

Paying for others' protection: Causal evidence on wages in a two-tier system

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Synopsis

Mandated employment protection **reduces wages** of protected workers (Lazear, 1990).

Two-tier system: In a segmented labor market there maybe a spillover to wages of (non-protected) fixed-term contracts (Boeri, 2010).

Widening the **protection gap** between contracts causes wages of new contracts to pay for the extra protection. But, a large burden of the **costs** falls on **fixed-term contracts**.

Strong **substitutability** of contract types.

Outline

- 1 Mandated protection in two-tier systems
- 2 Portuguese labor market institutions
- 3 The 2004 Labor Code reform: A quasi-experiment
- 4 Data
- 5 Quasi-experiment

1 Mandated protection in two-tier systems

Employment protection and wages: the theory

1. Lazear (1990) – Demand shift may cause wages to fall
2. Lindbeck & Snower (2001) – Bargaining model, insiders are shielded
3. Summers (1989) – Mandated benefits cause a supply shift, which may contain employment losses, but magnify wage losses

Segmentation and spillovers

The wedge of protection between **fixed-term contracts** and **open-ended contracts** generates **two-tier systems**.

Boeri (2010), Bentolila, Cahuc, Dolado & Le Barbanchon (2011), and Cahuc, Charlot, & Malherbet (2012)

Empirical analyses: For the U.S., Autor, Donohue III and Schwab (2006); for Italy, Leonardi and Pica (2010).

For Portugal, Centeno & Novo (2012) show that firms adjust turnover. But an important question remains, do they adjust workers' wages?

Differentiated impact of two-tier reforms on wages and flows

Increase in:	Employment protection for permanent jobs (1)	UI replacement rate (2)	Employment subsidies for entry jobs (3)
Job loss rate (from entry jobs)	+	0	+
Job loss rate (from continuing jobs)	-	+	0
Job finding rate	+	0	+
Premium on permanent contracts	+	+	+
Conversion temporary to permanent	-	+	-
Entry jobs as % of total employment	+	+	+

Source: Boeri (2010)

2 Portuguese labor market institutions

FTC introduced in **1976**, but revised several times since.

1. Offered **concurrently** with permanent contracts.
2. Can be used for **all levels** of qualifications and most tasks.
3. Could be renewed for **up to 3 years**; in 2004-09, **up to 6**.
4. **Severance payment**: 2 days/month if tenure $>$ 1 year; 3 days otherwise. In permanent contracts typically 2.5 days (1 month/year)
5. **Procedural costs**: largest difference; absent at end of FTC.

OECD's EPL Indicator:

Portugal has the strictest legislation on permanent contracts. But an average strictness on FTC. It creates a **large wedge**.

Quadros de Pessoal: The **share of FTC** increased from **20.8%** in 2002, to **27.9%** in 2008; +7.1 p.p.

3 The 2004 Labor Code reform: A quasi-experiment

The differences in severance payments for OEC and FTC are minor. The largest contribution to the gap: **procedural costs**, which are absent at the expiration of FTC, but not for OEC.

Firing a worker implies: **(i)** written procedures; **(ii)** witnesses interviews involving the works council and **(iii)**, if the worker is a union delegate, the union itself.

Altogether, the procedures extend the dismissal process typically **2 months**, involving legal counselors and administrative costs.

Often, to avoid the costs of long and uncertain judicial processes, firms reach **out-of-court agreements**, typically exceeding the amount legally required.

In 2004, a labor market reform increased the procedural costs for a subset of firms, generating a **quasi-experimental setting**.

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

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

4 Data

An employer-employee matched administrative source.

1. **Quadros de Pessoal**: Annual, 2002 – 2008

- a) Covers 'all' firms; widely used to study the Portuguese economy.
- b) Sample: Matches in firms with more than **10** workers and less than **50** workers.
- c) 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.

Quadros de Pessoal: Sample size, 2002-2008

Number of matches	1 405 800
Number of workers	1 302 865
Number of firms	56 680
Number of observations (matches \times year)	3 581 305
Open-ended contract	2 656 122
Fixed-term contract	925 183
Before	
Treatment	372 770
Control	513 638
After	
Treatment	1 128 155
Control	1 566 742

Notes: *Quadros de Pessoal*, match-level values 2002-2008. The "Before" period corresponds to 2002-2003 and the "After" period to 2004-2008. Each period, a treatment match is in a firm with 11 to 20 workers and a control match in a firm with 21 to 50 workers.

Large sample

- **3.5 million** match \times year pairs.
- 1.4m matches
- 57k firms

Quadros de Pessoal: Average 2002-2008

Variable (match level)	Mean	Std. Deviation
Fixed-term contracts (in %)	25.8	43.8
Base wage	657.4	356.1
Hourly base wage	4.0	2.3
Total wage	807.8	442.2
Hourly total wage	4.8	2.8
Age (in years)	37.4	10.9
Educational level, percentage of workers with:		
4 or less years	27.9	44.9
4-6 years	23.9	42.6
7-9 years	20.7	40.5
10-12 years	17.9	38.3
College	9.6	29.5
Females (in %)	41.6	49.3
Immigrants (in %)	4.0	19.5
Minimum wage (in %)	8.3	27.5
Tenure (in months)	84.1	89.5
Firm size (average number of workers)	25.6	11.2
Foreign ownership (in %)	3.5	18.3
Number of observations (matches × year)		3 581 305

Notes: *Quadros de Pessoal*, match-level values 2002-2008.

1. **More than a quarter** of a typical firm's workforce is on **FTC**.
2. Average wages: base **657 euros** and total **808 euros**.
3. Minimum wage earners: **8.3%**.
4. Tenure: **84 months**.

Two-tier data

- Total wages:
 - FTC €757; OEC €825
 - Low tenure (< 36 months) €760;
High tenure (≥ 36 months) €838
 - Treated firms (11-20 workers): €773
Control firms (21-50 workers): €833
Larger firms (51-100 workers): €893

- Tenure:
 - OEC share of low tenure (< 36 months): 25%
 - Large variance for high tenure (≥ 36 months): 94 months
More than $1/4$ has at least 15 years.

5 Quasi-experiment

Common trend

$$y_{it} = \theta_1 Treat_{it} + \theta_2 Time_t + \theta_3 Treat_{it}Time_t + X_{it}\Phi + \varepsilon_{it}$$

The firm characteristics included in matrix X_{it} are: (i) the logarithm of the number of workers as a proxy for firm size, (ii) the firm age (indicator variables: 1, 2, ..., 10, 11-15, 16-20, and more than 20 years), (iii) the sector of activity (at 2-digits), (iv) the region (the 23 Portuguese districts), and (v) an indicator of foreign ownership majority. **On the worker side**, we control for: (vi) gender, (vii) nationality, (viii) age, entering as a quadratic polynomial, and also for (ix) five levels of education (4 or less years; 6 years; 9 years; high school; and college degree). In terms of **match characteristics**, we control for: (x) white and blue collar positions, (xi) workers on a (regulated) minimum wage, with an indicator variable, and for (xii) tenure, entering as a quadratic polynomial.

ε_{it} – **Match (worker × firm) fixed-effects.**

Common trend

	Base wage		Total wage	
	Monthly	Hourly	Monthly	Hourly
Treat × Time	0.051 (0.302)	-0.009 (0.855)	-0.001 (0.987)	-0.067 (0.445)
Treat	0.112 (0.338)	0.181 (0.126)	0.332 (0.111)	0.436 (0.036)
Time	3.501 (0.000)	3.481 (0.000)	4.096 (0.000)	4.021 (0.000)
No of observations	886408			

Notes: **Match (worker-firm) fixed effects** estimates. Values in percentage points with p -values in parentheses. The estimation window corresponds to the “before” period, 2002 and 2003. Treatment units identify workers in firm with 11 to 20 workers and a control units workers in firm with 21 to 50 workers. The estimates are computed for all workers. See paper for a list of control variables included in the regressions.

Test if treatment and control have a common trend in **log-wages** in the before period:

- A **common trend** is not rejected

The parallel paths of treatment and control groups is key for the identification process

Difference-in-differences estimator

$$\log(y_{it}) = \psi_1 Treat_{it} + \psi_2 After_{it} + \psi_3 After_{it} \times Treat_{it} + X_{it}\beta + \varepsilon_{it}$$

Quasi-experimental evidence: Impact on wages

	Base wage		Total wage	
	Monthly	Hourly	Monthly	Hourly
All contracts	-0.289 (0.000)	-0.317 (0.000)	-0.272 (0.000)	-0.308 (0.000)
	3581305			

Notes: **Match (worker-firm) fixed effects** estimates of the After \times Treat coefficient; values in percentage points with *p*-values in parentheses. The “before” period corresponds to 2002 and 2003; the “after” period to 2004–2008. For each period, treatment units identify workers in firm with 11 to 20 workers and a control units workers in firm with 21 to 50 workers.

After the reform firms with 11–20 workers have a **more stringent** OEC fair dismissals law, causing:

1. a **reduction** in the level of all wage measures of around 0.3 p.p..
2. with a **larger** wage fall for hourly measures.

Impact on wages by contract type

	Base wage		Total wage	
	Monthly	Hourly	Monthly	Hourly
Open-ended contracts	-0.227 (0.000)	-0.226 (0.000)	-0.213 (0.000)	-0.227 (0.000)
	2656122			
Fixed-term contracts	-0.644 (0.000)	-0.735 (0.000)	-0.508 (0.004)	-0.537 (0.002)
	925183			

Notes: Match (worker-firm) fixed effects estimates of the After \times Treat coefficient; values in percentage points with p -values in parentheses.

Fixed-term contracts suffer a larger **wage drop** ...

1. a **reduction** of 0.5 p.p. to 0.7 p.p. for fixed-term contracts.
2. **smaller** reduction for open-ended contracts, around 0.2 p.p..

Open-ended: New contracts vs. Older contracts

	Base wage		Total wage	
	Monthly	Hourly	Monthly	Hourly
Open-ended contracts				
Older ($\geq 36m$)	-0.094 (0.015)	-0.103 (0.009)	-0.061 (0.343)	-0.089 (0.167)
		1990753		
Newer ($< 36m$)	-0.623 (0.000)	-0.707 (0.000)	-0.843 (0.000)	-0.885 (0.000)
		665369		

New contracts, with less than 36 months of tenure, have large wage falls . . .

1. Larger than for FTC (previous table).
2. **NO** reduction for more tenured OEC (≥ 36 months).

Do all workers pay the same?

Age and gender

Age		Gender		Sector			Skill	
<35 (A)	≥35 (B)	Male (C)	Female (D)	Manuf (E)	Constr (F)	Services (G)	White (H)	Blue (I)
Older open-ended contracts								
0.095 (0.436)	-0.032 (0.685)	-0.272 (0.002)	0.157 (0.079)	-0.119 (0.229)	-0.711 (0.002)	-0.163 (0.077)	-0.498 (0.001)	0.116 (0.105)
675811	1314942	1149562	841191	738038	192252	1060463	423839	1566914
New open-ended contracts								
-0.933 (0.001)	-0.653 (0.037)	-1.194 (0.000)	-0.310 (0.287)	-0.784 (0.013)	-2.149 (0.000)	-0.769 (0.012)	-0.660 (0.174)	-0.852 (0.000)
383644	281725	407159	258210	202480	99242	363647	126597	538772
Fixed-term contracts								
-0.382 (0.108)	-0.296 (0.269)	-0.966 (0.000)	0.078 (0.741)	0.283 (0.396)	-1.581 (0.001)	-0.716 (0.002)	-0.528 (0.264)	-0.289 (0.129)
545352	379831	534680	390503	198343	117447	609393	143517	781666

Notes: Match (worker-firm) fixed effects estimates of the average treatment effect on the treated (After × Treat variable). Values in percentage points with *p*-values in parentheses.

- Younger workers**, with lower bargaining power, have larger wage drops. Larger for new OEC.
- Male workers**, with more inelastic labor supply, lose more. This is true for all types of contracts and tenure.

Sectors

Age		Gender		Sector			Skill	
< 35 (A)	≥ 35 (B)	Male (C)	Female (D)	Manuf (E)	Constr (F)	Services (G)	White (H)	Blue (I)
Older open-ended contracts								
0.095 (0.436)	-0.032 (0.685)	-0.272 (0.002)	0.157 (0.079)	-0.119 (0.229)	-0.711 (0.002)	-0.163 (0.077)	-0.498 (0.001)	0.116 (0.105)
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Notes: Match (worker-firm) fixed effects estimates of the average treatment effect on the treated (After × Treat variable). Values in percentage points with *p*-values in parentheses.

1. **Construction**, and to a less extent **Services**, where turnover is higher and specific human capital less important, have larger losses.
2. In **Manufacturing**, only new OEC have lower wages. Note that wages of FTC are not affected. FTC in this sector are not very prevalent.

Skills

Age		Gender		Sector			Skill	
< 35	≥ 35	Male	Female	Manuf	Constr	Services	White	Blue
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
Older open-ended contracts								
0.095	-0.032	-0.272	0.157	-0.119	-0.711	-0.163	-0.498	0.116
(0.436)	(0.685)	(0.002)	(0.079)	(0.229)	(0.002)	(0.077)	(0.001)	(0.105)
675811	1314942	1149562	841191	738038	192252	1060463	423839	1566914
New open-ended contracts								
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(0.001)	(0.037)	(0.000)	(0.287)	(0.013)	(0.000)	(0.012)	(0.174)	(0.000)
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Fixed-term contracts								
-0.382	-0.296	-0.966	0.078	0.283	-1.581	-0.716	-0.528	-0.289
(0.108)	(0.269)	(0.000)	(0.741)	(0.396)	(0.001)	(0.002)	(0.264)	(0.129)
545352	379831	534680	390503	198343	117447	609393	143517	781666

Notes: Match (worker-firm) fixed effects estimates of the average treatment effect on the treated (After × Treat variable). Values in percentage points with *p*-values in parentheses.

1. **Blue-collar**s with OEC have a 0.9 p.p. reduction in wages. It can be rationalized with their lower bargaining power.
2. **White-collar**s OEC with high tenure also lose 0.4 p.p., a quite unique result for tenure OEC. It can be due to higher expected layoff costs; these workers are more likely to litigate in court.

Threats to the identification

As in all quasi-experiments, we can think of **drawbacks** of our identification strategy. Two leading examples are:

1. **Other reforms occurring at the same time.** The Labor Code reform was not restricted to dismissal costs, but other reforms applied equally to treatment and control firms. Example: **extension of FTC.**
2. **Selection issues.** We perform several robustness checks and a falsification exercise.

Worker robustness: Worker fixed-effects

	Workers	Falsification
Worker	Always	pT: [21,30];
FE	same status	pC: [31,50]
(E)	(F)	(G)
Older open-ended contracts		
-0.008	-0.179	0.074
(0.898)	(0.014)	(0.372)
1990753	1535549	1156160
New open-ended contracts		
-0.748	-0.682	-0.284
(0.000)	(0.011)	(0.324)
665369	500132	338382
Fixed-term contracts		
-0.554	-0.613	0.250
(0.002)	(0.005)	(0.250)
925183	720490	545451

We estimate the base model controlling for **worker fixed effects**, instead of match fixed effects.

The results are robust. . .

1. wage losses only for new OEC and FTC, **-.75 and -.55p.p.**
2. tenured OEC are shielded.

Worker robustness: Always same treatment status

Worker	Workers Always FE (E)	same status (F)	Falsification pT: [21,30]; pC: [31,50] (G)
Older open-ended contracts			
-0.008 (0.898) 1990753	-0.179 (0.014) 1535549	0.074 (0.372) 1156160	
New open-ended contracts			
-0.748 (0.000) 665369	-0.682 (0.011) 500132	-0.284 (0.324) 338382	
Fixed-term contracts			
-0.554 (0.002) 925183	-0.613 (0.005) 720490	0.250 (0.250) 545451	

Consider only workers that **never changed treatment status** throughout entire sample period.

The results are robust. . .

1. **wage penalties, -0.7 to -0.6**, for new OEC and FTC.
2. But now we have a wage penalty for **more tenured OEC workers**. Maybe these workers are less mobile and the results with movers capture some selection.

Firm robustness: Firm fixed-effects

Firm Fixed-E (A)	Firms			T: [13,17]; C: [26,50] (D)
	Status set before (B)	Always same status (C)		
Older open-ended contracts				
-0.482 (0.000) 1990753	0.084 (0.212) 1581376	-0.210 (0.004) 1550470	0.043 (0.588) 1719743	
New open-ended contracts				
-0.745 (0.000) 665369	-0.936 (0.000) 414408	-0.533 (0.041) 480867	-1.055 (0.000) 554046	
Fixed-term contracts				
-0.763 (0.000) 925183	-0.417 (0.031) 581116	-0.502 (0.020) 657333	-0.558 (0.010) 806001	

We estimate the model controlling for **firm fixed effects**, instead of match fixed effects.

1. significant wage losses for **all contracts** and tenure duration.
2. the results for **more tenured OEC** show that the selection behavior of workers (not captured by firm fixed-effects) is important.

Firm robustness: Treatment status set in “before” period

Firm Fixed-E (A)	Firms			T: [13,17]; C: [26,50] (D)
	Status set before (B)	Always same status (C)		
Older open-ended contracts				
-0.482 (0.000) 1990753	0.084 (0.212) 1581376	-0.210 (0.004) 1550470	0.043 (0.588) 1719743	
New open-ended contracts				
-0.745 (0.000) 665369	-0.936 (0.000) 414408	-0.533 (0.041) 480867	-1.055 (0.000) 554046	
Fixed-term contracts				
-0.763 (0.000) 925183	-0.417 (0.031) 581116	-0.502 (0.020) 657333	-0.558 (0.010) 806001	

Treatment status defined in the **before period** and **kept the same** each year. The results are robust. . .

- **same impact** as the base model.

Firm robustness: Always same treatment status

Firm Fixed-E (A)	Firms			T: [13,17]; C: [26,50] (D)
	Status set before (B)	Always same status (C)		
Older open-ended contracts				
-0.482 (0.000) 1990753	0.084 (0.212) 1581376	-0.210 (0.004) 1550470	0.043 (0.588) 1719743	
New open-ended contracts				
-0.745 (0.000) 665369	-0.936 (0.000) 414408	-0.533 (0.041) 480867	-1.055 (0.000) 554046	
Fixed-term contracts				
-0.763 (0.000) 925183	-0.417 (0.031) 581116	-0.502 (0.020) 657333	-0.558 (0.010) 806001	

Keep only firms that **never changed treatment status** (always “small” or always “big”).

The results confirm the ones obtained for the workers that do not change status, with a **reduction** in wages for all groups considered.

As in the case of workers with the same treatment status, there is a significant reduction in the wages of older OEC, with similar magnitudes, **-0.21 vs -0.18**.

Firm robustness: Exclude firms around thresholds

Firm Fixed-E (A)	Firms			T: [13,17]; C: [26,50] (D)
	Status set before (B)	Always same status (C)		
Older open-ended contracts				
-0.482 (0.000)	0.084 (0.212)	-0.210 (0.004)	0.043 (0.588)	
1990753	1581376	1550470	1719743	
New open-ended contracts				
-0.745 (0.000)	-0.936 (0.000)	-0.533 (0.041)	-1.055 (0.000)	
665369	414408	480867	554046	
Fixed-term contracts				
-0.763 (0.000)	-0.417 (0.031)	-0.502 (0.020)	-0.558 (0.010)	
925183	581116	657333	806001	

Drop, in the before period, with a 20-worker threshold, **firms with 18-25 workers**.

Drop, in the after period, with a 10-worker threshold, **firms with 11 or 12**.

The results again show no sign of selection.

Falsification

	Workers	Falsification
Worker	Always	pT: [21,30];
FE	same status	pC: [31,50]
(E)	(F)	(G)
Older open-ended contracts		
-0.008	-0.179	0.074
(0.898)	(0.014)	(0.372)
1990753	1535549	1156160
New open-ended contracts		
-0.748	-0.682	-0.284
(0.000)	(0.011)	(0.324)
665369	500132	338382
Fixed-term contracts		
-0.554	-0.613	0.250
(0.002)	(0.005)	(0.250)
925183	720490	545451

The falsification exercise consists of:

1. **pseudo-treatment** matches: in firms sized [21, 30]
2. **control** matches: in firms sized [31,50]; part of previous control group.

As expected, the estimated treatment effect is **non-significant**.

Conclusion

1. The Portuguese labor market **fit stylized facts** of segmented economies. Despite Labor Code rigidity, there is an **intense reallocation** of workers.
2. Theoretically, an increase in protection of OEC should reduce wages, specially of new contracts. FTC share a larger burden of the adjustment, even without benefiting of the extra protection. **Our results adhere to this theoretical framework.**
3. Wages adjust downwards to more stringent mandated employment protection. The causal evidence gathered shows that workers pay the extra protection in the form of lower wages.

4. **Stringent OEC** legislation led to **(i)** large wage drop of new OEC; **(ii)** significant fall in wages of FTC; **(iii)** no impact on wages of more tenured (incumbents) OEC.
5. Clear signs of a high **substitutability** of contract types. A (non)fair share of the burden of adjustment falls upon workers on FTC.

Danke.