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labour earnings”**

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NIPE WP 07/ 2011

NÚCLEO DE INVESTIGAÇÃO EM POLÍTICAS ECONÓMICAS  
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# The effect of private versus public ownership on labour earnings\*

Paulo Bastos<sup>†</sup>      Natália P. Monteiro<sup>‡</sup>      Odd Rune Straume<sup>§</sup>

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## Abstract

We examine the impact of privatisation on wage formation in unionised labour markets. Using longitudinal worker-firm data for Portugal spanning the period 1991-2007, we find that privatisation leads to higher wages, and show that this effect is driven by the fact that privatised firms tend to pay larger mark-ups on the union wage floor. These findings accord with a theoretical model in which actual paid wages are determined via sector-wide collective bargaining and firm-specific "fair-wage" policies, and where private ownership affects wage-setting incentives in both of these stages.

*Keywords:* Privatisation, wage formation, trade unions.

*JEL Classification:* D21; J31; J51; L13

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# 1 Introduction

The late 20th century has witnessed the emergence of a broad consensus among policy makers that private good provision is optimally realised through privately-owned competitive firms. As a result, comprehensive privatisation programmes have been implemented across the globe, most widely in Europe and Latin America, but also pervasively in a number of countries in Africa and Asia (World Bank, 2005). When it comes to the evaluation of the economic and social impacts of these reforms, no such consensus has emerged (Claessens and Djankov, 2002; Chong and López-de-Silanes, 2005; Rodrik, 2006). An important issue in this debate is whether and how workers at privatised firms are impacted by the shift in corporate ownership (Nelson et al., 1995; López-de-Silanes et al., 1997; Fernandez and Smith, 2005). Does privatisation give capital the upper hand at the expense of labour income? What is the relative importance of institutional factors, such as collective bargaining, versus market forces in shaping the wage effects of privatisation?

This paper addresses these questions theoretically and empirically. The theoretical model studies the effect of private versus public ownership on wage formation in a setting in which labour earnings are determined in a two-tier system composed of sector-wide collective bargaining and firm-specific "fair wage" policies. Worker effort is endogenous and influenced by two factors: the degree of job security and what workers consider to be the "fair wage", the latter of which depends on the employer's ability to pay. Private firms are profit maximisers, while public firms have a broader objective function and also take consumer welfare into account. In addition, the firm's ownership regime affects the degree of job security, as jobs at state-owned enterprises tend to be more secure than in private ones. A rent-maximising trade union sets a binding wage floor, anticipating its effect on the actually paid "fair wages" and the employment level subsequently set by the firms.

Privatisation impacts on wage setting incentives in each of these stages. The effect on the union wage floor is not clear-cut. Greater profit orientation tends to increase the trade-off between wages and employment faced by the union, thereby depressing wages, while higher worker effort stemming from less job security pulls in the opposite direction. In contrast, privatisation unambiguously increases the mark-up set by the firm on the union wage floor (the wage cushion), as greater profit orientation and increased worker effort mean that private firms have more rents to share with their workers. Irrespective of the response of the wage floor, the effect on the wage cushion always dominates, implying that going private leads to an unambiguous increase in actual paid wages.

We confront the key predictions of our theory against worker-firm panel data gathering administrative records on the population of workers, firms and collective bargaining agreements of the corporate sector in Portugal over the period 1991-2007. Two features of this dataset make it especially well suited for our purposes. First, it makes it possible to distinguish, at the worker-

level, between the wage floor set via collective bargaining and the wage actually paid. Second, the firm-level records contain precise information on the share of capital that is state-owned in each year. Employing a differences-in-differences strategy, we are therefore able to estimate the effect of private ownership on the wage set in each stage – and hence on the actual paid wage.

The empirical results provide support to the key predictions of our theory: private ownership increases actual paid wages, and this effect is driven by the fact that privatised firms tend to pay larger mark-ups on the union wage floor. These effects are quantitatively important: our preferred specifications suggest that privatisation increases actual paid wages by about 5 to 7 percent, on average. We conduct a number of checks to verify the robustness of this finding. First, we tackle the issues of endogeneity due to either firm or worker selection bias. Potential firm selection bias is addressed by including a lead dummy variable for whether an ownership change occurred in the subsequent year, in order to test for reverse causality. Potential worker selection bias is addressed by estimating spell fixed-effects models which allow us to account for unobserved heterogeneity of both workers and firms. Second, we account for the bounded nature of our dependent variable by estimating Tobit models. Third, we consider alternative specifications of the different wage measures. Fourth, we consider alternative definitions of private ownership. In each of these cases, the main results of the basic model are supported. In a final step, we examine whether and how the effects of privatisation are heterogeneous across skill categories, and find robust evidence that the positive wage impacts tend to be more pronounced among highly-educated workers.

We contribute to several strands of existing research. Our paper relates closely to the literature on the labour market effects of privatisation, including early work by Haskel and Szymanski (1993), Bhaskar and Kahn (1995) and La Porta and López-de-Silanes (1999).<sup>1</sup> Taking stock of this literature, Brown et al. (2010) emphasise that most studies draw on limited sample sizes, explore short time spans and face difficulties in defining a control group, which hampers the generality and interpretation of the (often mixed) empirical results. Using comprehensive firm-level panel data from Hungary, Romania, Russia and Ukraine, they then provide evidence that privatisation led to moderately lower wages.<sup>2</sup> We add to this literature by drawing on linked employer-employee panel data which makes it possible to: i) account for changes in the composition of the workforce; ii) test for the heterogeneity of effects across skill categories, and iii) distinguish, at the individual level, between the union wage floor and the wage actually paid. In addition, we tie the estimation to a theoretical model tailored to the institutional setting under analysis, thereby highlighting several novel mechanisms by which privatisation potentially impacts on wage formation.

In being able to empirically distinguish, at the individual level, between the union wage floor

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<sup>1</sup>See also Kikeri (1998), Birdsall and Nellis (2003) and Chong and López-de-Silanes (2005).

<sup>2</sup>See also Brown et al. (2006) for a related analysis of the effects of privatisation on firm efficiency in these countries.

and the actually paid wage, we build on important work by Cardoso and Portugal (2005), who use the same dataset employed in our paper, but do not examine the impacts of privatisation.<sup>3</sup> More generally, our paper is related to the theoretical and empirical literature on two-tiered wage setting systems, including work by Holden (1988, 1998), Ordine (1995), Muysken and van Veen (1996) and Hibbs and Locking (1996).<sup>4</sup> We are not aware of previous research, either theoretical or empirical, focusing on the effect of privatisation on each stage of the wage determination process.

The plan for the remainder of the paper is as follows. Section 2 develops a theoretical model linking private and public ownership to wage determination, and derives testable predictions for the empirical analysis. Section 3 describes the data employed, before Section 4 provides brief background information on the privatisation process in Portugal. Section 5 discusses the empirical strategy and presents the econometric results. Section 6 concludes the paper.

## 2 Theoretical model

Consider an industry with  $n$  identical firms producing a homogeneous good. The demand for the good is given by the inverse demand function

$$p = 1 - \sum_{i=1}^n q_i, \tag{1}$$

where  $q_i$  is the quantity supplied by Firm  $i$ . The good is produced using only labour in a constant-return-to-scale technology. More specifically, the production function is given by

$$q_i = e_i L_i, \tag{2}$$

where  $L_i$  measures the number of labour units used and  $e_i$  is effort per unit of labour. We endogenise worker effort by combining the *efficiency wage* and *fair wage* hypotheses. More specifically, effort is assumed to be dependent on two factors: the degree of job security and what workers consider to be a "fair wage". Applying a modified version of the fair wage hypothesis of Akerlof and Yellen (1990), we assume that worker effort in Firm  $i$  is given by

$$e_i = \theta_i^{-1} \min \left( \frac{w_i}{w_i^{fair}}, 1 \right), \tag{3}$$

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<sup>3</sup>See also Bastos et al. (2009) for a related analysis.

<sup>4</sup>Two-tiered wage setting systems are prevalent in many European countries (Flanagan, 1999; OECD, 2004) and are also important in Argentina, Brazil and Uruguay (O'Connell, 1999; Arbache, 2001).

where  $w_i$  is the actual paid wage by Firm  $i$  and  $w_i^{fair}$  is the wage rate considered to be "fair" by the workers of Firm  $i$ . The parameter  $\theta \leq 1$  measures the degree of job security for workers in Firm  $i$ . By a standard efficiency wage argument, a higher degree of job security will, all else equal, induce a lower worker effort. Since the *effective wage rate* is constant ( $\frac{w_i}{e_i} = \theta w_i^{fair}$ ) for  $w_i < w_i^{fair}$ , Firm  $i$  has no incentive to set a wage below what the workers consider to be fair. Consequently, Firm  $i$  will set  $w_i = w_i^{fair}$  and worker effort is given by  $e_i = \theta_i^{-1}$ .

We assume that the fair wage is determined by an internal reference perspective and depends on the firm's ability to pay. More specifically, as in Bastos et al. (2009), we assume that the fair wage in Firm  $i$  is given by

$$w_i^{fair} = \beta \bar{w} + (1 - \beta) \frac{pq_i}{L_i}, \quad (4)$$

where  $\bar{w}$  is the contracted wage floor which constitutes the lowest wage the firm is allowed to pay. The highest possible wage the firm can pay is equal to  $p q_i / L_i (= e_i p)$ . In this case, all the firm's revenues are distributed to workers as wage payments. We assume that the fair wage is a linear combination of these two extremes, according to a weight  $\beta \in (0, 1)$ .<sup>5,6</sup>

The wage floor  $\bar{w}$  is set by an industry-wide trade union representing all workers in the industry. We assume rent-maximising union preferences, implying that the objective function of the union is given by

$$U = \sum_{i=1}^n (w_i - r) L_i, \quad (5)$$

where  $r < 1$  is the reservation wage, reflecting, for example, unemployment benefits or simply the disutility of working.

As regards the firms, we allow for preferences that deviate from profit maximisation by assuming that the objective function of Firm  $i$  is given by

$$\Omega_i = \pi_i + \alpha S, \quad (6)$$

where

$$\pi_i = \left( p - \frac{w_i}{e_i} \right) q_i = \beta \left( p - \frac{\bar{w}}{e_i} \right) q_i \quad (7)$$

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<sup>5</sup>Our definition of the fair wage is similar in spirit to the one used by Danthine and Kurmann (2006). Akerlof and Yellen (1990) use a somewhat different internal perspective by assuming that workers of different skills compare their wages to other co-workers within the same firm.

<sup>6</sup>Our definition of the fair wage is also consistent with an alternative assumption about local wage setting, since the wage given by (4) is the wage that would result from efficient Nash bargaining between the firm and a local rent-maximising union, where  $\beta$  is the relative bargaining power of the firm.

is the profit of Firm  $i$  while

$$S = \frac{1}{2} \left( \sum_{i=1}^n q_i \right)^2 \quad (8)$$

is consumers' surplus. The weight attached to consumer welfare by Firm  $i$  is given by the parameter  $\alpha \in \left[0, \frac{\beta}{n}\right)$ . The upper bound on  $\alpha$  ensures an interior solution with non-negative equilibrium profits in the game considered below.

We assume that the mode of competition is Cournot and consider the following sequence of events:

1. The trade union sets a wage  $\bar{w}$  that constitutes a contracted wage floor applying to all firms in the industry.
2. Each firm chooses how many labour units to employ, taking into account the wage rate needed to elicit the desired worker effort.
3. Production takes place and payoffs are realised.

We solve the game by backwards induction, looking for a unique subgame perfect Nash equilibrium in pure strategies.

## 2.1 Equilibrium wages

For a given wage floor,  $\bar{w}$ , the optimally chosen level of employment by Firm  $i$  is given by the first-order condition

$$\frac{\partial \Omega_i}{\partial L_i} = \beta \left( e_i \left( 1 - \sum_{i=1}^n e_i L_i \right) - e_i^2 L_i - \bar{w} \right) + \alpha e_i^2 \sum_{i=1}^n L_i = 0. \quad (9)$$

Applying symmetry,  $L_i = L$  and  $e_i = e$  for  $i = 1, \dots, n$ , the equilibrium level of employment as a function of the contracted wage floor is

$$L(\bar{w}) = \frac{\beta(e - \bar{w})}{e^2(\beta(n+1) - \alpha n)}. \quad (10)$$

The wage paid by each firm is then given by

$$w(\bar{w}) = \beta \bar{w} + (1 - \beta) p e = \frac{\beta(n(1 - \alpha) + \beta)\bar{w} + e(1 - \beta)(\beta - \alpha n)}{\beta(n+1) - \alpha n}. \quad (11)$$

Since all firms choose the same level of employment and actual wages, the objective function of



the central trade union reduces to

$$U(\bar{w}) = (w(\bar{w}) - r)nL(\bar{w}). \quad (12)$$

The first-order condition for an optimally chosen wage floor is

$$\frac{\partial U}{\partial \bar{w}} = n \left( \frac{\partial w}{\partial \bar{w}} L + (w - r) \frac{\partial L}{\partial \bar{w}} \right) = 0, \quad (13)$$

or

$$\frac{\partial w}{\partial \bar{w}} \frac{\bar{w}}{w - r} = - \frac{\partial L}{\partial \bar{w}} \frac{\bar{w}}{L}. \quad (14)$$

Thus, the optimal wage floor is set at a level where the elasticity of the actual wage premium  $(w - r)$  with respect to  $\bar{w}$  is equal to the elasticity of labour demand with respect to  $\bar{w}$ . A higher wage floor increases the fair wage and thereby the actual wage paid by the firms. However, this comes at the cost of a lower level of employment. The optimal wage floor balances these two considerations and, using (10)-(11), is given by

$$\bar{w}^* = \frac{(\beta - n\alpha)(r + e(2\beta - 1)) + \beta n(r + e)}{2\beta(n(1 - \alpha) + \beta)}. \quad (15)$$

Setting  $\bar{w} = \bar{w}^*$  in (11) yields the actual wage paid in equilibrium:

$$w^* = \frac{1}{2}(r + e). \quad (16)$$

The difference between the actual paid wage and the wage floor constitutes the wage cushion:  $\eta^* := w^* - \bar{w}^*$ .

## 2.2 Private versus public ownership

Let us now see how private versus public ownership would affect the equilibrium wages derived above. As in Monteiro et al. (2010), we assume that public firms differ from their private counterparts along two different dimensions: profit orientation and job security for workers. While private firms are profit maximisers ( $\alpha = 0$ ) we assume that public firms have a broader objective and also take consumer utility into account ( $\alpha > 0$ ). Furthermore, we assume maximum job security in public firms ( $\theta = 1$ ) while workers in private firms have less secure jobs ( $\theta < 1$ ).<sup>7</sup> Thus, private

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<sup>7</sup>At least in most European countries (including Portugal), an important difference between public and private firms is that workers in public firms are subject to specific employment regulations which, due to more restrictive dismissal rules, allow them to enjoy a higher degree of job security (see, e.g., Friebel and Magnac, 2007; OECD, 2008).

firms are characterised by  $\alpha = 0$  and  $e > 1$ , while public firms are characterised by  $\alpha > 0$  and  $e = 1$ . When assessing the effect of private versus public ownership on equilibrium wages, we maintain the symmetric market structure (for tractability reasons) and compare the equilibria where all firms in the industry are either public or private.

Applying the above assumptions, in an industry consisting of *private* firms, the equilibrium wage floor is given by

$$\bar{w}_{priv}^* = \frac{r(n+1) + e(n-1 + 2\beta)}{2(n+\beta)}, \quad (17)$$

while the actual paid wage is

$$w_{priv}^* = \frac{1}{2}(r+e), \quad (18)$$

implying that the wage cushion is

$$\eta_{priv}^* = \frac{(1-\beta)(e-r)}{2(n+\beta)}. \quad (19)$$

On the other hand, in an industry consisting of only *public* firms, equilibrium wages are given by

$$\bar{w}_{pub}^* = \frac{(\beta - n\alpha)(r + (2\beta - 1)) + \beta nr}{2\beta(n(1-\alpha) + \beta)}, \quad (20)$$

$$w_{pub}^* = \frac{1}{2}(r+1), \quad (21)$$

$$\eta_{pub}^* = \frac{(1-\beta)(1-r)(\beta - n\alpha)}{2\beta(n(1-\alpha) + \beta)}. \quad (22)$$

A comparison of equilibrium wages in the two different scenarios reveals the following results:

**Proposition 1** *Going from public to private firm ownership in industries with two-tier wage setting leads to*

- (i) *a lower (higher) wage floor if the reduction in job security is small (high) relative to the increase in profit orientation,*
- (ii) *a higher actual paid wage,*
- (iii) *a higher wage cushion.*

**Proof.** From (17)-(22) we have

$$\bar{w}_{priv}^* - \bar{w}_{pub}^* = \frac{(e-1)((n+\beta)(n-1+2\beta) + n\alpha(1-2\beta)) - \frac{\alpha}{\beta}n^2(1-r + \beta(r+e-2))}{2(n+\beta)(n(1-\alpha) + \beta)}, \quad (23)$$

$$w_{priv}^* - w_{pub}^* = \frac{1}{2}(e - 1) > 0, \quad (24)$$

$$\eta_{priv}^* - \eta_{pub}^* = (1 - \beta) \frac{(e - 1)(n(1 - \alpha) + \beta) + \frac{\alpha}{\beta} n^2 (1 - r)}{2(n + \beta)(n(1 - \alpha) + \beta)} > 0. \quad (25)$$

The signs of (24) and (25) are unambiguous. The sign of (23) is determined the sign of the numerator and it is easy to see that it is negative if  $e$  is sufficiently close to 1, while it is positive if  $\alpha$  is sufficiently close to 0. ■

The ambiguous effect of private ownership on the equilibrium wage floor is due to two counter-acting forces. On the one hand, increased profit orientation pulls in the direction of a lower wage floor. Since more profit oriented firms operate with a lower level of output (and thus employment), the drop in employment (and thus the increase in revenue per worker) due to a higher wage floor is smaller.<sup>8</sup> This means that more profit-oriented firm objectives reduce the elasticity of the actual wage premium ( $w - r$ ) with respect to the wage floor.<sup>9</sup> In other words, an increase in the wage floor is to a lesser degree translated into higher actual wages. As follows from (14), the optimal response from the central trade union is therefore to reduce the wage floor. On the other hand, the higher worker effort associated with less job security pulls in the opposite direction. Increased labour productivity reduces the elasticity of labour demand with respect to the wage floor.<sup>10</sup> This means that the loss of employment due to a marginal increase in the wage floor becomes smaller. All else equal, union utility is therefore maximised at a higher level of  $\bar{w}$ . The relative strength of these two effect determines whether more private ownership leads to a lower or higher wage floor in equilibrium.

In contrast to the ambiguity of the wage floor effect, private ownership unambiguously increases the equilibrium wage cushion. Here, the two aforementioned effects pull in the same direction. More profit oriented firm objectives imply that profits, and thus revenues per worker, are higher in equilibrium. Increased labour productivity through higher worker effort has the same effect. Since

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<sup>8</sup>From (10) we have

$$\frac{\partial L}{\partial \bar{w}} = -\frac{\beta}{(\beta(1+n) - n\alpha)e^2} < 0.$$

The absolute value of this expression is increasing in  $\alpha$ .

<sup>9</sup>From (11) we have

$$\frac{\partial w}{\partial \bar{w}} \frac{\bar{w}}{w - r} = \frac{(n(1 - \alpha) + \beta)\beta\bar{w}}{(\beta - n\alpha)(e - r - \beta(e - \bar{w})) + \beta n(\bar{w} - r)},$$

which is increasing in  $\alpha$ .

<sup>10</sup>From (10) we have

$$-\frac{\partial L}{\partial \bar{w}} \frac{\bar{w}}{L} = \frac{\bar{w}}{e - \bar{w}},$$

which is decreasing in  $e$ .

private firms are more able to pay high wages (due to higher revenues per worker), the wage level that workers perceive to be fair is correspondingly higher under private ownership. This translates into a higher equilibrium wage cushion in industries with private firm ownership.

The effect of private ownership on the actual paid wage is the sum of the effects on the wage floor and the wage cushion. From (16) we see that the actual wage does not depend on  $\alpha$  in equilibrium. This means that the effects of the degree of profit orientation on the wage floor and the wage cushion exactly cancel each other out. However, since the effect of less job security increases both the wage floor and the wage cushion, the actual wage paid to workers is correspondingly higher in private firms.

### 3 Data

Our empirical analysis draws on data from *Quadros de Pessoal* for the years 1991 to 2007. This dataset is an administrative census that gathers information on firms, workers and collective bargaining agreements for the corporate sector in Portugal. It is collected yearly by the Ministry of Employment and participation is compulsory for every firm with wage earners.

Each firm is required to provide information about its attributes and those of each employee. The firm records include yearly information on number of employees, industry code, geographical location, and percentage of capital that is owned by the state and by foreign investors. Among the set of worker attributes are monthly wages (base wage and other components of pay), gender, schooling, date of starting, occupation and hours worked. Importantly for our purposes, the worker data additionally contain unique identifiers for the collective bargaining agreement that covers the worker, as well as for the corresponding professional category for bargaining purposes. The first digit of the collective agreement identifier indicates the type of contract that covers the worker (sectoral, multi-firm, firm, mandatory regime). The employee records may also be linked to those of the corresponding employer in each year.<sup>11</sup>

The information in the *Quadros de Pessoal* dataset is recognised for its high reliability. In fact, these same administrative records are used by the Ministry of Employment for checking the firm's compliance with labour law. In addition, these records must be made available to every worker in a public place of the establishment, which reduces the likelihood of misreporting.

A further important feature of these data is that they make it possible to distinguish, at the worker-level, between the union wage floor and the actually paid wage. By comparing the wage information available in *Quadros de Pessoal* with information on contractual wages for each worker category published in collective agreements, Cardoso and Portugal (2005) show that the mode of the

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<sup>11</sup>Worker data for 2001 were not collected by the Ministry of Employment and hence this year is excluded from the analysis.

base wage distribution for each professional category within each collective agreement corresponds with remarkable accuracy to the wage that is set via collective bargaining. We follow the same strategy to compute the union wage floor for worker  $i$  in year  $t$ ,  $\bar{w}_{it}$ . The actual paid wage,  $w_{it}$ , is then the overall monthly earnings actually received by the worker in year  $t$ , including the base wage, tenure-related and other regularly paid components.

Table 1: Descriptive statistics, Regressions data, 1991-2007

	Mean	SD	Min	Max
Wage floor (log of wage floor in Euros)	6.34	0.38	4.89	9.93
Actual wage (log of actual wage in Euros)	6.62	0.51	5.88	11.88
Base wage (log of base wage in Euros)	6.48	0.48	4.90	11.76
Male	0.61	0.49	0	1
Schooling	7.06	3.71	0	16
Age	37.47	10.89	16	65
Age squared	1522	864	256	4225
Tenure	8.57	8.80	0	63
Tenure less than 1 year	0.12	0.32	0	1
Skill				
Level 1	0.14	0.35	0	1
Level 2	0.70	0.46	0	1
Level 3	0.10	0.30	0	1
Level 4	0.06	0.24	0	1
Firm size (log)	4.63	2.24	0	10.30
Wage agreement				
Multifirm	0.05	0.22	0	1
Sectoral	0.83	0.38	0	1
Mandatory	0.04	0.20	0	1
Firm	0.05	0.22	0	1
Private ownership, defined at				
worker level	0.93	0.25	0	1
wage agreement level	0.93	0.22	0	1
Foreign ownership, defined at				
worker level	0.14	0.35	0	1
Observations		3,080,261		

In line with Cardoso (2004, 2006), we have conducted extensive checks of the raw files to guarantee the accuracy of worker and firm data. After these checks, we kept for analysis full-time wage earners working at least 25 hours a week, with more than 16 and less than 65 years of age, earning at least the national minimum wage, and working in firms located in mainland Portugal. Since the union wage floor is computed as the mode of the distribution of base wages for each job category within each collective agreement, we keep for the analysis, as in Cardoso and Portugal (2005), only categories with at least 50 workers and agreements with at least 1,000 workers.

After imposing these constraints, the resulting panel comprises information on 2,872,231 workers, 302,793 firms and 396 sectoral agreements, yielding a total of 15,391,207 worker-year observations. We perform the estimation on a 20% random sample of workers from these data (preserving all yearly information for the sampled workers).

Table 1 provides summary statistics on these data. As can be seen in the first column of this table, the actual and base wages received by workers tend to be significantly above the wage floor set via collective bargaining. It is also interesting to notice the relatively high participation of females in the labour market and the low level of schooling of the workforce (7.06 years of formal schooling, on average). In addition to formal education, *Quadros de Pessoal* makes it possible to construct occupational categories based on the 1988 International Standard Classification of Occupations (ISCO-88). Specifically, this classification allows us to define four skill-levels which are based on: i) the level of general education required to perform a job, and ii) the job-related formal training required to perform a job (ILO, 1990).<sup>12</sup> The summary statistics also show that average worker tenure is relatively high, pointing to relatively long spells of employment in the same firm.

## 4 Privatisation in Portugal

During the nineties, Portugal launched one of the most ambitious privatisation programmes in the OECD area (OECD, 2001). In the enlarged European Union, Portugal ranks in 6th place by total revenues generated from privatisations (almost 26 billion US dollars). However, when the size of the economy is taken into account, Portugal is the largest privatiser, with total privatisation revenues representing 14% of GDP over the period 1977-2003.<sup>13</sup>

The privatisation programme was made possible due to a constitutional amendment in June 1989, which allowed complete privatisation (100 per cent) of public companies. The first privatisation law was adopted in 1988 and allowed merely partial privatisation of public firms as the state still retained 51% of the equity. For this first phase of privatisation, the government selected four profitable firms: a brewery company, one medium-sized bank and two insurance companies. In April 1990 the *lei Quadro das Privatizações* (decree-law 11/90) was passed, allowing full privatisation of enterprises nationalised after 1974. The four main goals of the privatisation programme were i) to raise Portugal's competitiveness, ii) to strengthen private ownership, iii) to develop capital markets, and iv) to broaden share ownership. Under this law, foreign ownership was limited on a case-by-case basis, reflecting the government's intention of keeping large institutions under

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<sup>12</sup>See the Appendix for a detailed description of this classification.

<sup>13</sup>These figures are taken from The Privatization Barometer (2004). Revenues are calculated in 2003 US dollars and scaled by 2003 nominal GDP. The second largest privatiser is Finland, with privatisation revenues accounting for 13% of GDP. Similar figures for the major European economies are 8% for United Kingdom, 7% for Italy, 6% for Spain and 4% for France and Germany.

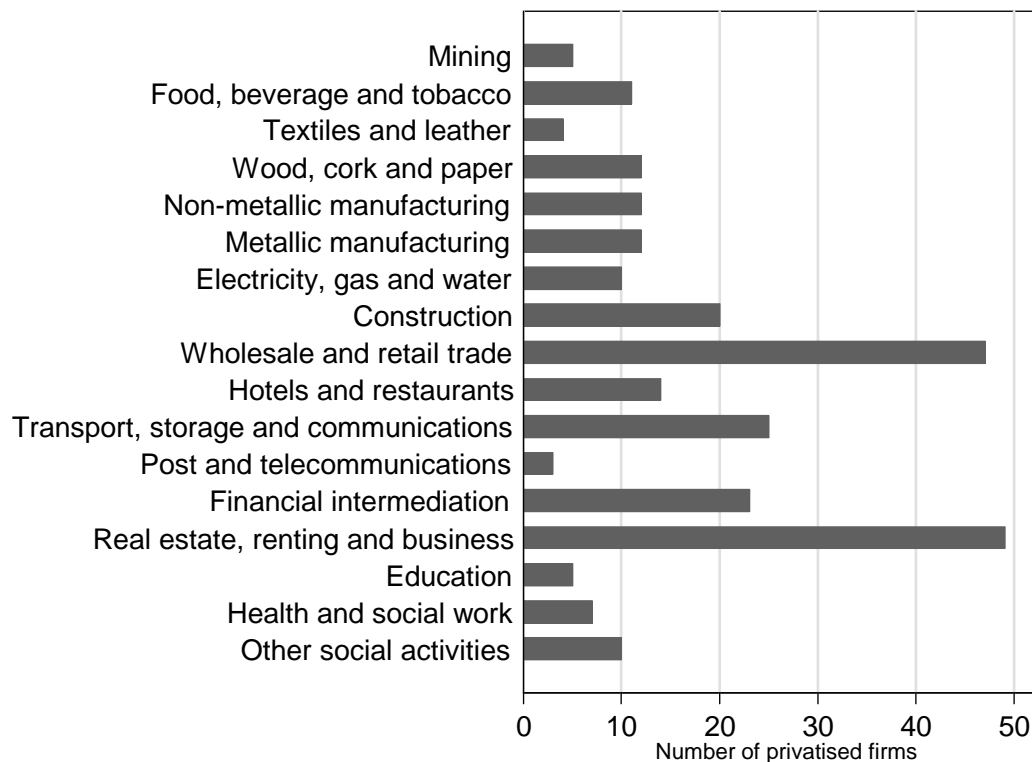


Figure 1: Distribution of privatised firms by economic sectors

Portuguese control, a restriction that was abolished in 1994. In contrast with the first phase of partial privatisation, where the initial four firms were selected among those with solid financial base and operating in sectors free of any particular adjustment problems, there was no firmly scheduled order in which firms would be fully privatised after *lei Quadro das Privatizações* (decree-law 11/90) was passed in 1990 (OECD, 1991).

The privatisation programme involved a large number of firms covering almost all industries. Initially, privatisation took place mainly in the financial sector (banking and insurance) but later spread to other services and manufacturing.<sup>14</sup> The process has not yet been concluded but the government has withdrawn its presence in most sectors, such as brewery, paper and pulp, cement, oil and highways. In some strategic sectors (telecommunications and energy) the state has retained a qualified stake in capital or special voting rights ('golden shares'), which allows some control of firm management. The bulk of the privatisation programme was achieved by 1999 with a peak in 1997. Since then the reform has slowed down with very few major firms being added in the period 2000-07.

<sup>14</sup>For details about the privatisation programme in Portugal, see Sousa and Cruz (1995) and OECD (2001, 2003).

Figure 1 shows the distribution of privatised firms across economic sectors found in *Quadros de Pessoal* (after data cleaning) over the period 1991-2007. Though more dominant in the services sector, it is evident from the figure that privatisation is extensively spread across most sectors of the economy. In total, 269 firms were transferred from private to public hands during the period of analysis. In addition, the restructuring process also implied that a substantial number of firms were transferred from private to public control, while other firms experienced more than one ownership change during the period of analysis.<sup>15</sup> In our data, these two categories amount to 150 and 89 firms, respectively. In order to identify the wage effects of private versus public firm ownership, we withdraw a random sample of workers from a dataset containing all firms that changed ownership status during the period of analysis, whether privatised or nationalised, as well as all firms that did not change ownership status, remaining either private or public throughout the period of analysis.

## 5 Empirical strategy and results

We are interested in testing whether the key predictions of our model find support in the data. To examine the effect of private versus public ownership on the union wage floor, we adopt the following baseline specification:

$$\bar{w}_{it} = \beta Private_{cat} + \mathbf{x}_{it}\gamma + \mathbf{y}_{jt}\delta + \mathbf{z}_{at}\eta + v_i + \lambda_j + \tau_r + \phi_k + \psi_t + \mu_{it} \quad (26)$$

where  $\bar{w}_{it}$  is the log of the union wage floor for worker  $i$  in year  $t$ , and  $Private_{cat}$  is a dummy variable that equals one if the share of firms' capital that is privately-owned within the professional category  $c$  and collective agreement  $a$  that covers worker  $i$  in year  $t$  exceeds 50%. The set of regressors further includes:  $\mathbf{x}_{it}$ , a vector of worker attributes;  $\mathbf{y}_{jt}$ , a vector of characteristics for firm  $j$  at which worker  $i$  is employed in year  $t$ ;  $\mathbf{z}_{at}$ , a vector of characteristics of the collective agreement  $a$  which covers worker  $i$  in year  $t$ ;  $v_i$ , a pure individual unobserved effect;  $\lambda_j$ , a pure firm effect;  $\tau_r$ , a pure region effect;  $\phi_k$ , a pure industry effect;  $\psi_t$ , a fixed time effect; and, finally,  $\mu_{it}$ , an exogenous disturbance.

To estimate the effect of private versus public ownership on wages set at the local level, we then turn to the following specification:

$$w_{it} = \beta Private_{jt} + \varphi \bar{w}_{it} + \mathbf{x}_{it}\gamma + \mathbf{y}_{jt}\delta + \mathbf{z}_{at}\eta + v_i + \lambda_j + \tau_r + \phi_k + \psi_t + \mu_{it} \quad (27)$$

where the dependent variable,  $w_{it}$ , is the log of the actual wage received by worker  $i$  in year  $t$ , and  $Private_{jt}$  is a dummy variable that equals one if the proportion of capital that is privately-

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<sup>15</sup>Although there was no nationalisation programme in place during the period of analysis, the restructuring process sometimes led to newly privatised firms being acquired by existing public firms in the same industry.



owned at firm  $j$  in year  $t$  exceeds 50%. In our theoretical model the wage floor constitutes the reference level of pay for determining the optimal "fair wage" (c.f. (4)). Therefore, this variable is included among the set of regressors used in the estimation. The remainder of the regressors have the meaning defined in (26).

The reduced-form effect of privatisation on the actual paid wage is then given by a specification similar to (27), but where  $\bar{w}_{it}$  is excluded. For robustness, we will adopt several alternative specifications. Notice that we define ownership at different levels of aggregation in (26) and (27). In cases where each firm constitutes only a small share of the total number of firms involved in a collective bargaining agreement, the impact of each firm on the bargaining outcome will presumably be limited. Thus, we believe that the effect of private ownership on the wage floor is better explained by defining the ownership variable at wage agreement level, taking into account the ownership of all firms involved in each collective bargaining agreement. On the other hand, when explaining locally set wages, private ownership is naturally defined at firm-level. Below, in subsection 5.2, we test the robustness of this choice by re-estimating (26) using private ownership defined at firm-level instead.

Arguably, the most critical issue in evaluating the affect of ownership changes on wages is how to account for potential selection bias that could contaminate the estimates. In our case, both firms and workers can be self-selected, for example, if privatised firms are not randomly assigned and/or workers are able to move freely across firms with different ownership status. However, even in the absence of instruments that determine ownership status while being unrelated to wages, we do not believe that selection bias is a major problem in our particular economic context. First, we use workers from non-privatised firms – either public or private – in the same economic sector and year in a panel regression framework as control groups. Workers from privatised firms serve as identification of ownership changes for a given firm while worker fixed-effects allow us to control for time-invariant differences among workers. Second, apart from the four firms being privatised during the very first phase of privatisation, there is no evidence of a systematic selection of privatised firms in the Portuguese privatisation programme, as detailed in Section 4. The evidence from Table 1 also points to relatively long employment spells of workers within the same firm, which suggests that the mobility of workers across firms is relatively low. Furthermore, the employment spells remain fairly stable across firm ownership types throughout the period of analysis. We nevertheless test explicitly for these two forms of selection bias in subsection 5.2 below.

## 5.1 Main results

Table 2 reports the results of our basic specification, obtained with worker fixed-effects models. All regressions include the set of worker, firm and collective agreement controls defined above, and also account for industry, year and region fixed-effects. As can be seen in column (1), the coefficient

estimate giving the effect of private ownership (defined at the category-agreement level) on the wage floor is negative but statistically insignificant. This finding is consistent with the theoretical model presented above, which suggests that this effect is ambiguous, due to counteracting forces of private ownership on the wage setting incentives of organised labour.

In column (2) we examine the effects of private ownership (defined at the firm-level) on the wage rate set at the local level. In line with our theory, the point estimate on the relationship between the union wage floor and the actual paid wage is positive, statistically significant at the 1% level, and smaller than one. Most importantly, our model predicts that private ownership unambiguously increases the mark-up set by the firm on the wage floor. This prediction also finds support in the data: controlling for the union wage floor, private ownership increases the actual paid wage by 6.7% on average, an effect that is estimated with a great degree of precision. Finally, in column (3) we examine the reduced-form effect of private ownership (defined at the firm-level) on actual paid wages without controlling for the union wage floor. In accordance with our theory, and as the empirical results above would suggest, the estimates point to a positive and statistically significant effect of private ownership on actually paid wages.

Table 2: Ownership and wages, worker fixed-effects

Variable	Wage floor (1)	Actual wage (2)	Actual wage (3)
Private ownership <sup>a</sup>	-.089 (.074)	.067*** (.015)	.066*** (.016)
Wage floor	-	.105*** (.005)	-
Schooling	.002*** (.0006)	.004** (.0006)	.004*** (.0007)
Age	.020*** (.002)	.039*** (.0005)	.042*** (.0005)
Age2	-.0002*** (.00002)	-.0002*** (.00001)	-.0003*** (8.53e-06)
Tenure	.004*** (.0005)	.003** (.0003)	.004*** (.0004)
Tenure less 1 year	-.002 (.002)	-.022*** (.001)	-.022*** (.001)
Skill 1	-.199*** (.019)	-.168*** (.007)	-.189*** (.007)
Skill 2	-.118*** (.011)	-.138*** (.006)	-.150*** (.006)
Skill 3	.003 (.002)	-.069*** (.003)	-.068*** (.003)

*Continues on next page...*

... table 2 continued

Variable	Wage floor (1)	Actual wage (2)	Actual wage (3)
Firm size (log)	.019*** (.002)	.027*** (.001)	.029*** (.001)
Multifirm	.249 (.082)	-.0002** (.0001)	.036*** (.027)
Sectoral	.315*** (.057)	-.071*** (.006)	-.040*** (.006)
Mandatory	.282*** (.068)	-.063*** (.006)	-.036*** (.006)
Foreign ownership	.015*** (.006)	.009 (.009)	.040*** (.006)
Observations	3,080,261	3,080,261	3,080,261
$R^2$ within	.124	.240	.232
$F$ statistic	97.31	679.36	620.98
P-value	.000	.000	.000

Notes: Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%. <sup>a</sup> Private ownership defined at wage agreement level in (1) and at worker level in (2) and (3). Robust standard errors in parentheses clustered by collective wage agreement in (1) and at firm level in (2) and (3). The regressions are estimated by worker fixed-effects and include industry, region and time effects.

Our finding regarding the effect of corporate ownership on actual paid wages is consistent with several previous studies. For example, a similar positive relationship between private ownership and wages is found by La Porta and López-de-Silanes (1999) for Mexican data, Brainerd (2002) for Russian data and Ho et al. (2002) for Chinese data. Using the same dataset as in the present paper, but in an analysis that is confined to the banking sector, Monteiro (2009) also finds a positive long term effect of privatisation on wages. However, the existing empirical literature is not unanimous and our results contrast with Haskel and Szymanski (1993) and Brown, Earle and Telegdy (2010), who find (small) negative wage effects of privatisation in, respectively, the UK and four transition economies. Our results also contrast with Chong and Leon (2009), who use firm-level data for a wide range of emerging economies and do not find statistically significant effects of privatisation on wages of production workers.

## 5.2 Robustness checks

In this section we conduct a number of checks to verify the robustness of our findings reported above. Every regression includes the attributes for workers, firms and collective bargaining agreements defined above. For brevity, we report only the estimated coefficients on the key variables of interest.

### 5.2.1 Testing for selection bias

**Firm selection bias** When testing for potential firm selection bias we follow the strategy proposed by Gruber and Hanratty (1995) and later adopted by Friedberg (1998) and several others. This informal yet intuitive test of reverse causality consists of including a lead dummy variable for whether an ownership change occurs in the subsequent year. Under the hypothesis of reverse causality or some other type of endogeneity – i.e., if wages determine ownership changes – then the lead dummy should enter significantly. Otherwise, the coefficient on the lead dummy should not be statistically significantly different from zero.

Table 3: Ownership and wages, firm selection bias

Variable	Wage floor (1)	Actual wage (2)	Actual wage (3)
Private ownership <sup>a</sup>	-.096 (.074)	.065*** (.006)	.062*** (.017)
Ownership change - 1 year later	-.035 (.022)	-.011 (.016)	-.013 (.017)
Wage floor	-	.105*** (.005)	-
Observations	3,080,261	3,080,261	3,080,261
$R^2$ within	.125	.240	.232
$F$ statistic	96.24	666.75	609.91
P-value	.000	.000	.000

Notes: Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%. <sup>a</sup> Private ownership defined at wage agreement in (1) and at worker level in (2) and (3). Robust standard errors in parentheses clustered by collective wage agreement in (1) and at firm level in (2) and (3). The regressions are estimated by spell fixed-effects and include industry, region and time effects.

The results in Table 3 show that the lead dummy is statistically insignificant in all three specifications, while the magnitudes of the private ownership coefficients remain almost identical to those from Table 2. Thus, the results from this particular test suggest that our estimates are not contaminated by firm selection bias.

**Worker selection bias** Thus far, we have accounted for unobserved worker heterogeneity in the estimation, but not for unobserved firm heterogeneity. Hence the effects of private ownership on wage determination are identified from both: i) worker mobility across public and privately-owned firms; and ii) changes over time in the ownership status of a given firm. Due to potential worker

selection bias, though, one might argue that the latter source of variation, alone, is better suited for examining the wage effects of privatisation. For robustness, we therefore re-estimate the basic specification using worker-firm (or spell) fixed-effects models. In this case, identification of wage effects comes solely from changes over time in wages and ownership status within the same job spell.<sup>16</sup>

Table 4: Ownership and wages, spell fixed-effects

Variable	Wage floor (1)	Actual wage (2)	Actual wage (3)
Private ownership <sup>a</sup>	.026 (.053)	.065*** (.006)	.069*** (.017)
Wage floor	-	.064*** (.006)	-
Observations	3,080,261	3,080,261	3,080,261
$R^2$ within	.092	.204	.200
$F$ statistic	55.06	288.51	277.63
P-value	.000	.000	.000

Notes: Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%. <sup>a</sup> Private ownership defined at wage agreement in (1) and at worker level in (2) and (3). Robust standard errors in parentheses clustered by collective wage agreement in (1) and at firm level in (2) and (3). The regressions are estimated by spell fixed-effects and include industry, region and time effects.

An inspection of Table 4 reveals that the estimation results remain remarkably similar when this method is adopted instead. In fact, we have verified that none of the key results of the paper hinge upon the choice between worker or worker-firm fixed-effects models.

### 5.2.2 Accounting for censoring

Another source of concern about the basic results lies in the fact that both the union wage floor and the actually paid wage are left-censored: the union wage floor cannot fall below the national minimum wage, while the actually paid wage must be above the union wage floor. To account for this, we re-estimate the basic model using Tobit random effects models. Table 5 reports the marginal effects of interest. The elasticity effect of private ownership on the union wage floor (column (1)) remains negative and is now more precisely estimated. We should bear in mind, however, that this

<sup>16</sup>For a detailed exposition of this method see Andrews, Schank and Upward (2006).

method does not allow us to account for idiosyncratic correlation of the standard errors within the same agreement and over time, and hence the standard errors are likely to be biased downwards.

In columns (2) and (3) the marginal effects of interest remain positive and highly significant. The magnitude of the effects changes somewhat relative to the baseline model, with the elasticity effect of private ownership on the wage floor becoming clearly larger (column (1)) and that on actual wages somewhat smaller – columns (2) and (3). But, most importantly, the qualitative implications of our theory continue to find support in the data when this alternative estimation method is used.

Table 5: Ownership and wages, Tobit random effects

Variable	Wage floor (1)	Actual wage (2)	Actual wage (3)
Private ownership <sup>a</sup>	-.314*** (.002)	.044*** (.001)	.032*** (.001)
Wage floor	-	.172*** (.006)	-
Observations	3,080,261	3,080,261	3,080,261
Log Likelihood	-267,762	-485,368	-510,422
$\chi^2$ statistic	1.06e+06	1.44e+06	1.31e+06
P-value	.000	.000	.000

Notes: Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%. <sup>a</sup> Private ownership defined at wage agreement in (1) and at worker level in (2) and (3). The regressions are estimated by tobit random effects and include industry, region and time effects.

### 5.2.3 Alternative wage and ownership measures

In Table 6 we examine whether the basic results are sensitive to alternative wage and ownership measures. In column (1), we consider the effect of private ownership defined at the firm-level (rather than category-agreement level) on the union wage floor. As before the point estimate is negative, but insignificantly different from zero.

One potential concern about the wage concepts defined above is that, in some industries, trade unions might have influence over tenure-related payments. One might worry, therefore, about the extent to which local wage regressions are indeed capturing firm-specific arrangements due to "fair wage" considerations. To check this, in columns (2) and (3) we examine the effect of privatisation on the actually paid base wage, thereby excluding tenure related and other regular components of pay from actual wages. The results remain quite similar, both qualitatively and quantitatively,

suggesting that our main specification is indeed capturing the effects of privatisation on the mark-up set by the firm on the union wage floor.

Table 6: Ownership and wages, alternative measures

Variable	Wage floor (1)	Base wage (2)	Base wage (3)
Private ownership <sup>a</sup>	-.012 (.033)	.057*** (.010)	.056*** (.012)
Wage floor	-	.111*** (.005)	-
Observations	3,080,261	3,080,261	3,080,261
$R^2$ within	.123	.225	.213
$F$ statistic	442.89	599.88	567.83
P-value	.000	.000	.000

Notes: Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%. <sup>a</sup> Private ownership defined at worker level in all regressions. Robust standard errors in parentheses clustered at firm level in all regressions. The regressions are estimated by worker fixed-effects and include industry, region and time effects.

#### 5.2.4 Alternative definitions of private ownership

We now turn to whether our results are sensitive to the definition of private ownership. Throughout the analysis, we have used the threshold of 50% of private capital to determine whether the firm is privately- or state-owned. It might be argued, however, that the main forces emphasised by our model, notably changes in the degree of profit orientation and job security spurred by privatisation, are likely to begin exerting their influence over wage setting incentives even before this threshold is reached.

We adopt two alternative definitions of private ownership. First, we consider a lower threshold of private capital for defining private ownership (40%). The corresponding results, reported in Panel A of Table 7, show that the results remain remarkably stable when this alternative definition is used. Second, we define a *privatisation date* and use this instead of the threshold level of private capital for defining private ownership. We follow the standard practice in the privatisation literature (see, e.g., Megginson et al., 1994) of defining the privatisation date as the date of the first transfer of property rights from public to private hands (for firms that eventually reach the threshold level of 50% of private capital). Once more, the results (reported in Panel B) remain qualitatively unchanged.

Table 7: Alternative private ownership definitions

Variable	Wage floor (1)	Actual wage (2)	Actual wage (3)
<i>Panel A: Private capital threshold of 40%</i>			
Private ownership <sup>a</sup>	-.064 (.064)	.062*** (.015)	.062*** (.016)
Wage floor	-	.105*** (.005)	-
Observations	3,080,261	3,080,261	3,080,261
R <sup>2</sup> within	.124	.239	.232
F statistic	96.33	685.30	628.26
P-value	.000	.000	.000
<i>Panel B: Privatisation date</i>			
Private ownership <sup>a</sup>	-.068 (.063)	.053*** (.013)	.053*** (.014)
Wage floor	-	.105*** (.005)	-
Observations	3,080,261	3,080,261	3,080,261
R <sup>2</sup> within	.124	.239	.231
F statistic	97.53	693.31	639.05
P-value	.000	.000	.000

Notes: Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%. <sup>a</sup> Private ownership defined at wage agreement in (1) and at worker level in (2) and (3). Robust standard errors in parentheses clustered at wage agreement and year in (1) and at firm level in (2) and (3). The regressions are estimated by worker fixed-effects and include industry, region and time effects.

In a final robustness check, we have also verified that the results remain quite similar if the period of analysis is restricted to the years 1991 to 1999, when the bulk of the Portuguese privatisation programme was implemented (results not reported but available upon request).

### 5.3 Heterogeneity of wage effects

In the analysis so far, we have examined *average* wage impacts of private ownership. However, these wage effects might plausibly vary considerably across skill categories. For instance, in the context of our model, the effort of skilled workers could be more responsive to the degree of job-security, or "fair-wage" considerations could be more important for highly-educated workers. To investigate whether and how the wage effects of private ownership do in fact differ between skill groups, we examine interactions between the variable defining private ownership and a dummy variable that equals one if the worker has at least 12 years of formal schooling.



The results reported in Table 8 suggest that private ownership exerts a more positive impact on wages in the case of highly-educated workers. In addition, they suggest that this is mainly due to the fact that private firms tend to pay larger mark-ups on the union wage floor for this type of workers. In light of our theoretical model, a possible explanation could be that firm productivity depends more strongly on the effort levels of high-skilled workers, implying that increased worker effort due to privatisation more easily translates into higher final wages in firms with a higher skill-share in the workforce.

Table 8: Ownership and wages - heterogeneous effects

Variable	Wage floor (1)	Actual wage (2)	Actual wage (3)
Private ownership <sup>a</sup>	-.092 (.074)	.063*** (.015)	.062*** (.009)
Private ownership*Schooling>12	.023* (.013)	.036*** (.009)	.036*** (.016)
Wage floor	-	.105*** (.005)	-
Observations	3,080,261	3,080,261	3,080,261
$R^2$ within	.124	.240	.232
$F$ statistic	98.64	674.61	616.92
P-value	.000	.000	.000

Notes: Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%. <sup>a</sup> Private ownership defined at wage agreement in (1) and at worker level in (2) and (3). Robust standard errors in parentheses clustered at wage agreement in (1) and at firm level in (2) and (3). The regressions are estimated by worker fixed-effects and include industry, region and time effects.

Results from additional estimations (not reported but available upon request) confirm that this finding is quite stable across estimation methods. We conclude, therefore, that the wage gains stemming from privatisation appear to accrue mainly to highly-educated workers. It should be noted that this result contrasts with La Porta and López-de-Silanes (1999), who (perhaps surprisingly) report larger wage gains due to privatisation for blue-collar than for white-collar workers. On the other hand, our result is somewhat more in line with Chong and Leon (2009), who find that privatisation has a significantly positive effect on wages for managers but not for production workers.

## 6 Concluding remarks

We have examined – theoretically and empirically – the effect of privatisation on wage determination. The theoretical analysis is cast in a setting where actual labour earnings are determined by both sector-wide union wage setting and firm-specific "fair wage" policies; and in which private firms differ from public ones with respect to the degrees of profit orientation and job security. We have identified several novel channels whereby privatisation potentially affects wage determination. Greater profit orientation of privately-owned firms implies that trade unions face a higher trade-off between wages and employment, which tends to depress wages, but higher worker effort stemming from less job security pulls in the opposite direction. The net effect on the wage floor is therefore ambiguous. By contrast, private ownership unambiguously increases the wage cushion, as higher worker effort and greater profit orientation mean that private firms generate more rents to share with their workers. Independent of the impact on the wage floor, the response of the wage cushion always dominates, implying that privatisation leads to an unambiguous increase in actually paid wages.

We have then confronted the key predictions of our model against rich linked worker-firm data for Portugal spanning the period 1991-2007. This dataset is unique in that it makes it possible to distinguish, at the individual level, between the wage set via sector-wide collective bargaining and firm-specific arrangements establishing a mark-up on the union wage floor. Further, it allows us to follow workers and firms over the (long) period of time in which important segments of the corporate sector have been privatised.

The econometric results are supportive of the main predictions of our theory. In particular, they provide evidence that private ownership increases actually paid wages, and suggest that this effect is driven by the fact that privatised firms tend to pay larger mark-ups on the union wage floor. These effects are quantitatively important and are robust to a wide variety of alternative specifications. Therefore, our results suggest that when it comes to wage effects the average worker does not have reasons to fear privatisation. We also find, however, that the wage impacts of privatisation tend to be heterogeneous across skill categories, with pay rises accruing predominantly to highly-educated workers.

## Appendix: Definition of skill groups

In the econometric analysis, we include a group of dummy variables to control for the skill level associated with the worker's occupation, as defined in the ISCO-88 classification. Table A.1 presents the definition of skill groups.

Table A.1. Description of ISCO skills

Skill	Description	ISCO Major group
Skill level 1	Competence associated with general education usually acquired by completion of compulsory education.	(9) Elementary occupations
Skill level 2	Requires knowledge as for first skill level, but typically a longer period of worker-related training or work experience.	(4) Clerks; (5) Service workers and shop and market sales workers; (6) Skilled agriculture and fishery; (7) Craft and related workers; (8) Plant and machine operators and assemblers
Skill level 3	Requires a body of knowledge associated with a period of post-compulsory education but not to degree level.	(3) Technicians and associate professionals
Skill level 4	Normally requires a degree or an equivalent period of relevant work experience.	(1) Legislators, senior officials and managers; (2) Professionals

## References

- [1] Akerlof, G., Yellen, J. (1990), "The fair wage-effort hypothesis and unemployment." *Quarterly Journal of Economics*, 105, 255–283.
- [2] Andrews, M. Schank, T. and Upward, R. (2006), "Practical fixed-effects estimation methods for the three-way error-components model." *Stata Journal*, 6, 461–481.
- [3] Arbache, J.S. (1999), "Trade liberalisation and insider power: The case of Brazil." Studies in Economics 9902, University of Kent.
- [4] Bastos, P., Monteiro, N.P. and Straume, O.R. (2009), "Firm heterogeneity and wages in unionised labour markets: Theory and evidence." *Labour Economics*, 16, 440–450.
- [5] Bhaskar, V. and Khan, M. (1995), "Privatization and employment: A study of the jute industry in Bangladesh." *American Economic Review*, 85, 267–273.
- [6] Birdsall, N. and Nellis, J. (2003), "Winners and losers: assessing the distributional impact of privatization." *World Development*, 31, 1617–1633.
- [7] Brainerd, E. (2002), "Five years after: the impact of mass privatization on wages in Russia, 1993-1998." *Journal of Comparative Economics*, 30, 160–190.
- [8] Brown, J.D., Earle, J.S. and Telegdy, A. (2006), "The productivity effects of privatization: Longitudinal estimates from Hungary, Romania, Russia, and Ukraine." *Journal of Political Economy*, 114, 61–99.
- [9] Brown, J.D., Earle, J.S. and Telegdy, A. (2010), "Employment and wage effects of privatisation: Evidence from Hungary, Romania, Russia, and Ukraine." *Economic Journal*, 120, 683–708.
- [10] Cardoso, A.R. (2004), "Wage mobility: Do institutions make a difference? A replication study comparing Portugal and the UK." IZA DP No. 1086.
- [11] Cardoso, A.R. (2006), "Wage mobility: Do institutions make a difference?" *Labour Economics*, 13, 387–404.
- [12] Cardoso, A.R. and Portugal, P. (2005), "Contractual wages and the wage cushion under different bargaining settings." *Journal of Labor Economics*, 23, 879–902.
- [13] Chong, A. and Leon, G. (2009), "Privatised firms and labour outcomes in emerging markets." *Journal of Development Studies*, 45, 1513–1525.

- [14] Chong, A. and López-de-Silanes, F. (2005), *Privatization in Latin America: Myths and Reality*, Stanford University and World Bank Press.
- [15] Claessens, S. and Djankov, S. (2002), "Privatization benefits in Eastern Europe." *Journal of Public Economics*, 83, 307–324.
- [16] Danthine, J.P. and Kurmann, A. (2006), "Efficiency wages revisited: The internal reference perspective." *Economics Letters*, 90, 278–284.
- [17] Fernandez, S. and Smith, C. R. (2005), "Looking for evidence in public employee opposition to privatization: An empirical study with implications for practice." *Review of Public Personnel Administration*, 26, 356–381.
- [18] Flanagan, R. (1999), "Macroeconomic performance and collective bargaining." *Journal of Economic Literature*, 37, 1150–1175.
- [19] Friebel, G. and Magnac, T. (2007), "Public servants: a comparative advantage for public firms?" Mimeo, IDEI, Toulouse.
- [20] Friedberg, L. (1998), "Did unilateral divorce raise divorce rates? Evidence from panel data." *American Economic Review*, 88, 608–627.
- [21] Gruber, J. and Hanratty, M. (1995), "The labor-market effects of introducing national health insurance: evidence from Canada." *Journal of Business & Economic Statistics*, 13, 163–173.
- [22] Haskel, J. and Szymanski, S. (1993), "Privatization, liberalization, wages and employment: Theory and evidence for the UK." *Economica*, 60, 161–182.
- [23] Hibbs, D. and Locking, H. (1996), "Wage compression, wage drift and wage inflation in Sweden." *Labour Economics*, 3, 109–141.
- [24] Ho, S., Dong, X., Bowles, P. and MacPhail, F. (2002), "Privatisation and enterprise wage structures during transition: evidence from rural industry in China." *Economics of Transition*, 10, 659–688.
- [25] Holden, S. (1988), "Local and central wage bargaining." *Scandinavian Journal of Economics*, 90, 93–99.
- [26] Holden, S. (1989), "Wage drift and bargaining: Evidence from Norway." *Economica*, 56, 419–432.
- [27] Holden, S. (1998), "Wage drift and the relevance of centralised wage setting." *Scandinavian Journal of Economics*, 100, 711–731.

- [28] ILO (1990), ISCO-88: International Standard Classification of Occupations, Geneva: International Labour Office.
- [29] Kikeri, S. (1998), "Privatization and labor: What happens to workers when governments divest." World Bank Technical Paper No. 396.
- [30] La Porta, R. and López-de-Silanes, F. (1999), "The benefits of privatization: Evidence from Mexico." *Quarterly Journal of Economics*, 114, 1193–1242.
- [31] López-de-Silanes, F., Shleifer, Andrei and Vishny, R.W. (1997), "Privatization in the United States." *RAND Journal of Economics*, 28, 447–471.
- [32] Megginson, W.L., Nash, R.C. and van Randenborgh, M. (1994), "The financial and operating performance of newly privatized firms: an international empirical analysis." *Journal of Finance*, 49, 403–452.
- [33] Monteiro, N.P. (2009), "Using propensity matching estimators to examine the effect of privatization on wages", *Applied Economics*, 42, 1293–1313.
- [34] Monteiro, N.P., Portela, M. and Straume, O.R. (2010), "Firm ownership and rent sharing." IZA DP No. 4909.
- [35] Muysken, J. and van Veen, T. (1996), "Efficiency wages and local wage bargaining." *Scandinavian Journal of Economics*, 98, 119–127.
- [36] Nelson, A., Cooper, C. and Jackson, P.R. (1995), "Uncertainty amidst change: The Impact of privatization on employee job satisfaction and well-being." *Journal of Occupational and Organizational Psychology*, 68, 54–71.
- [37] O'Connell, L. (1999), "Collective bargaining systems in six Latin American countries: Degrees of autonomy and decentralization." IADB Research Department WP-399.
- [38] OECD (1991), *OECD Economic Surveys, Portugal*. OECD, Paris.
- [39] OECD (2001), *OECD Economic Surveys, Portugal*. OECD, Paris.
- [40] OECD (2003), *OECD Economic Surveys, Portugal*. OECD, Paris
- [41] OECD (2004), "Wage-setting Institutions and Outcomes," in *OECD Employment Outlook 2004 Edition*. OECD, Paris.
- [42] OECD (2008), *The State of the Public Service*. OECD Publishing, Paris.

- [43] Ordine, P. (1996), "Wage Drift and the Minimum Contractual Wage: Theoretical Interrelationship and Empirical Evidence for Italy." *Labour Economics*, 2, 335–357.
- [44] Privatization Barometer (2004), The PB Newsletter, Issue N. 1, July 2004. (Available at [www.privatizationbarometer.net](http://www.privatizationbarometer.net))
- [45] Rodrik, D. (2006), "Goodbye Washington Consensus, Hello Washington Confusion? A Review of the World Bank's *Economic Growth in the 1990s: Learning from a Decade of Reform*." *Journal of Economic Literature*, 44, 973–987.
- [46] Sousa, F. and Cruz, R. (1995), "O Processo de Privatizações em Portugal." *Associação Industrial Portuense*, Porto, Portugal.
- [47] World Bank (2005), *Economic Growth in the 1990s: Learning from a Decade of Reform*. Washington, D.C.: World Bank.

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