The impact of the minimum wage on low-wage earners: Employment and match evidence

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Synopsis[1]

Employment-to-minimum-wage elasticity is negative for workers whose initial wage is between the old and the new minimum wage.

The results are closer to the U.S. than to France.

Match-to-minimum-wage elasticity is also negative.

But matches are more elastic than total employment.

Counterpart to these results is typical of a labor demand schedule:

wages increase more in surviving matches than in employment.

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[1] This presentation is based on Centeno, Duarte & Novo (2012).

Outline

1 Minimum wage and employment

Stigler (1946): In a **monopsonic** labor market, an increase in the minimum wage increases employment; otherwise, it has a negative impact.

Empirical literature:

U.S.: Card & Krueger (1994), Neumark & Wascher (2000)

Portugal: Pereira (2003), Dias & Cardoso (2006)

France: Abowd, Kramarz, Margolis & Philippon (2000)

Freeman (1996): The impact on employment is a **debate around zero**.

2 Data

Social Security Records: 2002 – 2010

- Unique source: All mandatory social security contributions.

- **Matched employer-employee** longitudinal data.

- Mostly private sector.

- We consider only salaried workers in October of each year.

- Gross monthly wage.

- **25 million observations** (year $\times$ worker $\times$ firm);
  an average of **2.7 million workers each year**.
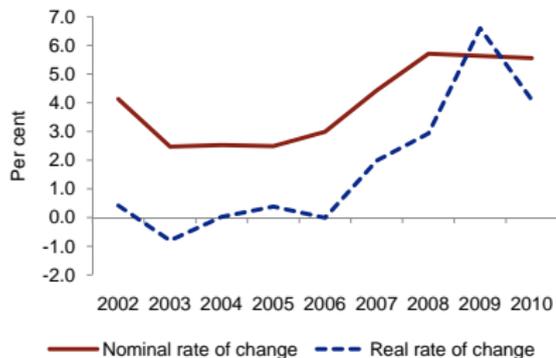
3 The minimum wage in Portugal

Minimum wage earners
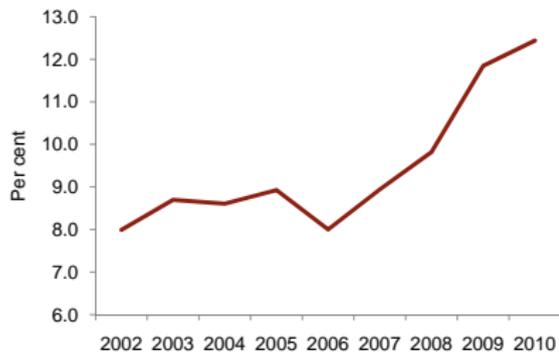
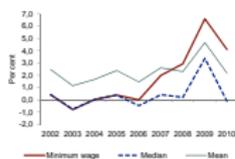Education levels

Private sector
college degree holders:
1982: 3%
1995: 6%
2010: 15%

Minimum wage growth rate

Mean and median rates of wage growth
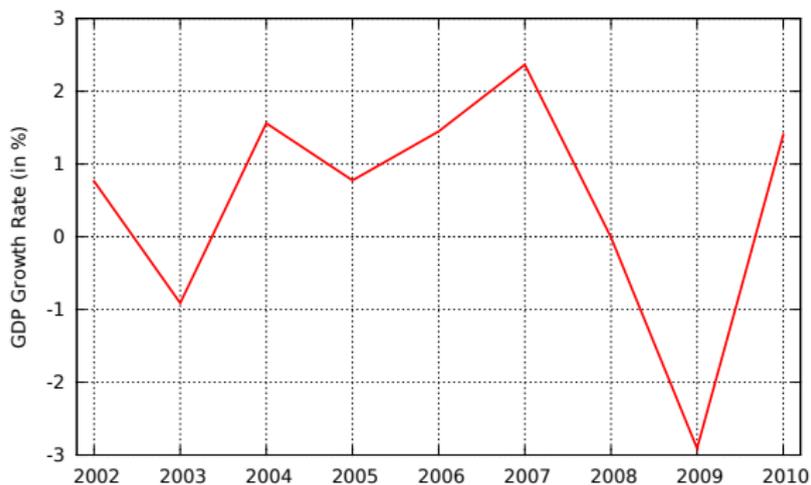
The large minimum wage increases occurred in an economic environment of lack luster growth performance.

4 Wage inequality: Ratio 50th/10th percentiles

Inequality (50th/10th) decrease since 2006; larger minimum wage increases.
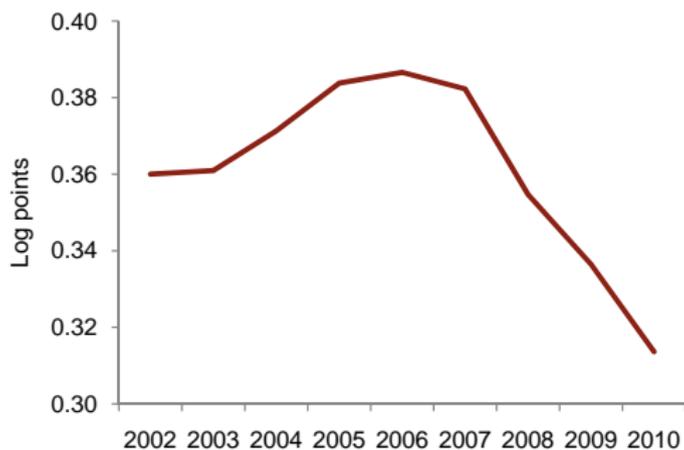
5 Wave effect

Left-tail real wage growth spillovers negatively over neighboring percentiles.

	Wages		
n^{th}-tile	$t-1$	t	$\Delta\%$
1st	400	440	10%
$\vdots$	$\vdots$	$\vdots$	$\vdots$
40th	600	606	1%
$\vdots$	$\vdots$	$\vdots$	$\vdots$
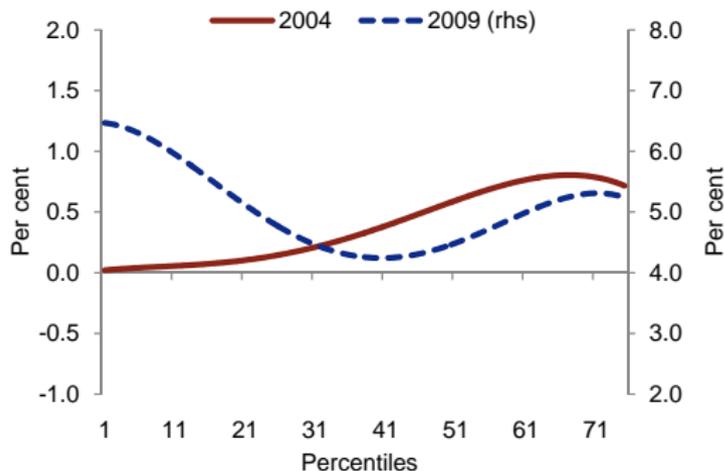
6 Results

Research question:

What's the **impact of the minimum wage on employment and match** survival?

More specifically, how does the **interaction** between the **real minimum wage increases** and the worker **position in the distribution of wages** determine the probability the worker remains: (i) **employed** or (ii) **same match**.

y_{it} equals 1 if still employed (match) next year; 0 otherwise:

$$y_{it} = X_{it}\lambda + \sum_{k=1}^{5} \left(\beta_k + \gamma_k \Delta W_t^{min} \right) D_{i,t-1}^k + \varepsilon_{it}, \tag{1}$$

Six levels of wages, $D_{i,t-1}^k$:

1. $W_{t-1} = W_{t-1}^{min}$ $t-1$ **minimum-wage earners; "Treatment group"**

2. $W_{t-1} < W_t^{min}$ **"Next" minimum-wage earners; "Treatment group"**

3. $W_t^{min} < W_{t-1} < Q_{0.25}(W_{t-1})$ **Still in 1st quartile**

4. $W_{t-1} \in Q_{0.50}(W_{t-1})$ **2nd quartile**

5. $W_{t-1} \in Q_{0.75}(W_{t-1})$ **3rd quartile**

6. $W_{t-1} \in Q_{1.00}(W_{t-1})$ **4th quartile; "Control group"**

6.1 Employment

Employment: Year-by-year

$I(Employment_t)$	Linear probability model							
	2003	2004	2005	2006	2007	2008	2009	2010
Wage level indicator:								
$W_{t-1} = W_{t-1}^{min}$	-8.32	-7.81	-9.00	-8.40	-7.96	-8.98	-8.61	-7.24
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$W_{t-1} < W_t^{min}$	-6.53	-7.08	-7.72	-7.56	-7.47	-7.71	-7.78	-6.72
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
⋮				⋮				

$I(Employment_t)$	Probit model							
	2003	2004	2005	2006	2007	2008	2009	2010
Wage level indicator:								
$W_{t-1} = W_{t-1}^{min}$	-8.92	-8.31	-9.70	-8.90	-8.81	-9.99	-9.48	-7.77
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$W_{t-1} < W_t^{min}$	-7.30	-7.90	-8.72	-8.61	-8.40	-9.08	-9.11	-7.77
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
⋮				⋮				
No of observations	2.1m	2.1m	2.1m	2.1m	2.2m	2,3m	2.3m	2.2m

Notes: Coefficients in percentage points relatively to top quartile. p-values in parentheses.

Notes:
(i): There is little varition over time;
(ii): The difference between the two estimation methods are minor (Angrist & Pischke, 2009)
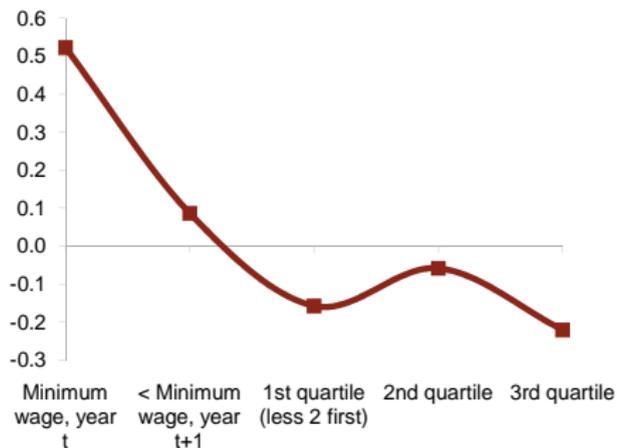
Employment status and wages: Firm fixed effects

	Employment	$\Delta \log$ Wages	Elasticity
Wage level indicator:			
$W_{t-1} = W_{t-1}^{min}$	-7.21	15.80	
	(0.000)	(0.000)	
$W_{t-1} < W_t^{min}$	-5.88	14.69	
	(0.000)	(0.000)	
$W_t^{min} < W_{t-1} < Q_{.25}(W_{t-1})$	-4.42	12.05	
	(0.000)	(0.000)	
$W_{t-1} \in Q_{.5}(W_{t-1})$	-2.56	9.22	
	(0.000)	(0.000)	
$W_{t-1} \in Q_{.75}(W_{t-1})$	-1.11	5.35	
	(0.000)	(0.000)	
$\mathbf{\Delta W_t^{min,real} \times}$ **Wage level indicator:**			
$\mathbf{W_{t-1} = W_{t-1}^{min}}$	**-0.56**	**0.52**	**-1.08**
	(0.000)	(0.000)	
$\mathbf{W_{t-1} < W_t^{min}}$	**-0.45**	**0.09**	**-5.26**
	(0.000)	(0.000)	
$W_t^{min} < W_{t-1} < Q_{.25}(W_{t-1})$	-0.26	-0.16	1.64
	(0.000)	(0.000)	
$W_{t-1} \in Q_{.5}(W_{t-1})$	-0.31	-0.06	5.23
	(0.000)	(0.000)	
$W_{t-1} \in Q_{.75}(W_{t-1})$	-0.17	-0.22	0.76
	(0.000)	(0.000)	
No of observations	17,377,525	14,721,929	

Notes: p-values in parentheses.

1. **Employment** : More stable for higher wage levels.

2. **Employment** $\times$ **Min wage** : Low wages less stable. For each p.p. $\Uparrow$ min. wage $\Rightarrow \Downarrow$ 0.6 p.p. Pr[Employment].

3. $\Delta \log$ **Wages** $\times$ **Min wage** : Only low wages gain; pattern of a (conditional) wave effect.

Conditional wave effect

Employment status and wages: Firm fixed effects (nested)

	Employment	$\Delta \log$ Wages	Elasticity
Wage level indicator:			
$\quad W_{t-1} = W_{t-1}^{min}$	-4.44	6.76	
	(0.000)	(0.000)	
$\quad W_{t-1} < W_t^{min}$	-3.09	5.68	
	(0.000)	(0.000)	
$\quad W_t^{min} < W_{t-1} < Q_{.25}(W_{t-1})$			
$\quad W_{t-1} \in Q_{.5}(W_{t-1})$			
$\quad W_{t-1} \in Q_{.75}(W_{t-1})$			
$\mathbf{\Delta W_t^{min,real}} \times$**Wage level indicator:**			
$\quad \mathbf{W_{t-1} = W_{t-1}^{min}}$	**-0.40**	**0.65**	
	(0.000)	(0.000)	
$\quad \mathbf{W_{t-1} < W_t^{min}}$	**-0.30**	**0.23**	
	(0.000)	(0.000)	
$\quad W_t^{min} < W_{t-1} < Q_{.25}(W_{t-1})$			
$\quad W_{t-1} \in Q_{.5}(W_{t-1})$			
$\quad W_{t-1} \in Q_{.75}(W_{t-1})$			
No of observations	17,377,525	14,721,929	

Notes: p-values in parentheses.

Hypothesis: minimum wage increase affects only workers earning less than "next year's" minimum wage.

1. Qualitatively the results are the same.

2. **Likelihood ratio test**: Both for employment probability and wages the restricted model is rejected.

3. There is evidence in favor of the **wave effect**.

Heterogeneity: Worker age and sector

	Young workers (< 25 years)		Manufacturing		Construction		Services	
	Employ (1)	Wages (2)	Employ (3)	Wages (4)	Employ (5)	Wages (6)	Employ (7)	Wages (8)
$\Delta W_t^{min,real} \times$ **Wage level indicator:**								
$W_{t-1} = W_{t-1}^{min}$	-0.74	0.55	-0.71	0.70	-0.61	0.64	-0.46	0.46
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$W_{t-1} < W_t^{min}$	-0.38	0.09	-0.44	0.37	-0.51	0.35	-0.27	-0.09
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$W_t^{min} < W_{t-1} < Q_{.25}(W_{t-1})$	-0.22	-0.36	-0.54	0.23	-0.27	0.15	-0.15	-0.32
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$W_{t-1} \in Q_{.5}(W_{t-1})$	-0.27	-0.08	-0.28	0.12	-0.45	0.30	-0.26	-0.16
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$W_{t-1} \in Q_{.75}(W_{t-1})$	-0.24	-0.01	-0.12	-0.06	-0.33	-0.04	-0.14	-0.24
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.043)	(0.000)	(0.000)
No of observations	2,184,150	1,720,885	4,456,811	3,878,574	2,120,848	1,698,736	10,799,866	9,144,619

6.2 Matches

Match status and wages: Firm fixed effects

	Match	Δ logWages	Elasticity
Wage level indicator:			
$W_{t-1} = W_{t-1}^{min}$	-7.22	12.53	
	(0.000)	(0.000)	
$W_{t-1} < W_t^{min}$	-6.26	11.43	
	(0.000)	(0.000)	
$W_t^{min} < W_{t-1} < Q_{.25}(W_{t-1})$	-4.65	9.42	
	(0.000)	(0.000)	
$W_{t-1} \in Q_{.5}(W_{t-1})$	-2.52	7.50	
	(0.000)	(0.000)	
$W_{t-1} \in Q_{.75}(W_{t-1})$	-0.79	4.58	
	(0.000)	(0.000)	
$\mathbf{\Delta W_t^{min,real}} \times$ **Wage level indicator:**			
$\mathbf{W_{t-1} = W_{t-1}^{min}}$	**-0.74**	**0.63**	**-1.18**
	(0.000)	(0.000)	
$\mathbf{W_{t-1} < W_t^{min}}$	**-0.47**	**0.24**	**-1.98**
	(0.000)	(0.000)	
$W_t^{min} < W_{t-1} < Q_{.25}(W_{t-1})$	-0.27	0.00	–
	(0.000)	(0.891)	
$W_{t-1} \in Q_{.5}(W_{t-1})$	-0.30	0.00	–
	(0.000)	(0.675)	
$W_{t-1} \in Q_{.75}(W_{t-1})$	-0.09	-0.17	0.54
	(0.000)	(0.000)	
Number of observations	17,733,720	13,239,530	

Notes: p-values in parentheses.

1. **Match** : More stable for higher wage levels.

2. **Match** $\times$ **Min wage** : Low wages less stable. For each p.p. $\Uparrow$ minimum wage $\Rightarrow$ $\Downarrow$ 0.7 p.p. Pr[Match].

3. $\Delta \log$ **Wages** $\times$ **Min wage** : Only low wages gain; pattern of (conditional) wave effect.

Employment *versus* Matches

The impact of the minimum wage:

- Largest increases on **wages of surviving matches** (lower in total employment);

- The counterpart is that the **probability of ending a match is larger** than the probability of destroying an employment position.

This result is typical of a **labor demand** schedule: (larger) wage increases lead to (larger) demand decreases.

Questions?

Thank you.

Labor Economics
ISEG, Lisbon, 2016