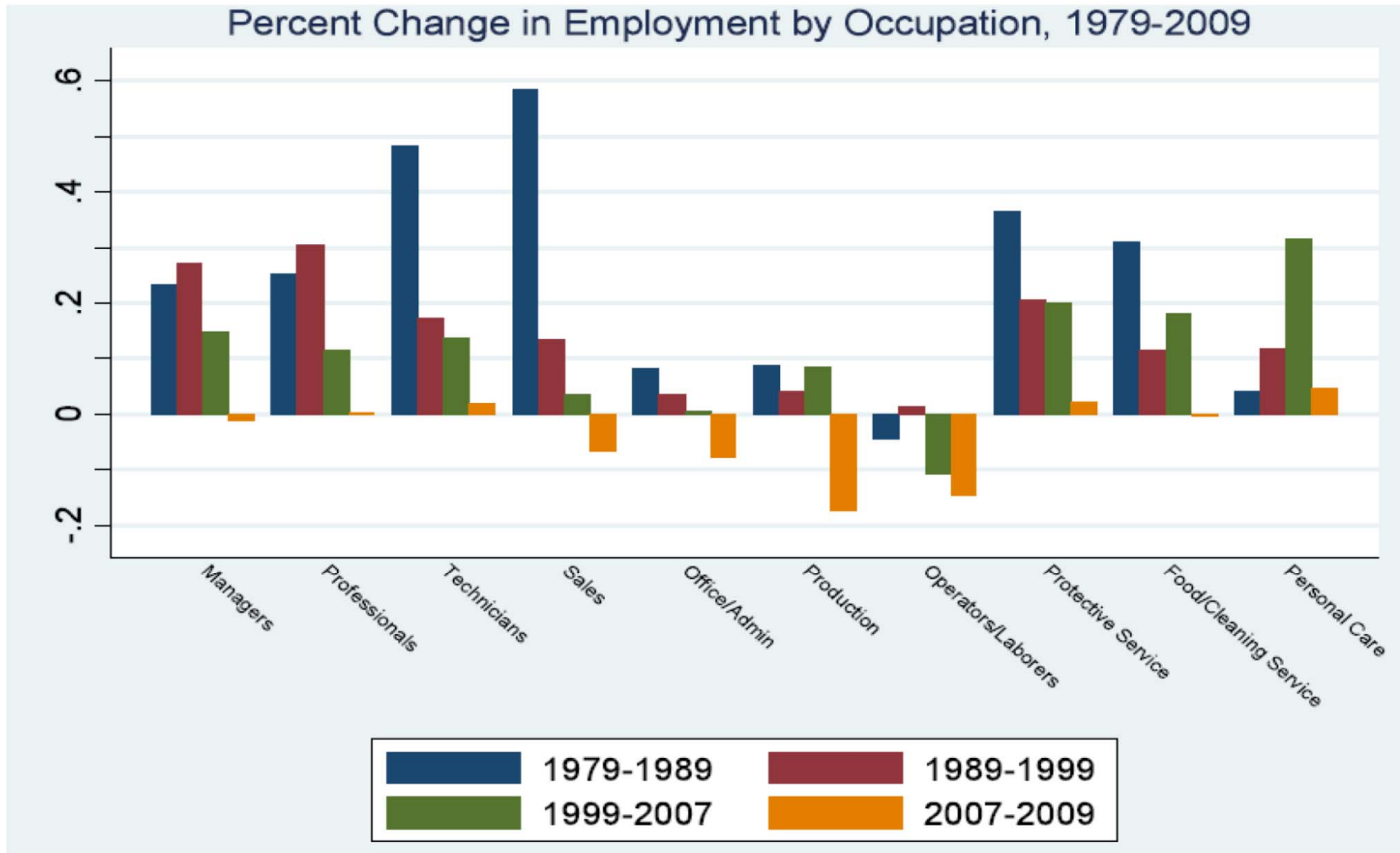
Acemoglu and Autor (2011)

# Dynamics at the top and the bottom: US



Acemoglu and Autor (2011)

# Employment polarization: US



Acemoglu and Autor (2011)

## Tasks vs biased technical change

- Think not only of skill levels but also of tasks
- Single good produced by a continuum of tasks
- Three skill levels (L, M and H) and comparative advantage in the various tasks
- Labour market equilibrium: two task-thresholds
- Technological change: change the productivity of a skill group in all tasks or in a particular task
- In a task-based model technological change can *reduce* the wages of certain categories of workers

# Cyclical variations

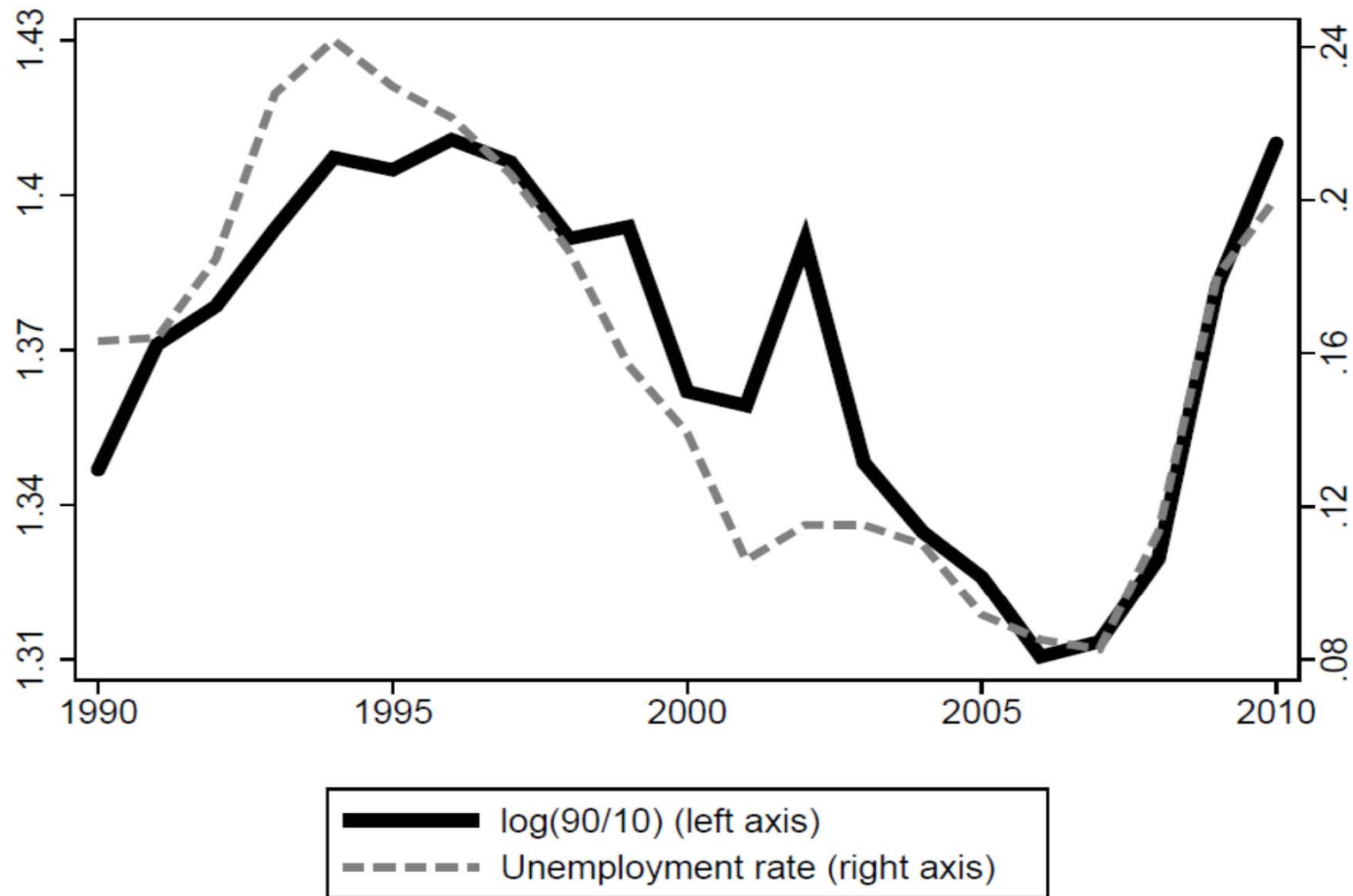
# Cyclical variations

Bonhomme and Hospido (2017)

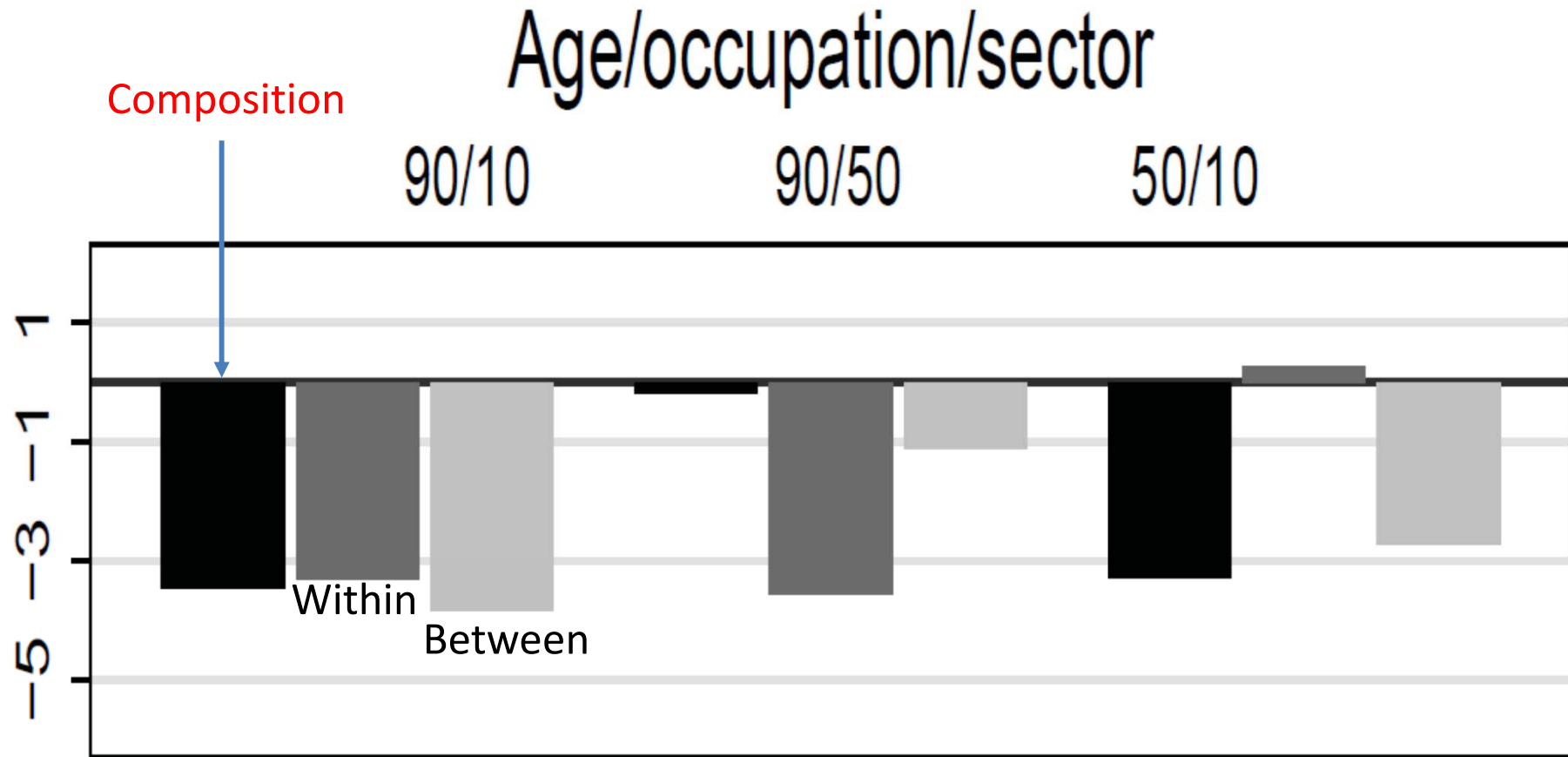
- Spain 1990-2010, male earnings
- Earnings inequality strongly countercyclical
- Wage sensitivity to the cycle has been strongest in the middle of the earnings distribution



# Earnings inequality and unemployment: Spain, males



# Decomposing inequality changes: 1996-2006



Notes: Source Social Security data. Black bars denote composition effects, dark gray bars denote between-group price effects, and light gray bars denote within-group price effects.

# Decomposing inequality changes: 2007-2010



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# Earnings inequality and unusual shocks

# Earnings inequality and unusual shocks

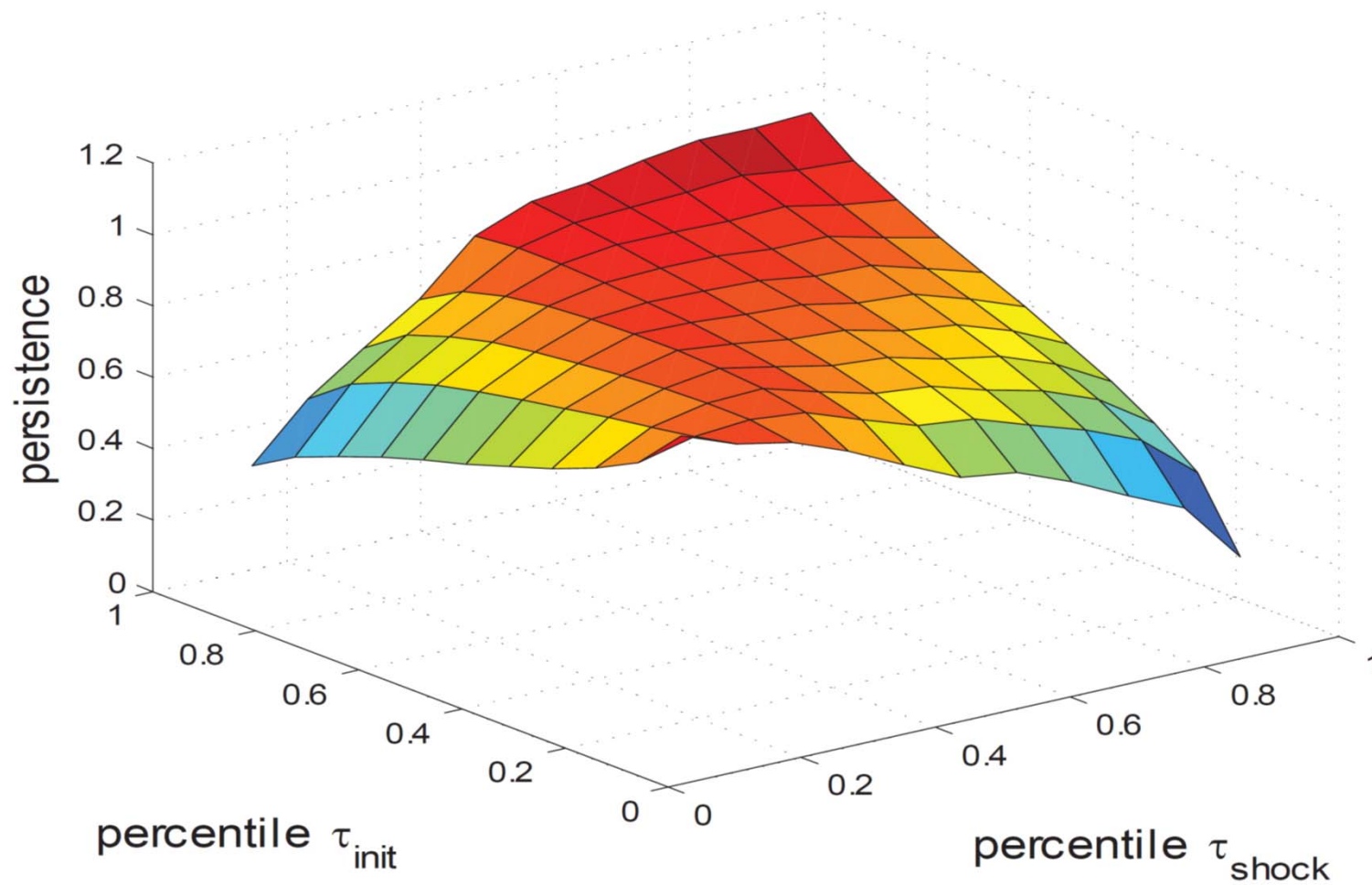
Arellano, Blundell and Bonhomme (2017)

- Consider alternative ways of modelling earnings persistence at the individual level
- Key element: impact of past shocks on current earnings can be altered by the size and sign of new shocks

# Earnings inequality and unusual shocks

- Standard model  $y_{it} = Z'_{it}\varphi + \eta_{it} + \varepsilon_{it}$   
 $\eta_{it} = \rho\eta_{it-1} + v_{it}$
- Problem : administrative data has revealed alternative patterns
- Non-linear persistence
- Role for unusual shocks: an unusual bad shock to those on high income can wipe out income history
- Develop a quantile-based analysis

# Non-linear persistence in PSID: US, household earnings



# Earnings inequality and unusual shocks

Model

$$y_{it} = Z'_{it}\varphi + \eta_{it} + \varepsilon_{it}$$

and a conditional quantile model where the persistence depends on the sign and size of the shock as well as on the past shock

$$\eta_{it} = Q_t(\eta_{it-1}, u_{it})$$

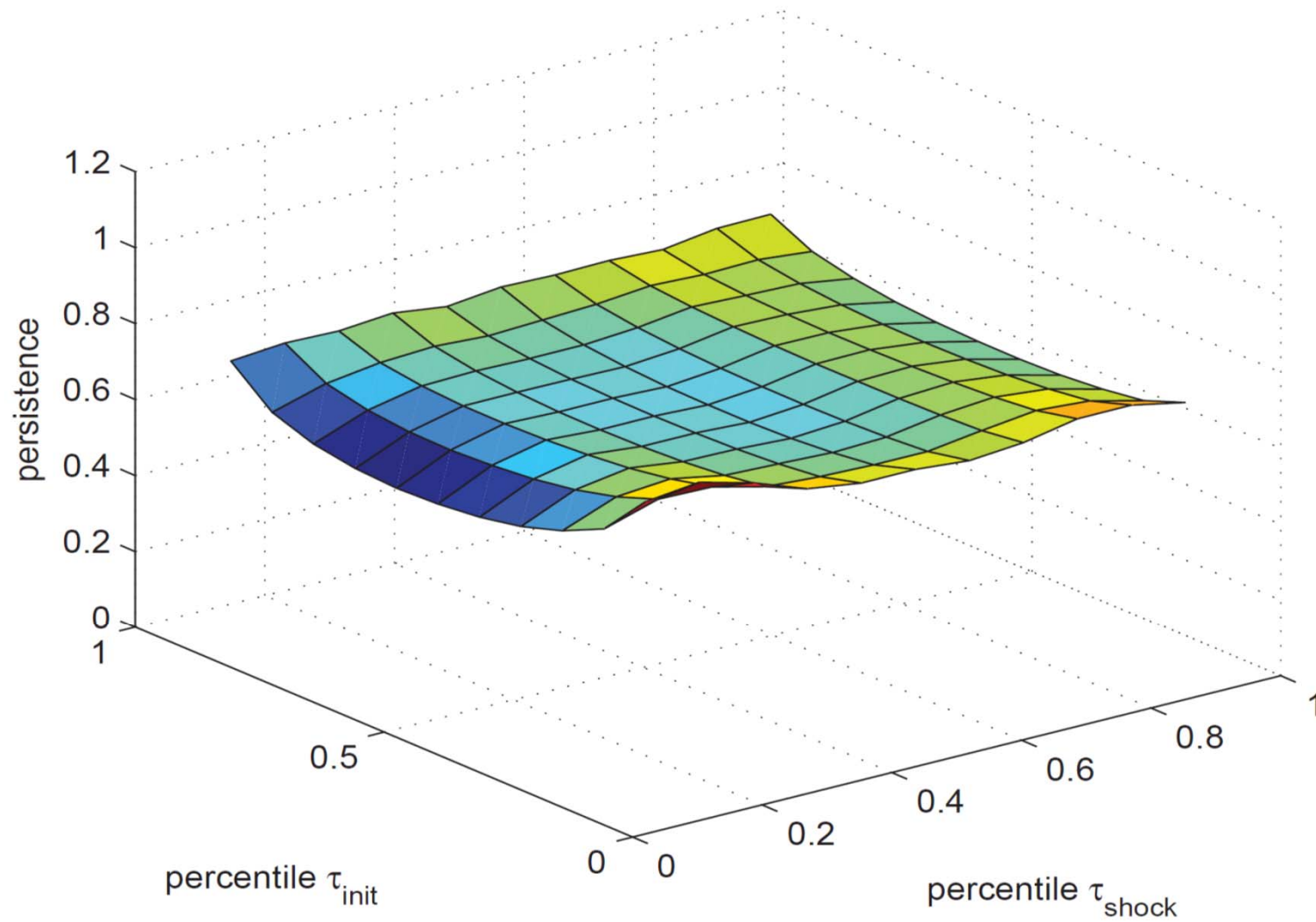
which replaces

$$\eta_{it} = \rho\eta_{it-1} + v_{it}$$

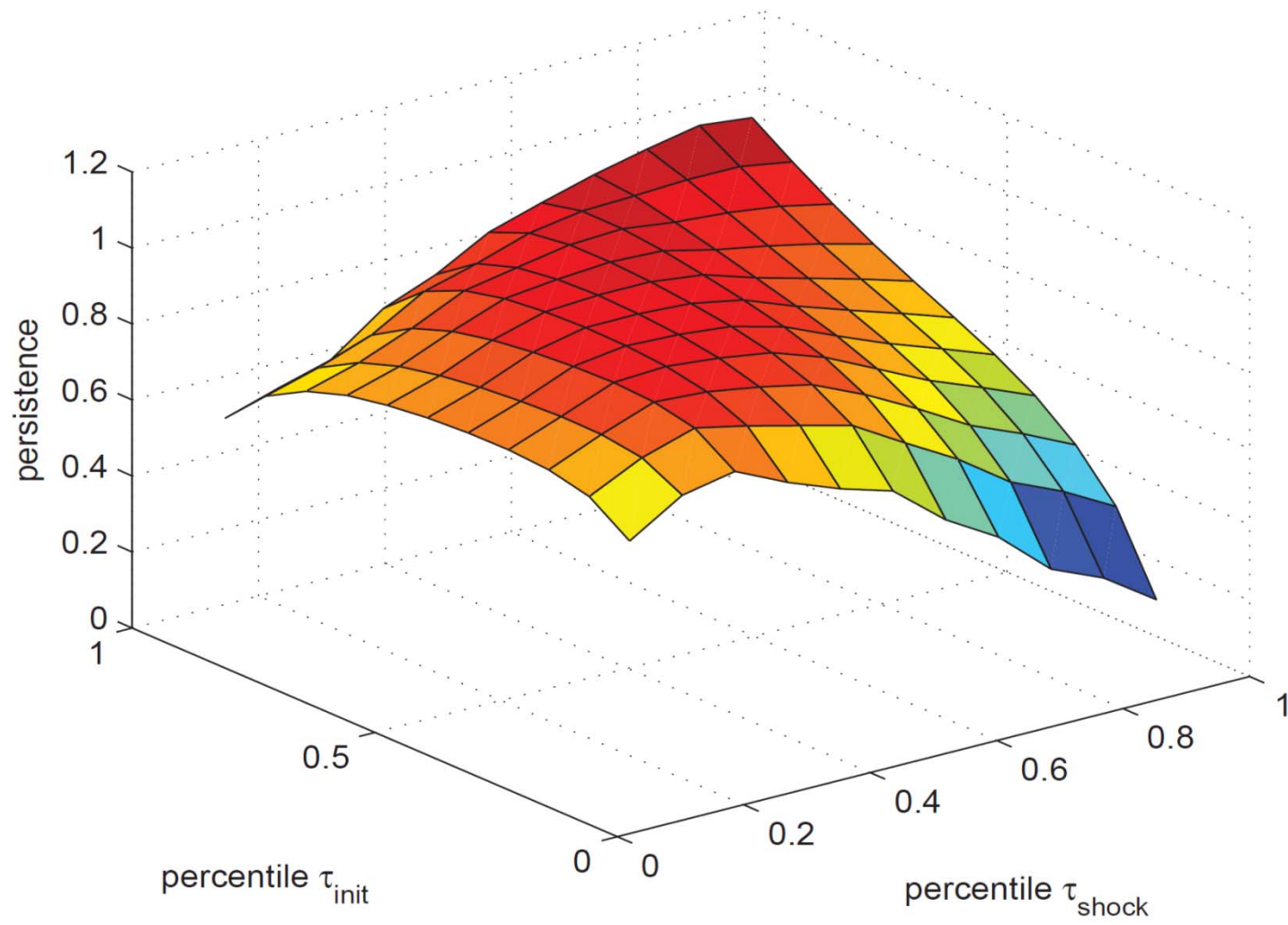
Much better fit of the data



# Canonical model



# Non-linear model



# Earnings Inequality and the Gender Pay Gap

# Earnings Inequality and the Gender Pay Gap

Mulligan and Rubinstein (2008)

- Implications of increasing wage inequality for the gender earnings gap
- Growing wage inequality within gender should cause women to invest more in their market productivity and should differentially pull able women into the workforce.
- US data (CPS) for the 1970s and 1990s

# Earnings Inequality and the Gender Pay Gap

- Wage process

$$w_{it} = \mu_t^w + g_i \gamma_t + \sigma_t^w \varepsilon_{it}^w,$$

- Change in the wage gap is given by

$$\Delta G_t = \Delta \gamma_t + b_{t-1} \Delta \sigma_t^w + \sigma_t^w \Delta b_t.$$

- Three terms:
  - change in gender specific component
  - change in variance of the returns to skills
  - change in selection bias due to women's change in behaviour
- Paper uses Heckman's two-step estimator

# Earnings Inequality and the Gender Pay Gap

TABLE I  
CORRECTING THE GENDER WAGE GAP USING THE HECKMAN TWO-STEP ESTIMATOR

Period	Method		Bias
	OLS	Two-Step	
Panel A: Variable Weights			
1975–1979	–0.414 (0.003)	–0.337 (0.014)	–0.077 (0.015)
1995–1999	–0.254 (0.003)	–0.339 (0.014)	0.085 (0.015)
Change	0.160 (0.005)	–0.002 (0.020)	0.162 (0.021)
Panel B: Fixed Weights			
1975–1979	–0.404 (0.003)	–0.330 (0.014)	–0.075 (0.014)
1995–1999	–0.264 (0.004)	–0.353 (0.015)	0.089 (0.016)
Change	0.140 (0.005)	–0.024 (0.021)	0.164 (0.021)

# Earnings Inequality and the Gender Pay Gap

- Selection into the female workforce shifted
  - negative in the 1970s
  - positive in the 1990s
- Majority of the apparent narrowing of the gender wage gap reflects changes in female workforce composition
- Findings explain why greater earnings *equality* *between* genders coincided with growing *inequality* *within* gender

# Earnings Inequality and the Gender Pay Gap

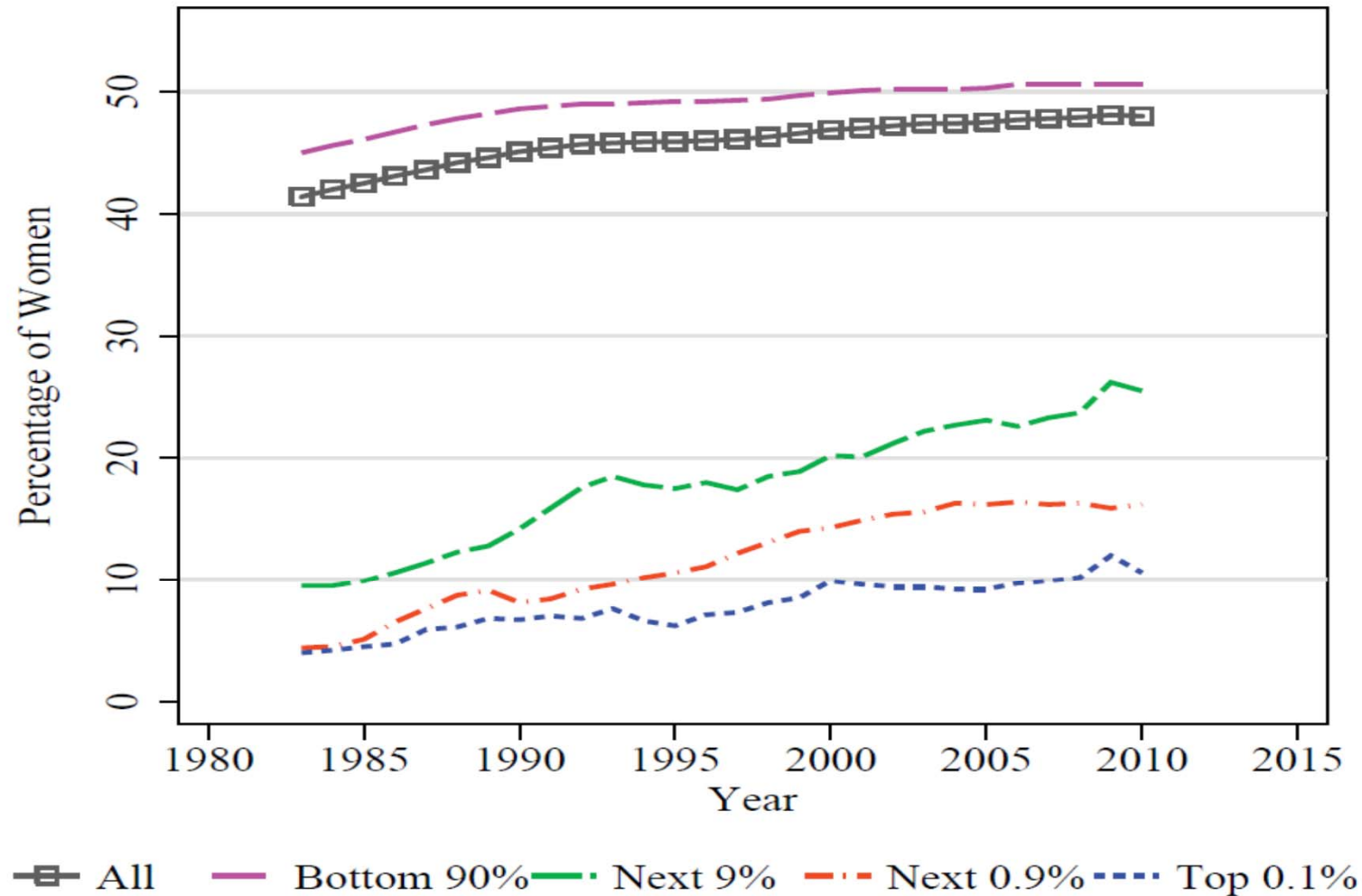
Fortin, Bell and Böhm (2017)

- What is the effect of increasing earnings inequality at the top of the distribution for the wage gap
- Administrative annual earnings data from Canada, Sweden, and the United Kingdom
- Applies the approach used in the analysis of earnings inequality in top incomes to the analysis of the gender pay gap.

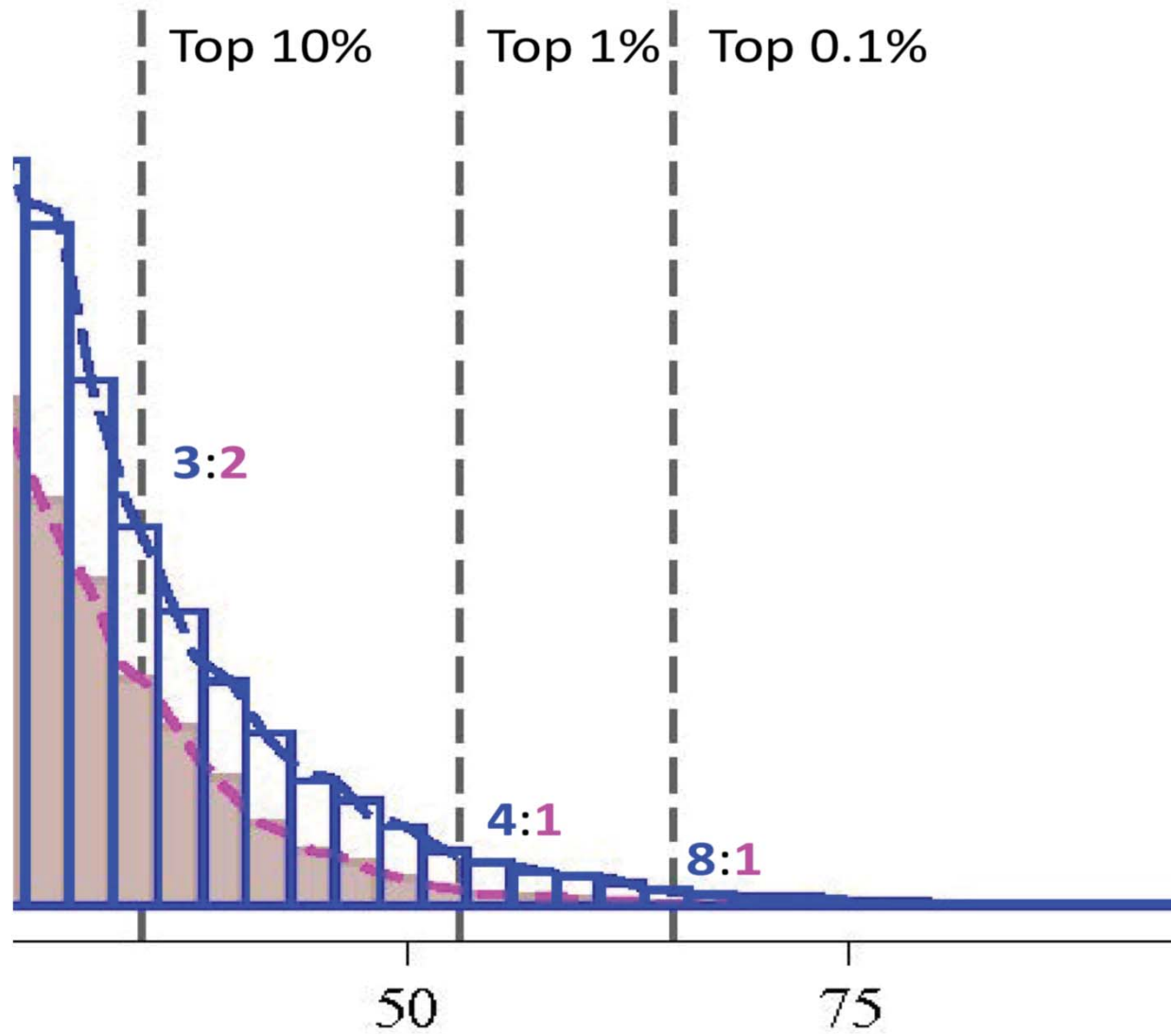


# Female presence by centile of the annual earnings distribution: Canada

A. Canada: Female Shares

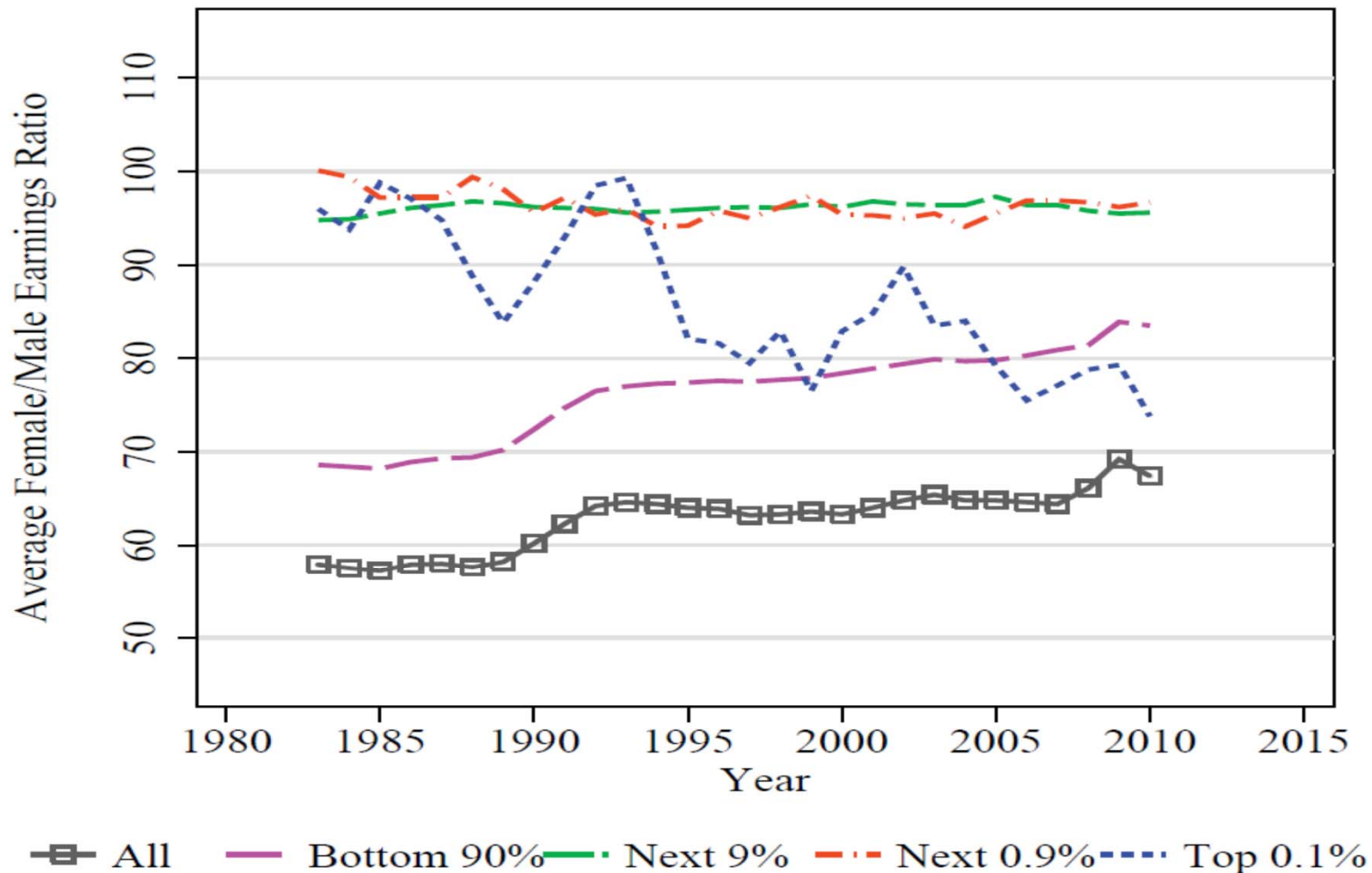


# Female presence



# Female/male earning ratios by centile of the annual earnings distribution: Canada

B. Canada: Gender Ratios

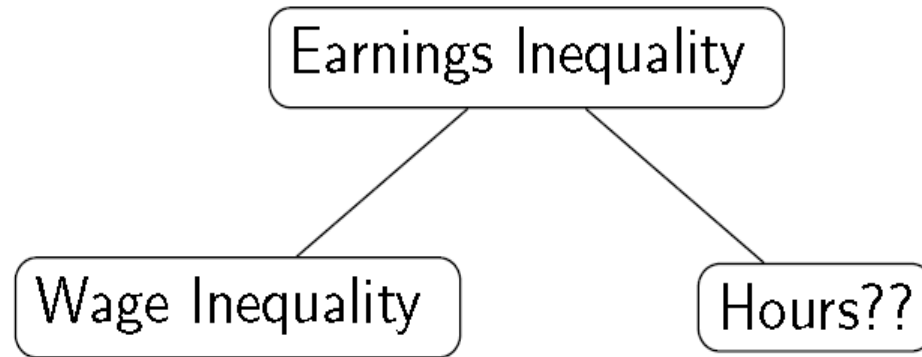


# Earnings Inequality and the Gender Pay Gap

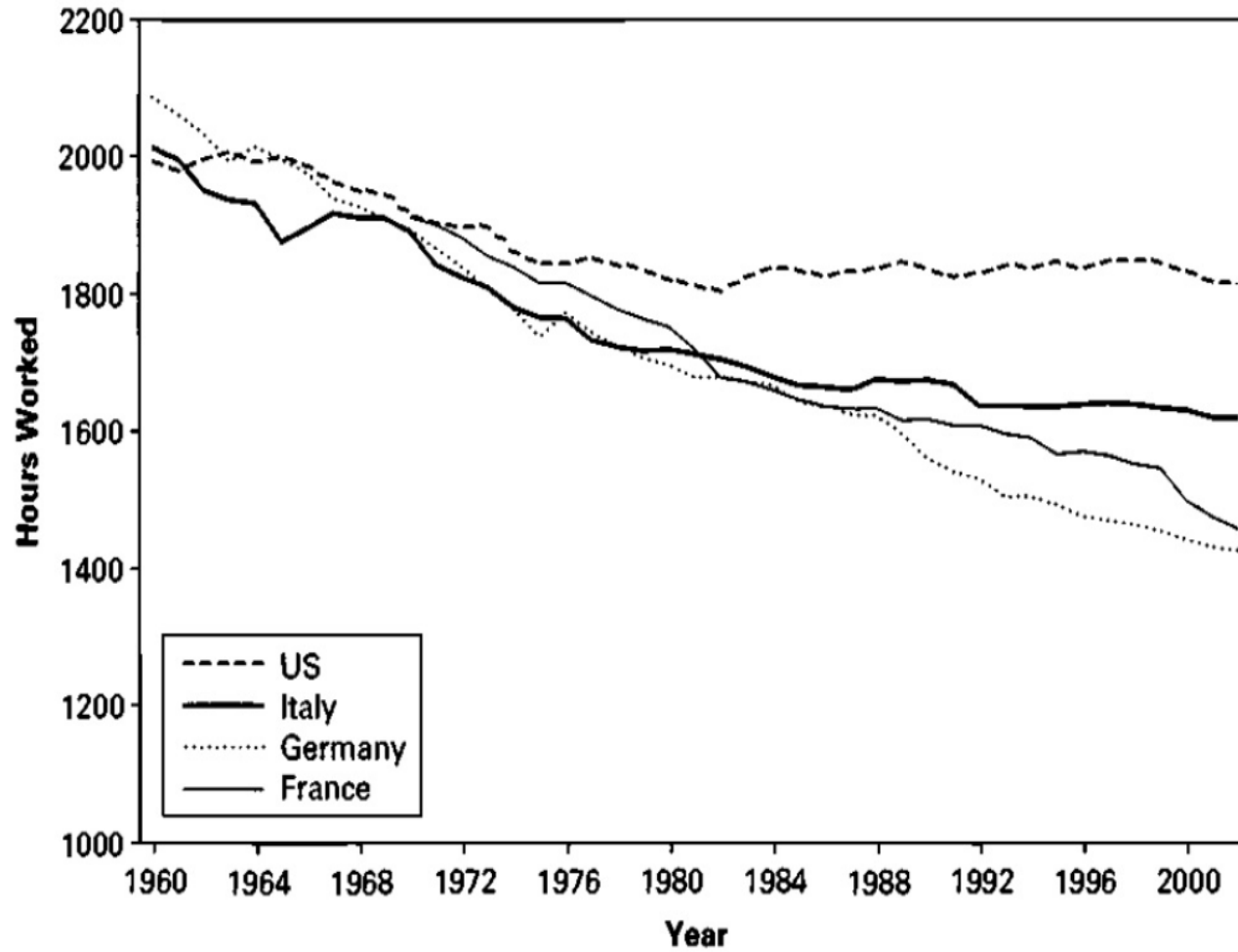
- For close to 95% of women the gender earnings ratio is substantially more favourable than the overall ratio
- Women in the next 9% and next 0.9% face even more favourable gender ratio in the upper nineties.
- Glass ceiling effects seem to be increasing only for women in the top 0.1%.
- Increasing inequality in top incomes and the under-representation of women among top earners contributes to slower progress in the gender pay ratio.

# Hours inequality

# Hours worked and earnings inequality



# Average hours worked



Source: Alesina et al., 2006

# Hours worked and earnings inequality

- Some work claiming that higher wage inequality induces higher average hours
  - Bell and Freeman 2001, Bowles and Park 2005
- But what about the distribution of hours?
- Recent work joint with Daniele Checchi and Lara Vivian
- Are there differences in the distribution of hours?
  - How do they contribute to earnings inequality?
  - Can we say something about their causes?



# Decomposing earnings inequality

Mean Log Deviation (MLD)

- Absolute Contributions

$$\underbrace{\frac{1}{N} \sum_{i=1}^N \ln\left(\frac{\bar{y}}{y_i}\right)}_{I_y} = \underbrace{\frac{1}{N} \sum_{i=1}^N \ln\left(\frac{\bar{w}}{w_i}\right)}_{I_w} + \underbrace{\frac{1}{N} \sum_{i=1}^N \ln\left(\frac{\bar{h}}{h_i}\right)}_{I_h} + \underbrace{\log\left(\frac{\text{cov}}{\bar{w}\bar{h}} + 1\right)}_{\rho}$$

- Relative Contributions

$$1 = \underbrace{\frac{I_w}{I_y}}_{RC_w} + \underbrace{\frac{I_h}{I_y}}_{RC_h} + \underbrace{\frac{\rho}{I_y}}_{RC_\rho}$$

# The data

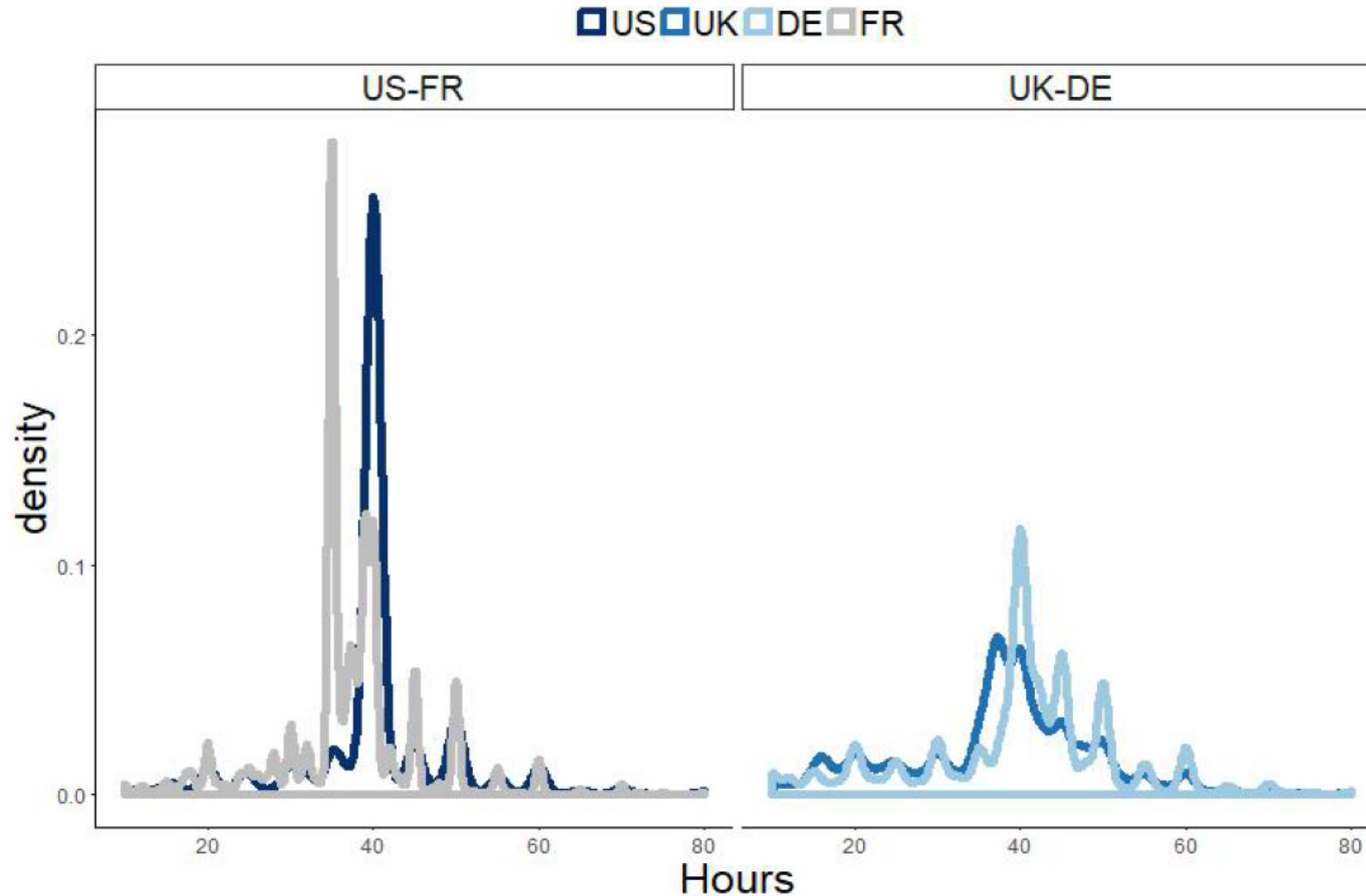
4 countries over the period 1990-2012

- US Current Population Survey
- UK British Household Panel + Understanding Society
- Germany German Socio-Economic Panel
- France Labour Force Survey

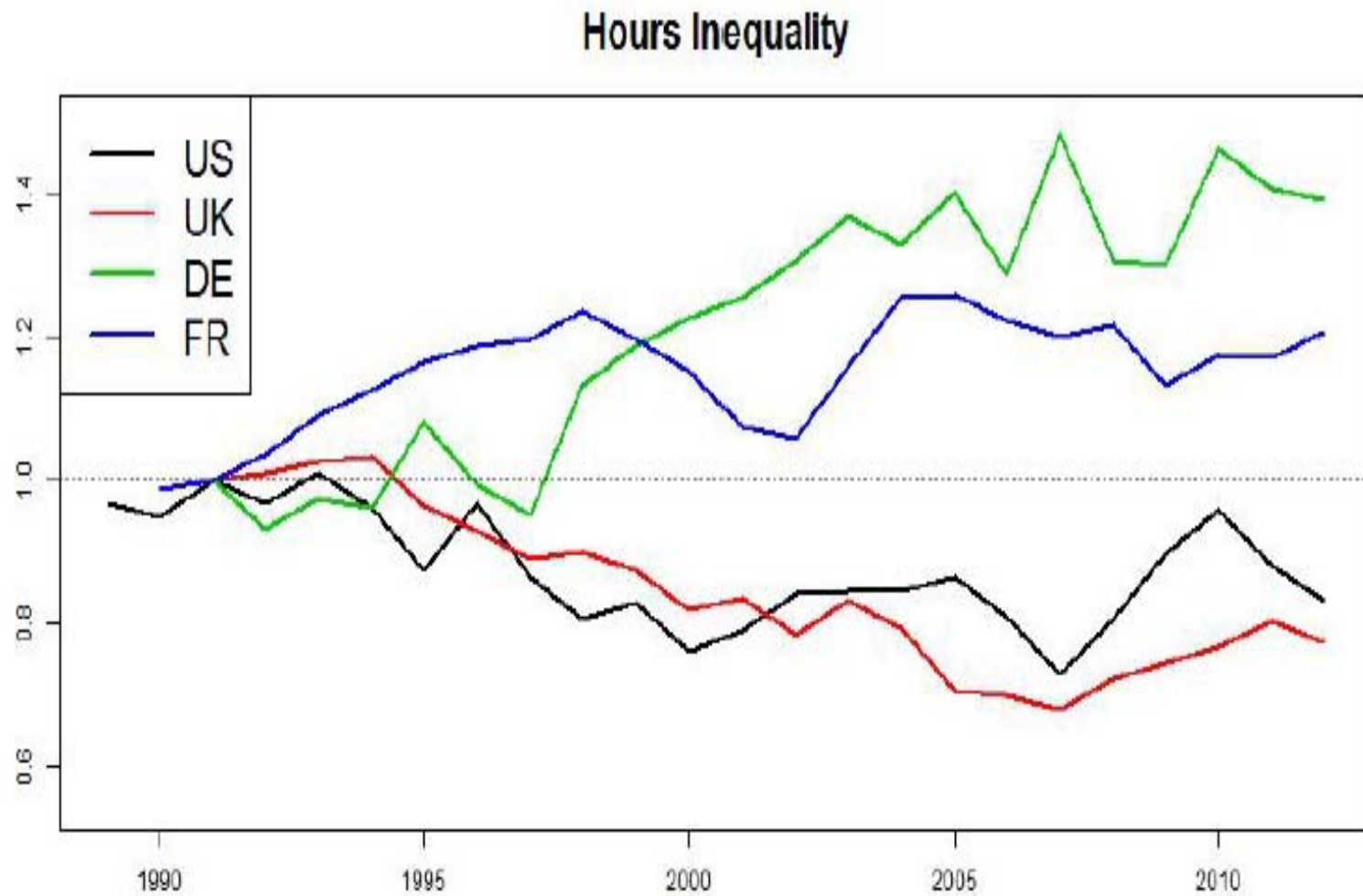
Main variables

- Gross weekly earnings in the main current job
- Weekly usual hours worked in the main current job including overtime (between 2 and 90 hours)
- Hourly wage for the representative week considered
- Prime-aged workers ( $25 < \text{age} < 55$ , no self-employed)

# The distribution of hours of work 2007-12



# Time trends: inequality in hours worked



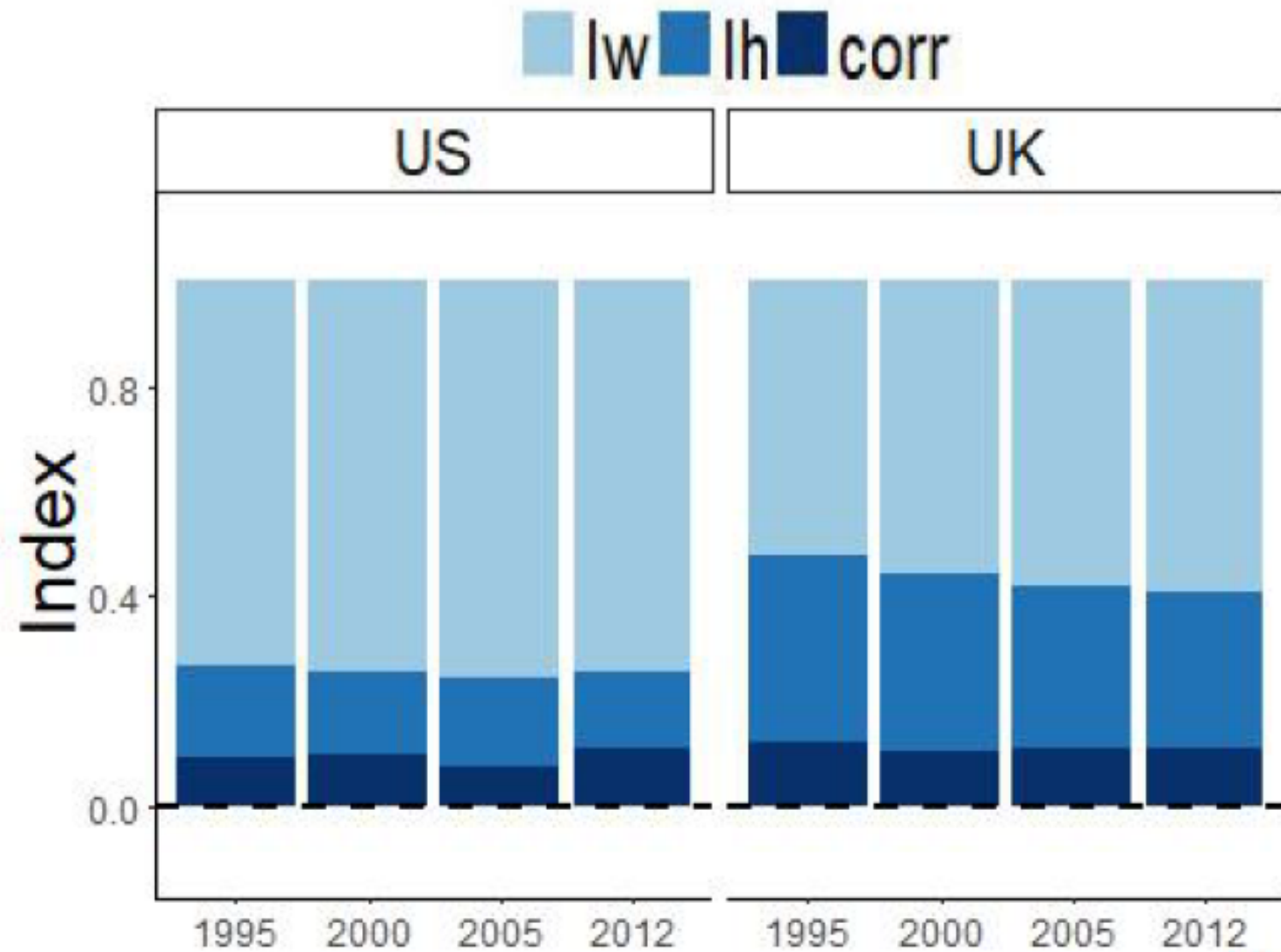
# Contribution to changes in inequality

Country	year	ly	lw	lh	corr
US	1995	0.225	0.165	0.039	0.021
	2012	0.247	0.183	0.037	0.027
	$\Delta\%$	9.78			
	$\delta$		0.81	-0.09	0.27
UK	1995	0.260	0.136	0.091	0.033
	2012	0.248	0.147	0.073	0.028
	$\Delta\%$	-4.61			
	$\delta$		0.91	-1.5	-0.42
DE	1995	0.147	0.103	0.060	-0.016
	2012	0.229	0.122	0.077	0.030
	$\Delta\%$	55.78			
	$\delta$		0.23	0.21	0.56
FR	1995	0.133	0.101	0.040	-0.008
	2012	0.137	0.086	0.042	0.010
	$\Delta\%$	3			
	$\delta$		-3.75	0.5	4.5

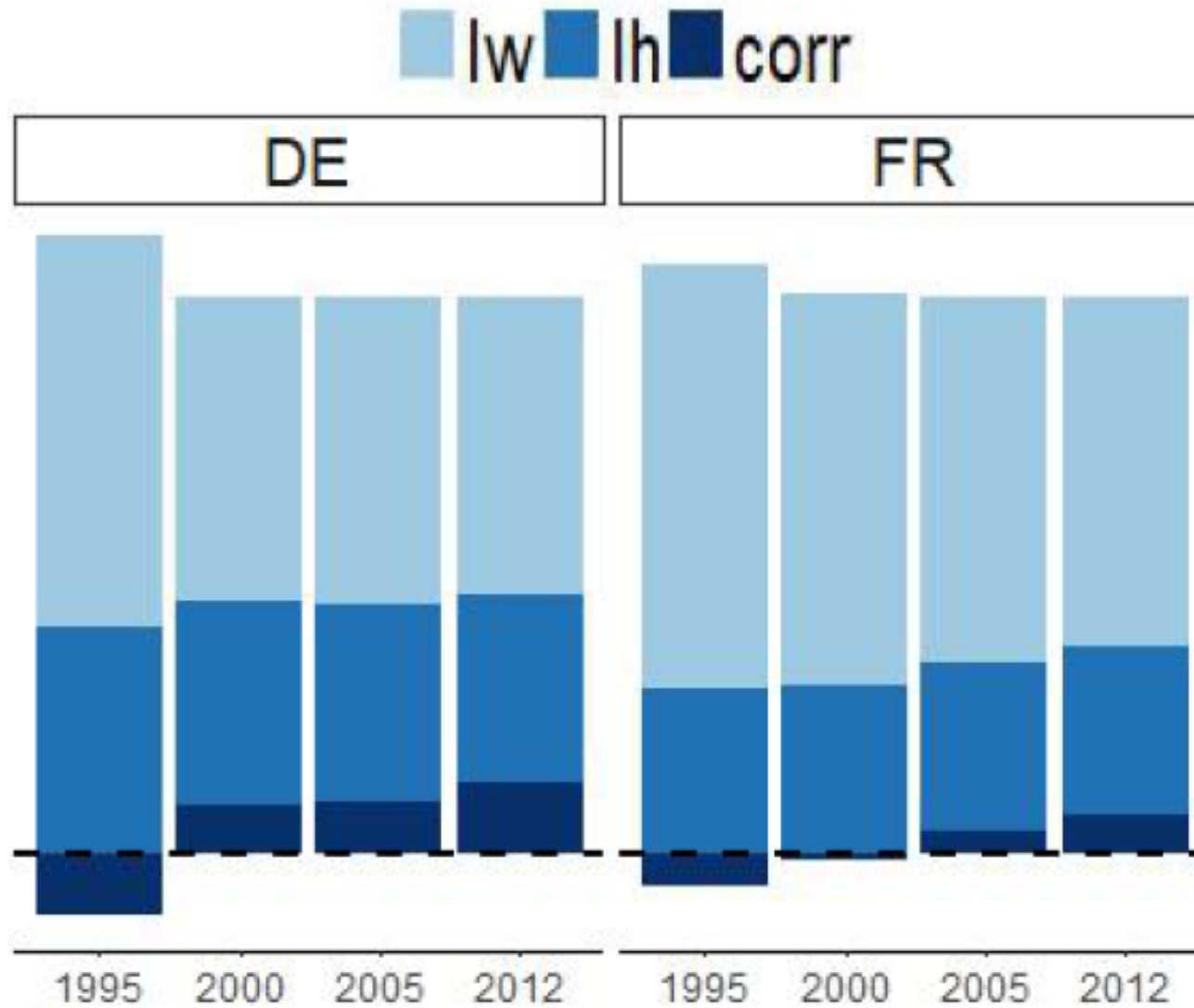
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# Relative contribution to changes in inequality

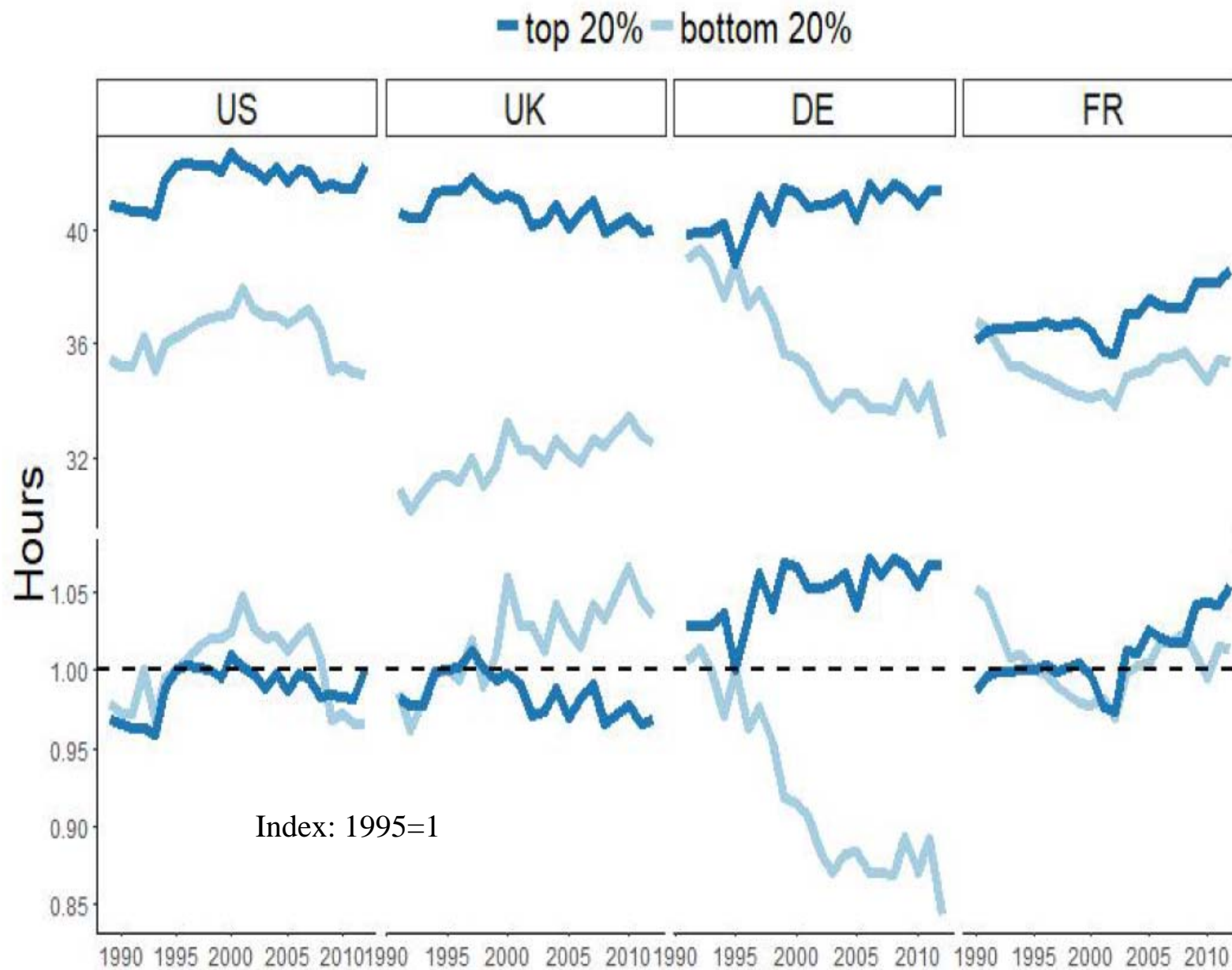


# Relative contribution to changes in inequality

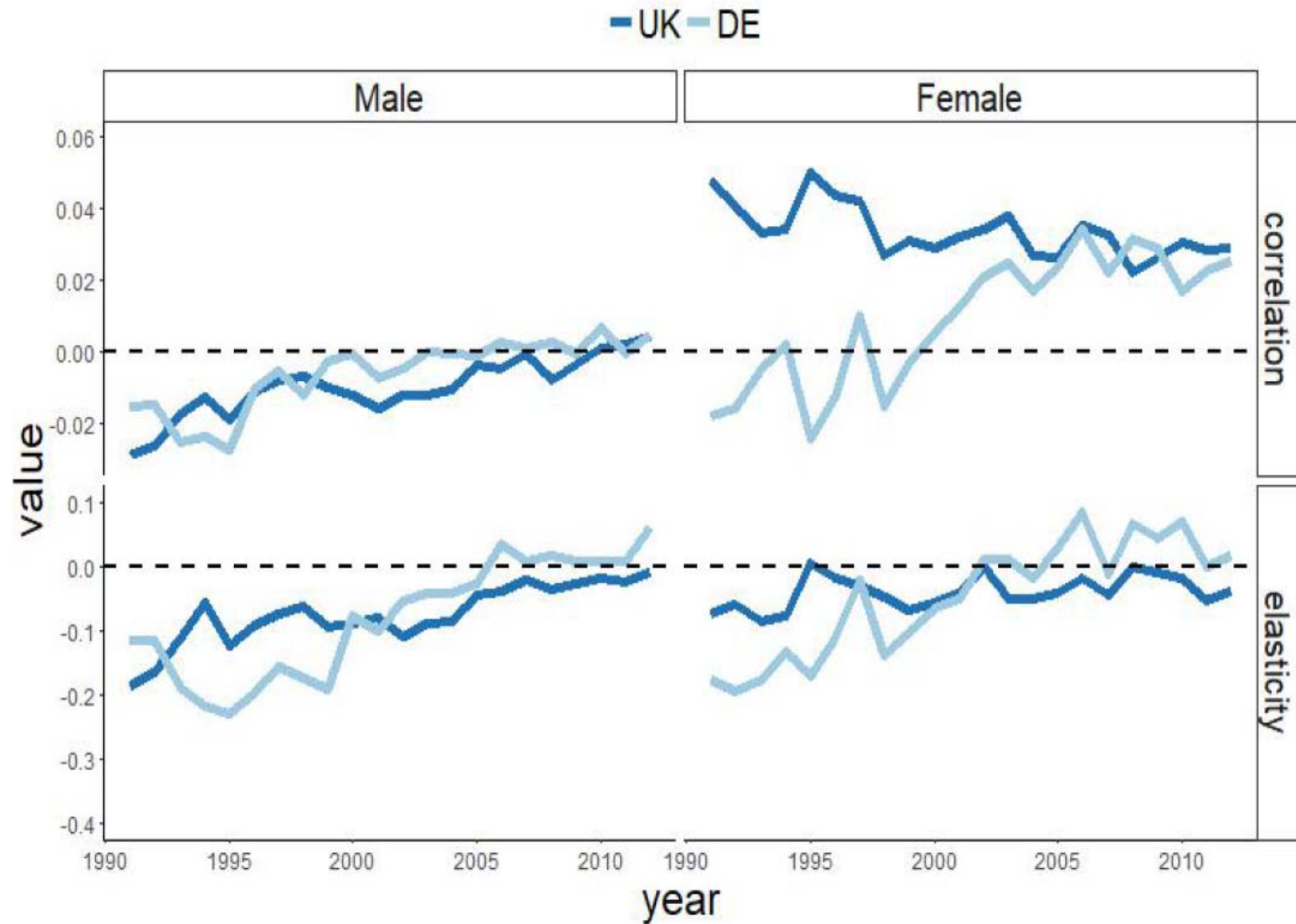




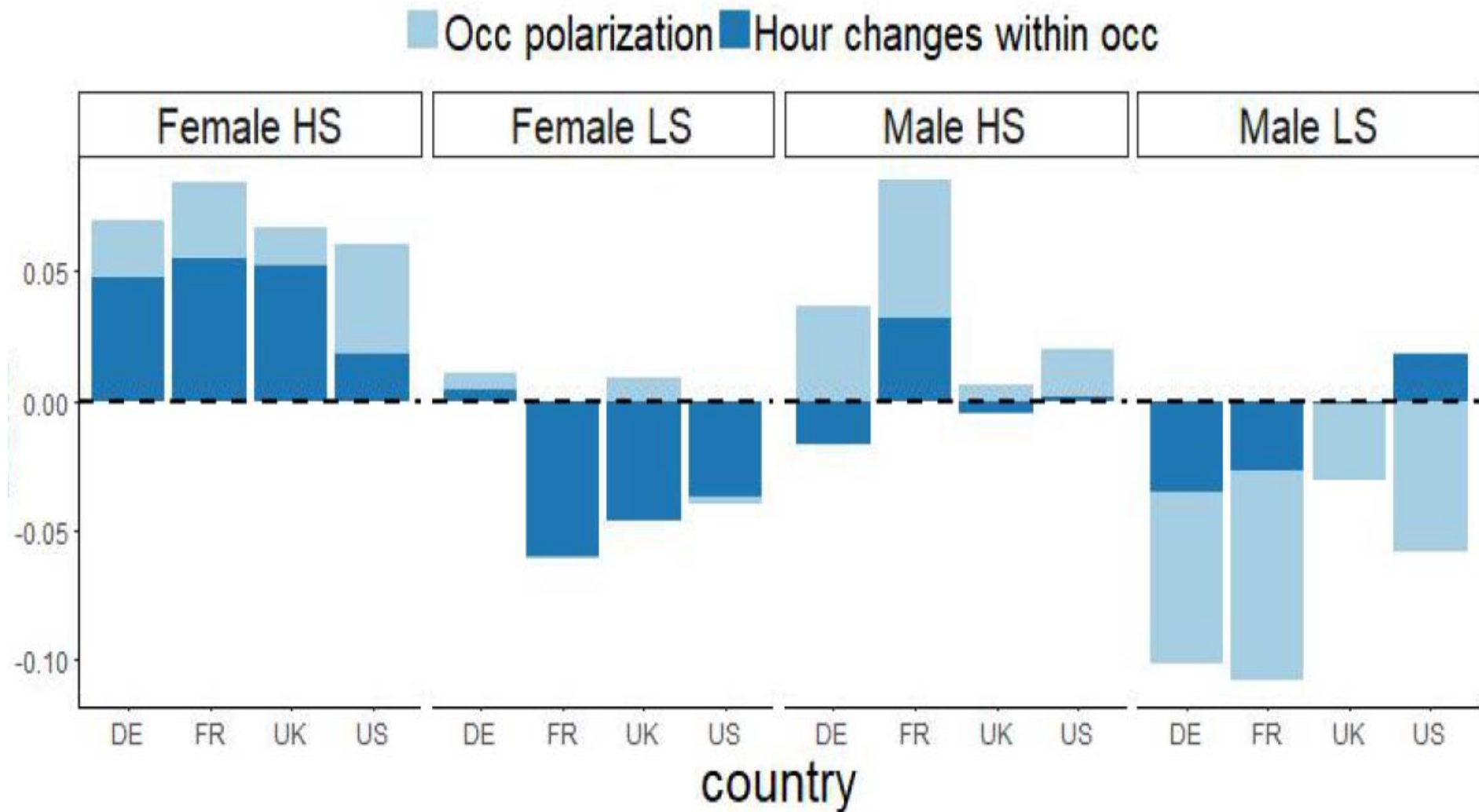
# Average hours by quintile of the wage distribution



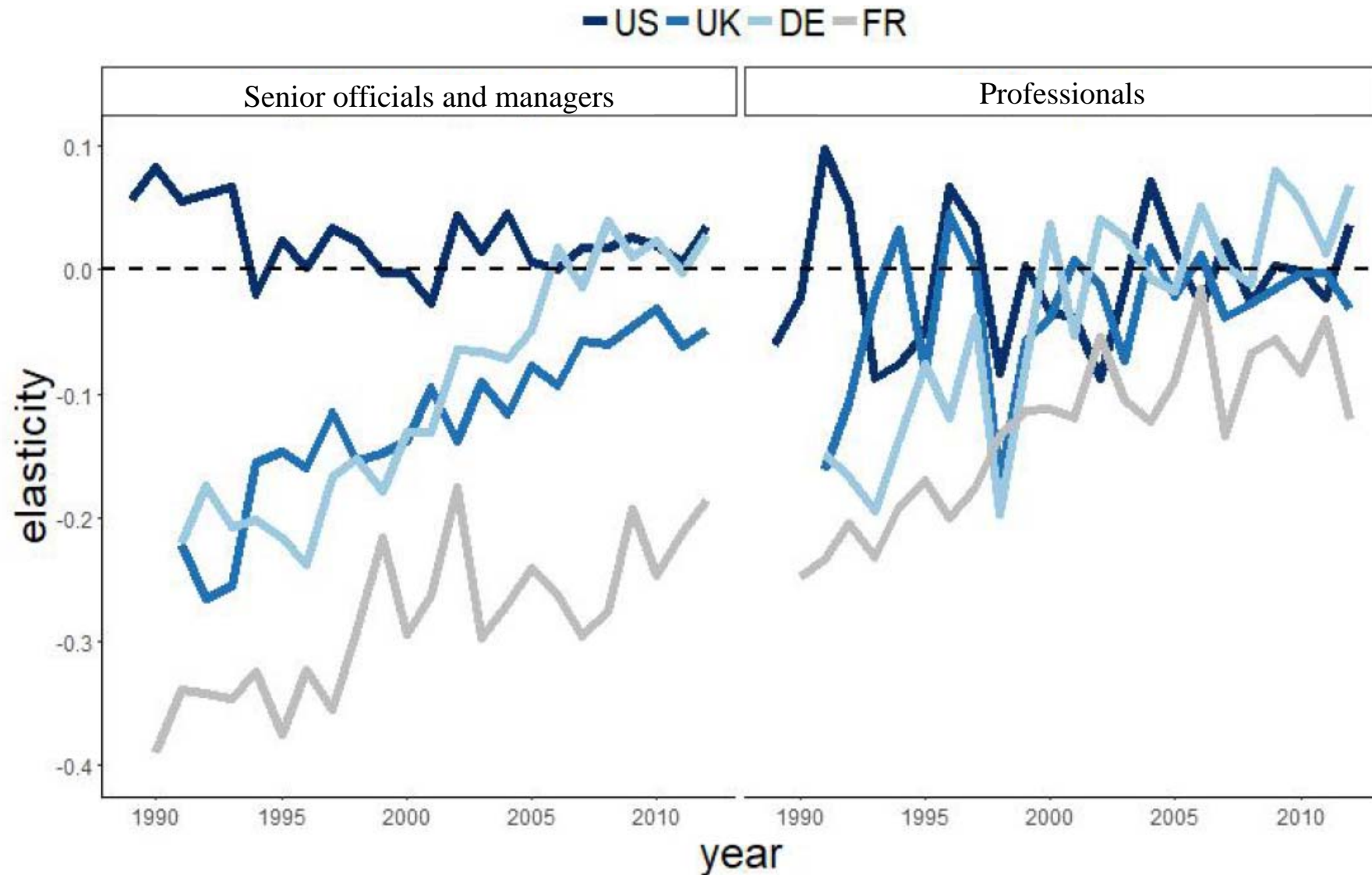
# Correlation and elasticity of hours w.r.t. wages



# Change in hours worked: Decomposition by skill and gender



# Elasticity of hours w.r.t. wages: Selected occupations



# Conclusions of the paper

- Hours inequality contributes up to 50% of total dispersion
- Importance of change in the hours-wage correlation
  - In some countries, it has moved from having an equalizing effect to having an unequalising one
- Need to understand what determines hours worked
  - Are a low hours chosen?
  - Are they a characteristic of certain jobs?
- Caveat – are low hours always *bad* for equality?  
German case

# Conclusions of the lecture

- Earnings inequality surprisingly non-monotonic
  - Very different story if we look at the skill premium or annual earnings
- Secular trends that need to be explained
  - still need for new theories (task?)
- Better data allows us to look at short-term effects
  - raised questions about the cyclicalities of earnings dispersion
  - What are the implications of this cyclicalities?

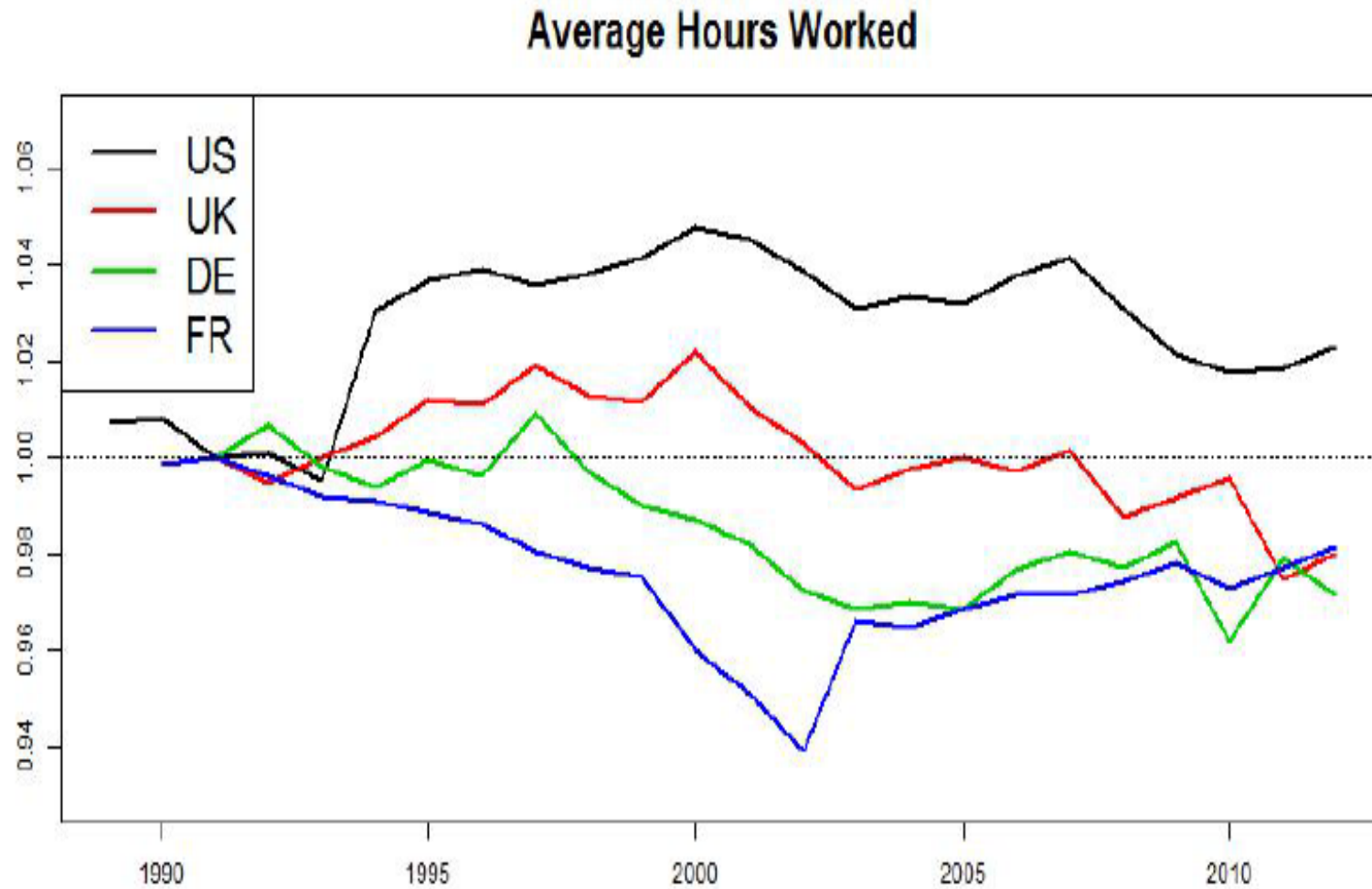
# Conclusions of the lecture

- What are the implications of is this cyclicality?
  - unusual shocks can have long-term impacts
- Growing earnings dispersion has had consequences for the gender ratio
  - changed the sign of the employment bias reducing the gender gap
  - but increased this gap for top incomes
- Hours inequality contributes considerably to earnings dispersion
  - need to understand its dynamics

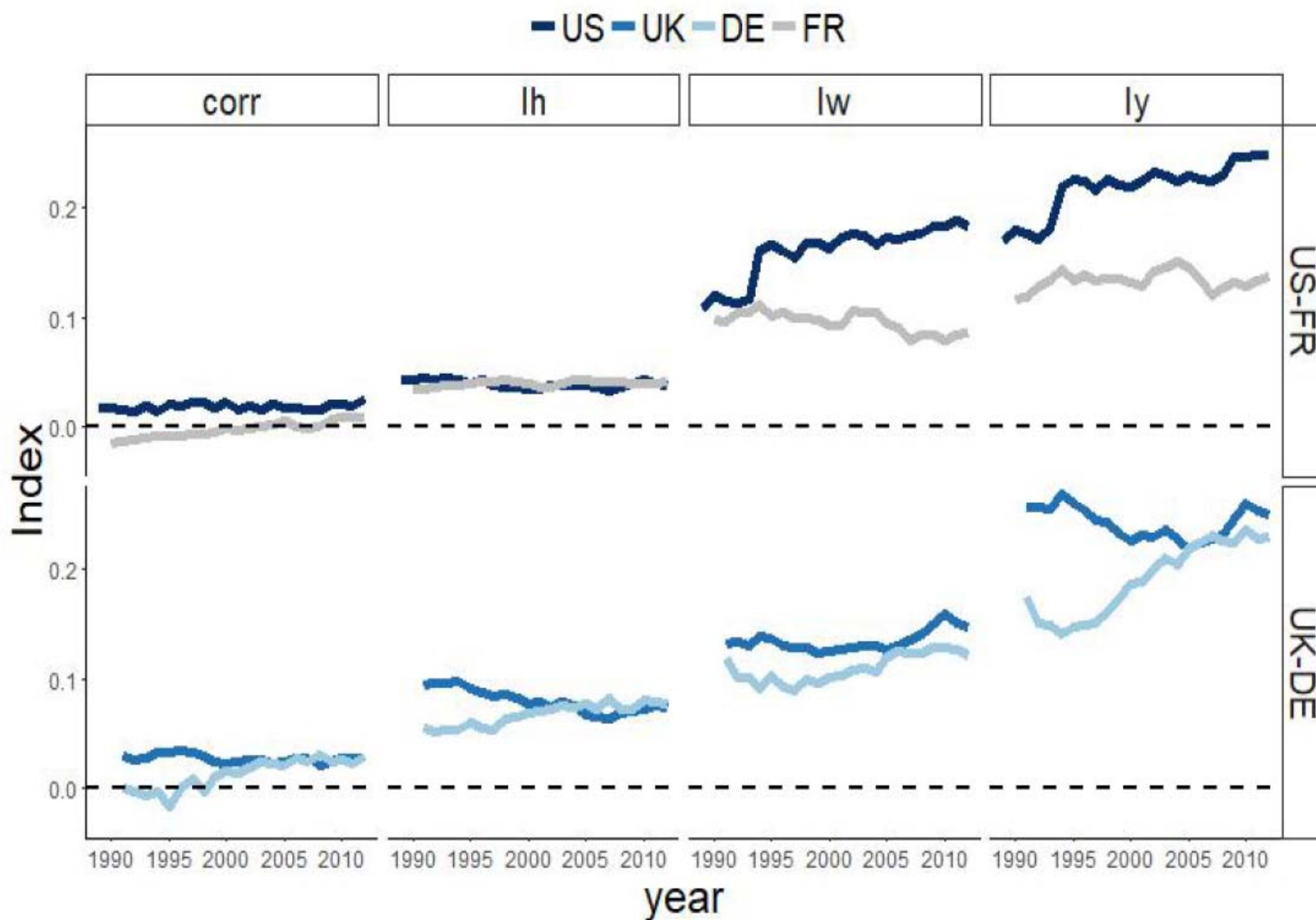
# **Additional tables and figures**



# Time trends: average hours worked



# Contribution to changes in earnings inequality



# What about zero hours?

Gini coefficient of earnings	Employed	Entire population
France		
2000	0.131	0.551
2012	0.137	0.533
Germany		
2000	0.185	0.474
2012	0.229	0.469

# Unions and inequality

Correlation Term VS Union Density

■ US ■ UK ■ DE ■ FR

