

Employment protection, segmentation and wage inequality in Portugal

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Motivation

What makes Portugal an interesting case to study wage inequality?

- Large supply shifts – from 2.5% to 15% of college graduates.
- Institutional setting: Continental Europe; Segmentation.
- Open/integrated economy (technological changes; globalization).

Part I

**Inequality: Aggregate
analysis**

Overview

Previous studies

Machado & Mata (2001), Martins & Pereira (2004), Cardoso (2007): Cover the earlier period (up to mid 90s) and tended to focus on college wage premium.

Cardoso (1998), Machado & Mata (2005): for the overlapping period, inequality analysis is line with our findings.

Upper-tail (90/50): 1982-2009

- Levels:
 - Twice as much as in Germany;
Starts at lower levels than the U.S., but ends up higher;
- Changes:
 - Portugal: +20 log points (1982-95); +11 l.p, (1996-09);
United States & Germany: +4 and +5 l.p. (80s & 90s);

[Sources: Autor, Katz & Kearny, 2008 (United States); Schönberg, Dustmann & Ludsteck, 2009 (Germany)]

Lower-tail (50/10): 1982-2009

- Levels:
 - United States > Portugal > Germany;
- Changes:
 - Portugal: 1982-95: 8 l.p.; 1996-09: Male/Female -6/3 l.p.
 - United States and Germany:
 - 1980s: 5/8 l.p. (M/F); 1990s: -1 l.p.;
 - 1980s: 3 l.p.; 1990s: 6 l.p.;

Market and institutional factors: 1982-1995

Increasing inequality:

- Low supply of skills;
 - 6 or less years of schooling: 69% in 1982, 44% in 1995;
 - college degree: 3% in 1982, 5% in 1995;
- No significant introduction of new institutions
- Skill-biased technological change is the main explanation.

It's a demand dominated story.

Market and institutional factors: 1996-2009

Increasing upper-tail; but decreasing lower-tail inequality:

- Large shift: 5% to 15% of college graduates from 1995 to 2009;
- Real minimum wage increased in the late 1990s;
- Polarization;

It's a demand and supply story.

Data

Administrative data: Quadros de Pessoal

- 1982-2009
- All (almost) salaried workers;
- Annual (October's snapshot)

Analysis

Supply and demand

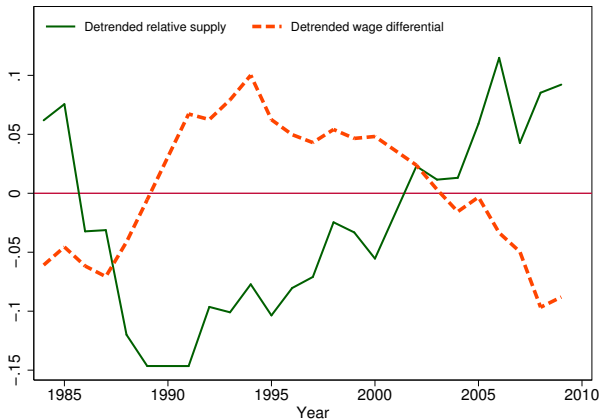
- Methodological setting: **Katz & Murphy (1992)**;

$$\text{CES: } Q_t = [\alpha_t (a_t N_{ct})^\rho + (1 - \alpha_t) (b_t N_{nt})^\rho]^{\frac{1}{\rho}} \quad (1)$$

$$\ln \left(\frac{w_{ct}}{w_{nt}} \right) = \left(\frac{1}{\sigma} \right) \left[D_t - \ln \left(\frac{N_{ct}}{N_{nt}} \right) \right], \quad (2)$$

- Supply factors**, $\frac{N_{ct}}{N_{nt}}$ (college/non-college relative supply);
 - Elasticity of substitution, $\sigma = \frac{1}{1-\rho}$;
- Demand factors** (time trend), D_t ;
- Good **'Wage gap' model** (fitted vs. actual);

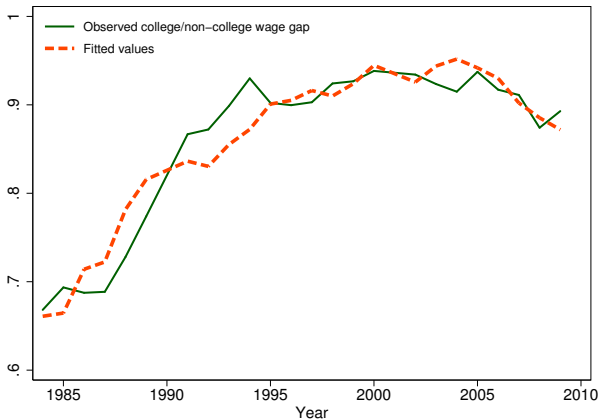
College/Non-college: Elasticity of substitution



College/Non-college log wage gap

	(1)	(2)	(3)	(4)	(5)
College/Noncollege relative supply	-0.678 <i>0.129</i>	-0.683 <i>0.144</i>	-0.713 <i>0.127</i>	-0.481 <i>0.091</i>	-0.378 <i>0.098</i>
Log real minimum wage			-0.610 <i>0.400</i>		-0.211 <i>0.246</i>
Natural unemployment rate				-0.038 <i>0.006</i>	-0.043 <i>0.007</i>
Time	0.052 <i>0.008</i>	0.052 <i>0.009</i>	0.059 <i>0.010</i>	0.043 <i>0.006</i>	0.045 <i>0.006</i>
Time*1995		0.001 <i>0.003</i>			-0.004 <i>0.001</i>
Constant	-1.109 <i>0.349</i>	-1.116 <i>0.381</i>	1.044 <i>1.450</i>	-0.409 <i>0.258</i>	0.632 <i>0.869</i>
No. of observations	24	24	24	24	24
R^2	0.777	0.777	0.800	0.911	0.937

Katz & Murphy (1992): Fitted vs. Actual Wage Gap



Experience levels: College/Non-college log wage gap

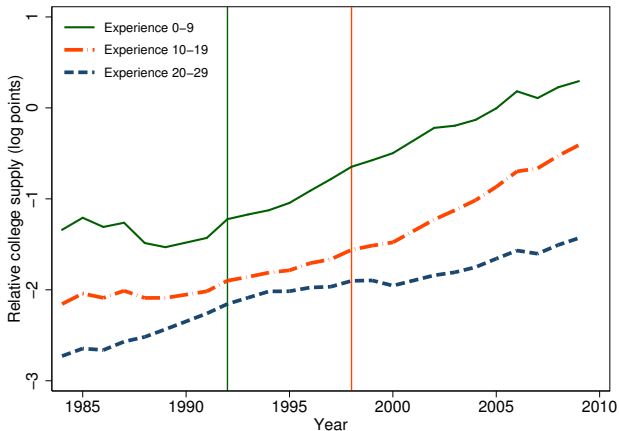
- **Card & Lemieux (2001)**: Impact of experience
 - (same education, different experience): not perfect substitutes;
- **Large supply shift** concentrated in the 1990s;
 - Most noticeable in the **younger cohort**;
 - Visible impact on unconditional inequality;
- Split workers into **4 experience groups** and compute the **own-group relative college/non-college** supply and wage gaps;

4 experience groups: C/NC wage gap

	All groups		0-9 years		Potential experience groups				30-39 years	
	(1)	(2)	(3)	(4)	10-19 years (5)	20-29 years (6)	(7)	(8)	(9)	(10)
Own minus aggregate supply	-0.324 <i>0.010</i>	-0.323 <i>0.009</i>	-0.209 <i>0.129</i>	-0.254 <i>0.110</i>	-0.584 <i>0.043</i>	-0.548 <i>0.112</i>	0.132 <i>0.161</i>	0.059 <i>0.064</i>	0.427 <i>0.197</i>	0.200 <i>0.116</i>
Aggregate supply	-0.578 <i>0.105</i>	-0.400 <i>0.107</i>	-0.614 <i>0.187</i>	-0.435 <i>0.176</i>	-0.459 <i>0.064</i>	-0.464 <i>0.068</i>	-0.242 <i>0.308</i>	-0.106 <i>0.125</i>	-0.163 <i>0.085</i>	-0.034 <i>0.054</i>
Log real minimum wage		-0.174 <i>0.314</i>		-0.188 <i>0.325</i>		-0.016 <i>0.189</i>		-0.141 <i>0.198</i>		-0.130 <i>0.160</i>
Natural unemployment rate		-0.036 <i>0.008</i>		-0.027 <i>0.008</i>		-0.004 <i>0.012</i>		-0.052 <i>0.005</i>		-0.027 <i>0.004</i>
Time	0.048 <i>0.007</i>	0.042 <i>0.008</i>	0.044 <i>0.011</i>	0.038 <i>0.011</i>	0.040 <i>0.004</i>	0.041 <i>0.005</i>	0.035 <i>0.017</i>	0.033 <i>0.008</i>	0.040 <i>0.007</i>	0.030 <i>0.005</i>
Constant	-0.734 <i>0.284</i>	0.543 <i>1.107</i>	-0.782 <i>0.585</i>	0.544 <i>1.109</i>	-0.325 <i>0.168</i>	-0.267 <i>0.665</i>	0.194 <i>0.847</i>	1.291 <i>0.731</i>	0.630 <i>0.260</i>	1.451 <i>0.562</i>
No. of observations	96	96	24	24	24	24	24	24	24	24
R ²	0.882	0.906	0.738	0.848	0.972	0.972	0.903	0.987	0.969	0.991

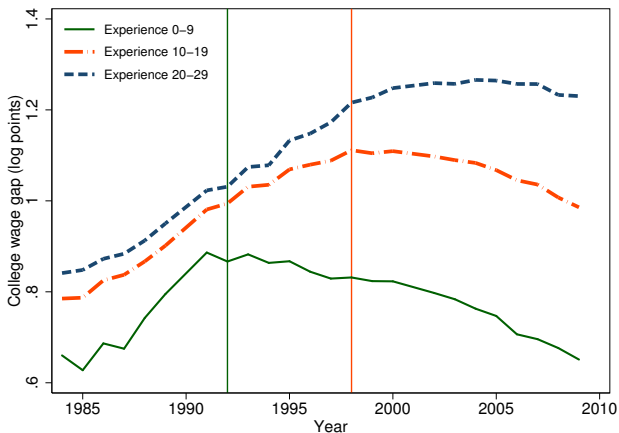
Own and aggregate supply: **only significant for the two less experienced groups.**

Experience level: Supply shifts



Change in the
relative supply
difference between
the less- and
most-experienced
groups:
53 l.p..

Experience level: Wage gap



21 l.p. increase in the difference between the **C/NC wage gap** of the less- and most-experienced.

Using the estimated own-group elasticity: **Explains 17 l.p.; 82% of total difference;**

Minimum wage

	Male		Female	
	90/50	50/10	90/50	50/10
College/Noncollege relative supply	-0.065 <i>0.037</i>	-0.185 <i>0.048</i>	-0.267 <i>0.072</i>	0.006 <i>0.033</i>
Log real minimum wage	-0.030 <i>0.110</i>	-0.265 <i>0.141</i>	-0.331 <i>0.210</i>	-0.457 <i>0.098</i>
Natural unemployment rate	-0.011 <i>0.003</i>	-0.016 <i>0.004</i>	-0.010 <i>0.005</i>	-0.008 <i>0.003</i>
Time	0.020 <i>0.003</i>	0.018 <i>0.003</i>	0.035 <i>0.005</i>	0.007 <i>0.002</i>
Constant	0.528 <i>0.387</i>	0.901 <i>0.499</i>	1.085 <i>0.743</i>	1.924 <i>0.346</i>
No. of observations	24	24	24	24
R^2	0.992	0.828	0.969	0.934

Katz-Murphy: 90/50 and 50/10 wage percentiles ratios as dependent variables;

Females 50/10 ratio is “explainable” with minimum wage developments.

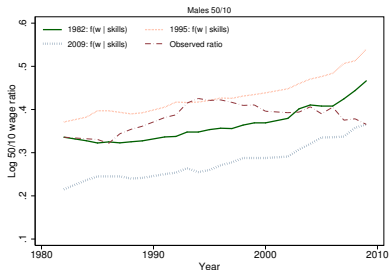
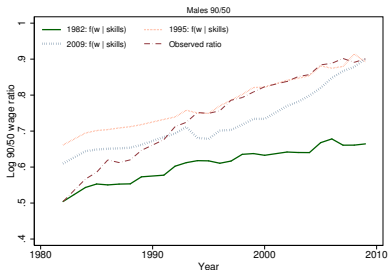
Counterfactuals analysis: DiNardo, Fortin & Lemieux (1996)

Let $f(w|T = t)$ be the **observed wage density** at time t . It can be decomposed into the density of observed wage **conditional on attributes** x at time t , $g(w|x, T = t)$ and the density of the same **attributes**, $h(x|T = t)$.

$$f(w|T = t) = \int g(w|x, T = t)h(x|T = t)dx$$

Counterfactual: wage distribution of t that would have prevailed if attributes were those of year t' .

Overall inequality



Price effect: Vertical distance between curves; *Composition effect*: Movement along curves

Price effect in 82-95:

24.5 \Rightarrow 13.2 (1995's X);

Composition effect in 96-09:

15.2 \Rightarrow -7.1 (1995's X);

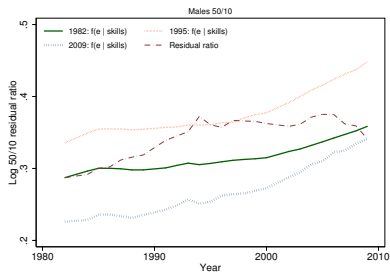
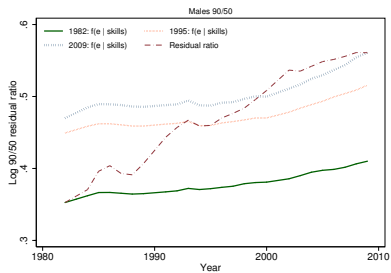
Price effect in 82-95:

8.5 \Rightarrow 6.1 (1995's X);

Price effect in 96-09:

-5.6 \Rightarrow -11.1 (1995's X);

Residual inequality



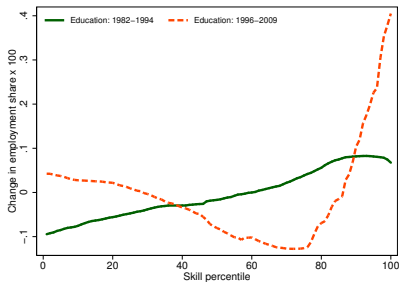
Price effect: Vertical distance between curves; *Composition effect*: Movement along curves

Polarization

Decrease in 50/10 wage inequality. Explanations?

- **SBTC** cannot account for the decrease;
- **Minimum wage** helps marginally;
- But other **demand factors** may be at play (Goos & Manning, 2007); we can gauge them by:
 - Employment shares by occupational skill;
 - Real wage variation by wage percentile;

Polarization: Skill shares



Polarization: Real wage log variation



Part II

Inequality: Causal analysis

Labor Code 2004 reform: A quasi-experiment

Fair dismissals: Firing a worker implies: (i) written procedures; (ii) witnesses interviews involving the works council.

New law: firms with **11 to 20** workers have to comply with this **additional procedural requirements**. Before 2004, only firms **21+** workers.

- **Treatment** firms: 11-20 workers
- **Control** firms: 21-50 workers
- **Before:** 2002-2003
- **After:** 2004-2008

Data

Quadros de Pessoal: 2002 – 2008

Our analysis starts in **2002**, the first year for which the information on the **type of contract is available**, and ends in 2008, to avoid the influence of the 2009 Labor Code revision.

Common trend

	90/50				50/10			
	Base wage		Total wage		Base wage		Total wage	
	Monthly	Hourly	Monthly	Hourly	Monthly	Hourly	Monthly	Hourly
Treat × Time	-0.163 (0.041)	-0.643 (0.220)	-0.113 (0.187)	-0.285 (0.573)	0.007 (0.878)	0.076 (0.835)	0.027 (0.632)	0.074 (0.848)
Treat	0.338 (0.084)	1.743 (0.176)	0.291 (0.158)	1.377 (0.257)	0.062 (0.585)	0.991 (0.251)	0.009 (0.945)	0.591 (0.528)
Time	0.116 (0.083)	-0.245 (0.574)	0.090 (0.198)	-0.356 (0.383)	-0.036 (0.359)	-1.013 (0.001)	-0.055 (0.228)	-1.000 (0.001)
No of observations	53278							

Match (worker × firm) fixed-effects with clustering.

Control variables: **(i)** number of workers as a proxy for firm size; **(ii)** firm age (indicator variables: 1, 2, ..., 10, 11-15, 16-20, and more than 20 years); **(iii)** sector; **(iv)** region, **(v)** foreign ownership majority; **(vi)** gender; **(vii)** nationality; **(viii)** age; **(ix)** education; **(x)** white and blue collar; **(xi)** workers on a (regulated) minimum wage; **(xii)** tenure.

Quasi-experimental evidence: Impact on inequality

	90/50				50/10			
	Base wage		Total wage		Base wage		Total wage	
	Monthly	Hourly	Monthly	Hourly	Monthly	Hourly	Monthly	Hourly
All contracts	0.063 (0.144)	0.727 (0.007)	0.043 (0.309)	0.368 (0.129)	0.061 (0.018)	0.442 (0.019)	0.065 (0.024)	0.572 (0.002)
	211369							
Open-ended contracts	-0.003 (0.948)	0.390 (0.193)	-0.055 (0.244)	-0.057 (0.831)	0.071 (0.020)	0.504 (0.019)	0.094 (0.004)	0.613 (0.003)
	201243							
Fixed-term contracts	0.028 (0.688)	1.113 (0.013)	0.051 (0.472)	1.037 (0.012)	0.014 (0.765)	0.239 (0.472)	-0.017 (0.737)	0.106 (0.745)
	143201							

Main messages:

**Adjustment in
base wages**

**Primarily on
(new) OEC.**

**Inequality among
FTC unaffected.**

Conclusion

- **Inequality increased from 1982 to 2006**
- **Supply & demand** have been the “**designated drivers**”
- **Institutional settings** took the “**passenger seat**”;

Novelty of our results: Causal relationship between employment protection and inequality. However, this is still work in progress.

Thank you.