

# The Political Economy of Flexicurity

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December 2007

## Abstract

We document the presence of a trade-off in the labor market between the use of unemployment benefits (UB) and employment protection legislation (EPL). Different countries' locations along this trade-off represent stable politico-economic equilibria. We develop a model in which individuals determine the strictness of EPL and the size of a redistributive UB system in a political environment. Agents are heterogeneous along two dimensions: employment status – insiders and outsiders – and skills – low and high. Unlike previous work, we emphasize the redistributive role of both EPL and UB across these two dimensions. A key implication of the model is that flexicurity configurations with low EPL and high UB should emerge in presence of dispersed wage structures and progressive UB systems. High education and mobility of the workforce also yield configurations with less EPL per any given level of UB. Panel regressions of countries' locations along the UB/EPL tradeoff are consistent with the implications of our model.

**Keywords:** employment protection, unemployment insurance, political equilibria. **JEL Classification:** J68, J65, D72.

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## 1. Introduction

According to the President of the European Union, José Manuel Barroso, "flexicurity is essential if Europe is to preserve both its competitive edge and social model in a globalised world"<sup>1</sup>. Even in the rhetoric of the official documents of the EU, flexicurity is defined as "flexible contracts" and "adequate unemployment benefits" that is, less rigid employment protection legislation (EPL) and greater coverage of unemployment benefits (UBs) (EC, 2007). The institutional tradeoff alluded in the EU communications is in the data: countries with more UBs have less EPL, and vice versa. But moving along this trade-off is proving very difficult. Countries' locations along this trade-off correspond to stable political-economic equilibria. Reforms of EPL have mostly been confined to introducing more flexible contractual types for *new hires*, without modifying rules for workers who already have a permanent contract. UB systems have experienced modifications of the enforcement rules (e.g., via activation schemes) but no changes in statutory replacement rates or in the maximum duration of benefits. Governments do not succeed in reducing EPL for standard contracts while contemporaneously increasing the coverage of UBs. Effectively, no country has moved along this tradeoff.

Why do different countries resort to alternative combinations of EPL and UBs? Why is it so difficult to modify these institutional configurations? What type of redistribution are they actually operating?

To address these issues, this paper applies for the first time (to our knowledge) a multidimensional voting approach to endogenous labor market institutions theory. A growing literature in the political economy of labor markets has singularly analyzed these issues in one-dimensional models (see Wright, 1986, Saint-Paul, 1996, 1999a, 1999b and 2000, Pallage and Zimmermann, 2001, Hassler and Rodriguez Mora, 1999, Hassler et al. 2002, 2005). Our environment is similar to that proposed by Wright (1986) to examine UBs, but draws also on Saint-Paul (1996, 1999a, 1999b and 2000) in modeling choices

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<sup>1</sup>See [http://ec.europa.eu/commission\\_barroso/president/focus/flexicurity](http://ec.europa.eu/commission_barroso/president/focus/flexicurity).

over EPL. We acknowledge that both EPL and UBs share the objective of providing insurance against otherwise uninsurable labour market risk. At the same time, however, EPL protects the employees against the risk of job loss, without imposing a tax burden on the worker, while UBs transfer income to the unemployed and are funded by a tax on labor income.

We concentrate on the redistributive aspects of these two policies. Unlike Wright and Saint-Paul, we model EPL and UBs as multidimensional institutions operating redistributions not only from insiders to outsiders, but also between high and low-skill types. Hence, we introduce two conflicts of interest in our model. The first conflict arises in the transition between employment and unemployment: unemployment inflow and outflow rates are affected by the strictness of EPL. The second conflict occurs because both EPL and UBs operate – at different degrees – some redistribution across skills.

The strictness of EPL and the size of UBs are determined in the political system. Because of the multidimensionality of the issue space, the existence of a Condorcet winner in a majority voting game is not guaranteed. We hence consider a political system in which the entire electorate votes simultaneously over the payroll tax financing unemployment benefits (hence over the size of UBs), and over the strictness of EPL; and policy decisions are taken issue-by-issue. In other words, we concentrate on steady state structure-induced equilibria (as defined by Shepsle, 1979, see also Persson and Tabellini, 2000). This equilibrium concept allows us to retain the flavour of the median voter approach even in a multidimensional setting and thus to highlight more clearly the crucial relevance of the redistributive components in UB and EPL. In this framework, the median voter over the UBs is typically a low-skill individual, while the pivotal voter over the degree of EPL may be a low ability insider or a high-skill type, depending on the distribution of the population by skill level.

We show that flexicurity configurations with relatively low EPL and high UB emerge in societies with a large (but not necessarily majoritarian) share of educated individu-

als, so that the pivotal voter over EPL is a high ability type; when wage differentials between high and low-skill types are large or when the unemployment benefit system is Beveridgian, so that large cross-skill redistribution is operated via taxes and benefits per any given size of the UB system. Our model thus implies that countries with compressed wage structures and or Bismarckian, insurance-type, unemployment benefit systems have stricter EPL. While the degree of compression of the wage distribution is affected by factors which are largely outside the control of Governments, such as the degree of centralization or coordination of wage bargaining, the targeting of the tax and benefit system provides a “possibility theorem” for Governments wishing to adopt flexicurity configurations. More flexibility may be introduced in the labor market, if the tax and unemployment benefit system is made more progressive. Finally, our model predicts that countries featuring a large share of high ability individuals, as well as more mobile workers (i.e., workers who are less attached to a geographical location), are characterized by both low EPL and low UB. These qualitative results are robust to a wide range of modifications in the specification of the economic and political environment, as discussed in section 4.4.

Our empirical strategy offers tests of these implications of the model. We run panel regressions over European countries obtaining results which are broadly in line with the model’s predictions. We also document that wage structures allowing for larger premia on education (and also higher unconditional wage dispersion) are associated with flexicurity configurations. Finally, we analyse the institutional configurations of the few countries that made some modest progress in reforming EPL and find that these countries had made their tax and unemployment benefit system more progressive.

The paper proceeds as follows: Section 2 documents the trade-off, characterizes the multidimensional conflicts involved by UBs and EPL and reviews the related literature. Section 3 presents the model and the economic environment. Section 4 develops the political system, and introduces the equilibrium concept. In section 5, we bring the

model’s main assumptions and results to the data. Section 6 concludes.

## 2. The UB/EPL trade-off

The theoretical literature acknowledging a welfare-enhancing role to labor market institutions suggests that UBs may be a close substitute for EPL. Clearly, both EPL and UB protect workers against uninsurable labor market risk. When severance payments and notice periods in case of dismissals are chosen optimally to maximize welfare of risk-adverse agents, there is no role for unemployment insurance (Pissarides, 2001). These two institutions have also important design features in common. An experience-rated unemployment insurance scheme involves the same type (and possibly amount) of transfers from the employer to the employee than a severance pay or a statutory notice period in the event of a dismissal. The only difference is that EPL would be paid in one installment, while UBs are generally provided throughout the unemployment spell up to their maximum duration. The reform of the French unemployment benefit system recently advocated by Blanchard and Tirole (2003) exploits this substitutability between EPL and UBs: it involves an increase in the degree of experience-rating of the UB system, which confines EPL to a one-off monetary compensation for the job loss.

Figure 1 documents the aggregate trade-off between UB and EPL over the OECD countries, for which we had comparable data on both institutional features. It displays, on the horizontal axis, an index of the strictness of employment protection for *regular* contracts<sup>2</sup> compiled by the OECD (OECD, 1999) on the basis of an assessment of national legislations. The vertical axis displays a summary measure of the generosity of unemployment benefits, namely the coverage of UBs (the fraction of unemployed

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<sup>2</sup>The OECD *overall* EPL index combines information on “regular” and “temporary” contracts. Less EPL on the latter (fixed-term contracts, temporary work agency, etc.) provides greater “flexibility at the margin” (more leverage in hiring via temporary contracts), which can actually insulate regular workers from labor market risk, by creating a “buffer stock” of flexible workers, who can be dismissed at low-cost in case of adverse shocks (Bentolila and Dolado, 1994; Boeri and Garibaldi, 2006). For these reasons we prefer to confine our attention to EPL on regular contracts.

receiving UBs) multiplied by the average gross replacement rate in the first-year of benefit receipt.

Both EPL and UB measures are normalized in the 0-1 range. Higher values denote stricter EPL and more generous UBs. Most countries are located in the first and in the third quadrant of Figure 1, pointing to an inverse relationship between UB and EPL. The two relevant exceptions are the US and the UK, which display less UBs and EPL than a typical OECD country. The pairwise correlation of the two institutional features is  $-.39$ , which is statistically significant at 95 percent confidence levels. Without the UK and the US the correlation is  $-.48$ , significant at 99 per cent.

As first time job-seekers typically do not qualify for UBs, a low coverage of UBs may be associated with high youth unemployment rates, which tend to be positively correlated with EPL. However, the negative correlation between UB and EPL is *stronger* when concentrating on central age groups (Table 1), whose unemployment rate is uncorrelated with EPL (OECD, 1999). The negative correlation between UBs and EPL holds also when measuring UB generosity only in terms of replacement rates, neglecting the coverage rate <sup>3</sup> (second row of Table 1).

This trade-off holds also at the micro level. Boeri, Börsch-Supan and Tabellini (2001) found that individuals, who feel protected by EPL, are less willing to purchase state-provided unemployment insurance; Ichino et al. (2003) found that courts deciding on labor disputes are more favorable to workers (effectively making EPL stricter) when unemployment benefits are lower.

Countries do not seem to modify their UB-EPL configuration over time. According to the OECD index of the strictness of employment protection for regular workers: only four countries (Korea, Finland, Spain and Greece) out of 28 reduced the strictness of EPL for regular workers throughout the 1987-2003 period. Reducing the generosity of UB systems has proved just as difficult, notably in countries with poor civic atti-

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<sup>3</sup>Buti, Pench and Sestito (1998) also found a negative pairwise correlation between UB replacement rates and EPL strictness.

tudes where moral hazard hinders the efficiency of unemployment insurance (Algan and Cahuc, 2006). The location of the different countries along the UB-EPL trade-off seems to represent a stable political-economic equilibrium. The only reform measures implemented have been parametric. An inventory of reforms (available at [www.frdb.org](http://www.frdb.org)) indicates that 93 out of 112 reforms reducing EPL carried out in the period 1986-2002 in Europe have involved the introduction of new contractual types only “at the margin”.

### **2.1. Vertical redistribution operated by UBs and EPL**

Besides providing insurance against the unemployment risk, UB and EPL redistribute across *employment margins*, as well as across *earning levels*.

EPL unavoidably involves some fixed-cost, such as those associated with procedural obligations of employers vis-a-vis labor inspectors and unions. These fixed costs explain most (up to 85%) of the cross-sectional variation in the aggregate EPL OECD index, compared with roughly 40% explained by the pure transfer and earning-related (statutory severance pay and advance notice) component of EPL. More importantly, it is just these fixed (or progressive) components of EPL which are found to have a stronger impact on unemployment inflows (OECD, 1999; Bertola, Boeri and Cazes, 2000). This is consistent with economic theory: as suggested by Lazear (1990), employment protection regulations involving just transfers from employers to employees can be undone by bonding wage contracts, provided that wages are sufficiently flexible and workers are risk-neutral. Judges are also typically more protective of unskilled workers with low re-employment probabilities (Ichino et al., 2003; Marinescu, 2005), as if they were maximizing the joint welfare of the dismissed worker and the firm, tailoring firing costs to individual economic circumstances.

These asymmetric effects of EPL across skill levels are documented in Figure 2, which displays proxy quarterly job loss rates (defined as persons who are currently unemployed and who have been dismissed by their employer in the previous three months, as a

proportion of dependent employment) by level of education, drawing on longitudinal data from the European Community Household Panel (ECHP), plotted against the OECD EPL index for regular workers. As shown by the second-degree polynomial fitted into the scatterplot, unemployment inflows are less responsive to changes in the strictness of EPL in the case of the high-skill types.

Net replacement rates (NRR) of UBs are almost everywhere decreasing with earnings, as a result of benefit floors and ceilings or explicit rules reducing the indexation of benefits to wages at higher earning levels. As a measure of progressiveness in the design of UBs, Table 2 displays the ratio of the replacement rates at three earning levels, respectively 2/3, 100 per cent and 150 per cent of the wage of the average production worker. For most countries the ratio is significantly greater than one, for some it is close to 2 pointing to strong progressiveness in the design of UBs. Moreover, UBs also redistribute through the higher incidence and duration of unemployment at low skill levels.

Overall, both EPL and UBs operate substantial vertical redistribution across skill levels.

### 3. A Political-Economic Model

#### 3.1. The environment

In our economy, agents are infinitely long lived. In every period, they consume their current income, since, as in Wright (1986), we assume that no saving technology is available<sup>4</sup>. Preferences are defined over the infinite stream of consumption,  $c$ , and leisure,  $1 - l$ , where  $l$  represents the time spent working or searching for a job, through a utility function,  $\sum_{k=t}^{\infty} \beta^{k-t} v(c_k, l_k)$ , with  $\beta$  representing the subjective discount factor. The instant utility function is assumed to be log-linear  $v(c, l) = c + \gamma \ln(1 - l)$ , and  $\gamma$

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<sup>4</sup>This assumption greatly simplifies the analysis, without affecting our conclusions. The fact that agents are not allowed to self-insure against negative labor market shocks through private savings does not affect the redistributive motive driving our results.

is a parameter measuring the relative importance of leisure.

Agents may be of low or high skill type, as indicated by the superscripts  $l$  and  $h$  respectively. The fraction of low and high ability workers in the population is indicated by  $\rho$  and  $1 - \rho$  respectively. We consider that there are more low than high skill types, so that  $\rho > 1/2$ . Low and high skill agents are assumed to differ along several dimensions. When employed, low skill workers earn a pre-tax real wage equal to  $w^l$ , whereas high skill workers earn  $w^h = (1 + \delta)w^l$ , with  $\delta > 0$  representing the wage differential. A type- $j$  worker determines her labor supply,  $l^j$ , by maximizing her utility when employed, that is,  $w^j l^j (1 - \tau) + \gamma \ln(1 - l^j)$ , where  $\tau$  represents a proportional tax on labor income levied to finance an unemployment benefit system, which provides to a type- $j$  individual a transfer  $b^j$ , when unemployed. The labor supply of a type- $j$  worker is:  $l^j = 1 - \gamma/w^j (1 - \tau)$ . A (low or high) unemployed individual spends a fixed amount of time,  $l^u$ , searching for a job, which reduces her leisure.

In every period, agents may be either employed (insider) or unemployed (outsider). The transition between the two states is regulated by a Markov process, with skill-specific transition probabilities. In particular,  $F^j \in (0, 1)$  is the probability that a type- $j$  employed worker becomes unemployed (the unemployment inflow rate); and  $H^j \in (0, 1)$  is the probability that a type- $j$  unemployed worker finds a job (the unemployment outflow rate). Our analysis concentrates on steady states. Thus, for each group of agents the unemployment rate is  $w^j = F^j / (H^j + F^j)$ , while the total unemployment rate is  $u = u^l \rho + u^h (1 - \rho)$ . Clearly, we have that  $\partial w^j / \partial F^j \geq 0$  and  $\partial w^j / \partial H^j \leq 0$ . Moreover, stability conditions for the unemployment rate require that  $F^j < H^j \forall j$ .

Finally, it is useful to denote by  $\Delta^l = (1 - \tau) w^l l^l + \gamma \ln(1 - l^l) - (b^l + \gamma \ln(1 - l^u))$  the difference in utility between the two labor market states for the low skill agents. To guarantee that low income individuals always have an incentive to work, when a job is available, rather than to stay unemployed, we assume that  $l^u$  is sufficiently large to ensure that  $\Delta^l > 0$ .

### 3.2. Labor Market Institutions

We consider two types of labor market institutions: i) employment protection legislation, which affects unemployment inflow (and outflow) rates; and ii) an unemployment benefit system, which in every period taxes the labor income of the workers and provides a transfer to the unemployed.

**Employment Protection Legislation ( $s$ )** Labor markets may be regulated by norms protecting workers against the risk of job loss. As discussed above, economic theory and empirical evidence suggest that it is mainly red-tape and procedural costs which affect labor market flows<sup>5</sup>. These costs are fixed (hence protect more low-skill workers) and deadweight from the standpoint of the employment relationship (hence cannot be replaced by experience-rated UBs). Accordingly, we model EPL as protecting only the low-skill workers, and disregard the existence of pure transfers such as mandatory severance payments.

In our model, the degree of EPL is measured by a parameter  $s \in [0, 1]$ , where  $s = 0$  means no protection and  $s = 1$  denotes maximum protection. As in Saint-Paul (1996 and 2000), we concentrate on the effects of EPL on unemployment inflow and outflow rates, a relationship on which there is little ambiguity in the empirical<sup>6</sup> and theoretical literature. Consider the low skill types. A higher degree of EPL decreases the unemployment inflow rate,  $\partial F^l / \partial s = F_s^l \leq 0$ . Consistently with empirical evidence reviewed in section 2, we assume that this effect is larger when the labor market is flexible ( $s \simeq 0$ ) than under strict EPL<sup>7</sup>, i.e.,  $\partial^2 F^l / \partial s^2 = F_{ss}^l > 0$ .

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<sup>5</sup>When EPL is confined to severance pay regimes, it can be replicated by any experience-rated unemployment benefit. This makes the UB-EPL substitutability rather uninteresting in that case.

<sup>6</sup>See OECD (1999, 2004 and 2006) and Boeri (1999).

<sup>7</sup>Mortensen and Pissarides' (2001) equilibrium search model also yields a convexity of the reservation productivity (hence unemployment inflows) in EPL, provided that the matching function is specialised as a Cobb-Douglas. This model also implies a negative effect of EPL on unemployment inflows *and* outflows. In the case of outflows, however, it is not possible to establish a priori the sign of the second derivative.

Also the unemployment outflow rate is negatively affected by the strictness of EPL,  $\partial H^l / \partial s = H_s^l < 0$ , in accordance with empirical evidence and with economic theory (e.g., Bentolila and Bertola, 1990) predicting that in rigid labor markets employers hire less workers in upturns in order to reduce the costs of dismissals during downturns. Figure 3 summarizes the behavior of the low skill inflow and outflow rates as a function of the strictness of EPL. Notice that a trade-off arises since more EPL decreases the unemployment inflow of low skill types, while reducing their outflow. The overall effect on the unemployment rate is therefore ambiguous, as in standard equilibrium models of the labor market (Mortensen and Pissarides, 2001). Provided that unemployment inflows are negative and convex in EPL, while unemployment outflows are linearly declining in EPL, we expect unemployment to be decreasing for low levels of employment protection (as the effect on unemployment inflows dominates) and increasing for larger values of  $s$  (as the effect on unemployment outflows becomes relatively more important). This assumption, which is standard in the literature (see Persson and Tabellini, 2000), is consistent with empirical evidence and delivers an interior minimum at  $\hat{s}^l$ .

Finally, we assume for simplicity that EPL leaves the high-skill types unaffected, i.e., that  $F^h$  and  $H^h$  are constant<sup>8</sup>. Moreover, consistently with the empirical evidence reviewed in Section 2, we assume that the unemployment inflow rate is always higher for the low than for the high skill workers, i.e.  $F^l(s) \geq F^h \forall s$ , and that, for any degree of EPL, the unemployment outflow rate of the high skill workers is higher than the outflow rate of the low skill ones ( $H^l(s) \leq H^h \forall s$ ). It follows that, for any level of EPL, the unemployment rate is higher among the low ability types.

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<sup>8</sup>This is another easily alterable assumption. In a companion paper (see Boeri, Conde-Ruiz and Galasso, 2003), we show that our results hold also in an environment in which EPL affects unemployment inflow and outflow rates of the high-skill types, provided that unemployment flows are less responsive for the high-skill types than for the low-skill individuals and that low-income insiders constitute a majority of the voters.

**Unemployment Benefits ( $\tau$ )** Our UB program imposes a proportional tax,  $\tau$ , on labor income and awards to any type- $j$  unemployed agent a transfer,  $b^j$ . We allow for the UB scheme to entail some redistribution, from high to low skills individuals, which is characterized by a parameter  $\phi \in [0, 1/2]$ .

Since we assume the system to be budget balanced in every period, the total amount of transfers to the two types of unemployed has to equal total contributions from the two groups of workers:

$$b^l u^l \rho + b^h u^h (1 - \rho) = T^l + T^h = \tau l^l w^l \rho (1 - u^l) + \tau l^h w^h (1 - \rho) (1 - u^h)$$

where  $T^l$  and  $T^h$  represent the total contribution from the low and high ability workers respectively. How these contributions are channelled to the low and high ability unemployed individuals depend on the parameter  $\phi$  according to the following expressions:

$$\begin{aligned} b^l u^l \rho &= (1 - \phi) T^l + \phi T^h \\ b^h u^h (1 - \rho) &= (1 - \phi) T^h + \phi T^l \end{aligned} \tag{3.1}$$

Hence, for every type of agent, the unemployment benefit depends on the unemployment rate, on the amount of resources channelled to the UB scheme by both groups of workers, and on the degree of redistribution between the two types. For  $\phi = 0$ , the UB systems for the two types are completely isolated, since the contributions from the low (high) types only finance the benefits for the low (high) skill unemployed. In this case, the generosity of each system depends on the skill-specific unemployment rate, as in a pure insurance scheme, which takes into account the different probabilities of being unemployed of high and low-skill types. For  $\phi \in (0, 1/2]$ , the resources are instead (partially) shared between groups. In this case, some redistribution takes place from high to low skilled individuals, provided that  $T^h > T^l$ . A sufficient condition for this to hold, hence for this model to address cross-skill redistribution, is that wage differentials are large enough relative to the ratio of low-skill individuals to high-skill employed, that is  $(1 + \delta) > \frac{\rho}{(1-\rho)} \frac{1}{(1-u^h)}$ . In what follows we consider this case.

### 3.3. Individual Preferences

As in Wright (1986) and Pissarides (2001), in our model individuals cannot save to insure against the unemployment risk. Thus, in every period, consumption is entirely determined by the employment status of the individuals: if employed, they consume  $(1 - \tau) w^j l^j$ ; if unemployed, they consume  $b^j$ .

We can now characterize the indirect utility function of each type of agents and labor market status with respect to EPL and UB. The expected lifetime utility of a type- $j$  agent who is currently in state  $i$ , is given by:

$$V_i^j(s, \tau) = \frac{(1 - \theta_i^j(s)) ((1 - \tau) w^j l^j + \gamma \ln(1 - l^j)) + \theta_i^j(s) (b^j + \gamma \ln(1 - l^u))}{(1 - \beta)} \quad (3.2)$$

where  $\beta$  is the discount factor, while

$$\theta_I^j(s) = \frac{\beta F^j}{1 - \beta + \beta(F^j + H^j)} \text{ and } \theta_O^j(s) = \frac{1 - \beta + \beta F^j}{\beta F^j} \theta_I^j(s) \quad (3.3)$$

represent the (discounted) proportion of time that a current insider (subscript  $I$ ) and outsider (subscript  $O$ ) type- $j$  will spend unemployed during their lifetime respectively; clearly,  $\theta_O^j(s) > \theta_I^j(s)$ . Notice that for the high-skill types, the measure  $\theta_i^h$  does not depend on EPL.

It is useful at this juncture to define the strictness of EPL which minimizes the (discounted) time spent unemployed by a low-skill insider and outsider respectively<sup>9</sup>:  $\tilde{s}_I = \arg \min \theta_I(s)$  and  $\tilde{s}_O = \arg \min \theta_O(s)$ . It is easy to see that  $\tilde{s}_O < \hat{s}^l < \tilde{s}_I$  – where  $\hat{s}^l$  is the degree of EPL which minimizes the unemployment rate – since  $\tilde{s}_O$  and  $\tilde{s}_I$  take into account the current employment status of the agent. Figure 4 summarizes the behavior of  $\theta_I^l(s)$ ,  $\theta_O^l(s)$ , and  $u^l$  with respect to  $s$ . Notice that the subjective discount factor,  $\beta$ , plays a crucial role in this context. As  $\beta$  approaches 1, current employment conditions lose their relevance and the indirect utilities of low skill insiders or outsiders coincide:

<sup>9</sup>Notice that, as for the unemployment rate,  $u^l(s)$ , the assumptions on  $F^l(s)$  and  $H^l(s)$  stated in the text are sufficient for  $\theta_I(s)$  and  $\theta_O(s)$  to have a minimum, albeit not to be convex.

$\theta_I^j = \theta_O^j = u^j$ ; whereas if  $\beta$  is sufficiently low, individuals will only be concerned about their current status. We hence assume<sup>10</sup> that  $\beta \in (\bar{\beta}, 1)$ .

#### 4. The Political Environment

The strictness of EPL and the generosity of the UB system are determined in the political arena, where the individual preferences – described by the indirect utility functions at equations 3.2 and 3.3 – are aggregated into a policy outcome. Given the strong persistence of the trade-off, we concentrate on steady state equilibria. Agents vote once and for all over the income tax, which finances the unemployment benefits,  $\tau$ , and the strictness of EPL,  $s$ . Due to the endogenous labor supply described in the previous section, taxation involves a Laffer curve effect. As we are interested in characterizing an efficiency-equity trade-off, we restrict the policy space,  $\tau$ , to remain in the increasing portion of the Laffer curve. A sufficient condition for this to hold is to assume that  $\tau < \bar{\tau} = 1 - \sqrt{\gamma/w^l}$ .

Since the issue space is bi-dimensional,  $(\tau, s)$ , Condorcet cycles typically arise. We hence impose on the voting game a set of institutional restrictions, which convert a multi-dimensional election into a simultaneous *issue-by-issue* voting game, in which a structure induced equilibrium exists (see Shapsle, 1979, and Conde-Ruiz and Galasso, 2003 and 2005). The concept of structure induced equilibrium – or issue-by-issue voting – applied to our political game can be summarized as follows. For every value of the strictness of EPL,  $s$ , each voter determines her most preferred generosity of UB,  $\tau$ ; analogously, the most preferred level of  $s$  is chosen for any given  $\tau$ . In other words, every agent votes two reaction functions:  $\tau(s)$  and  $s(\tau)$ . A duple  $(\tau^*, s^*)$  is an equilibrium of this voting game if  $\tau^*$  represents the outcome of a majority voting over the issue  $\tau$  – the level of unemployment benefits – when the other dimension is fixed at  $s^*$ , and likewise for  $s^*$ .

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<sup>10</sup>In the appendix (see proposition A.2), we will conveniently specialize  $\bar{\beta}$  to guarantee that individual preferences over the tax rate are single-peaked.

#### 4.1. Voting over EPL<sup>11</sup> ( $s$ )

The political decision over the EPL,  $s(\tau)$ , depends on the trade-offs that EPL creates through its effects on the unemployment inflow and outflow rates.

Consider a high-skill individual. EPL has no direct relevance for the high types' inflow and outflow rates ( $F^h$  and  $H^h$ ). However, it does affect their utility by modifying the UB that a high-skill type receives when unemployed,  $b^h$ . For  $\phi > 0$ , in fact, unemployment benefits to the high-skill unemployed are partially financed through the contribution paid by the low-skill workers, as the system shares the total resources between groups. This creates a fiscal externality: high-skill individuals (regardless of whether currently insiders or outsiders) benefit from maximizing the resources collected from low-skill workers<sup>12</sup>. They hence choose to minimize the unemployment rate for the low-skill types by setting  $s = \hat{s}^l$ .

The decision on the strictness of EPL for the low-skill individuals – both insiders and outsiders – is more complex, because of the direct impact on their inflow and outflow rates. An increase of EPL has two effects on the indirect utility of the low-skill types (see eq. 3.2). First, it has an impact on the (discounted) proportion of time that a low ability individual (currently insider or outsider) spends unemployed during her lifetime,  $\theta_i^l(s)$ , with  $i = I, O$ . It is easy to see from figure 4 that this effect – by raising the discounted probability of being employed – increases the utility of the low-skill insider for  $s < \tilde{s}_I$ , and of a low-skill outsider for  $s < \tilde{s}_O$ . Second, an increase in EPL modifies the unemployment benefit of the low-skill type (see eq. 3.1), through the changes in the unemployment rate. For both insiders and outsiders, the benefits – hence the utility – increase for  $s < \hat{s}^l$ . Thus, when voting on the strictness of EPL, a clear ordering of preferences emerges. Low-skill outsiders will vote for a lower strictness of EPL than the one minimizing the unemployment rate, in order to enhance their probability of being

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<sup>11</sup>Proposition A.1 in the appendix derives all the results presented in this section.

<sup>12</sup>For  $\tau = 0$ , there is no UB system, and hence high-skill types are indifferent about the strictness of EPL. To simplify the analysis, we assume that they still vote  $s = \hat{s}^l$ .

hired,  $s_O^l(\tau) \in (\tilde{s}_O, \hat{s}^l)$ . Low-skill insiders will instead support a higher level of EPL to protect their current employment status,  $s_I^l(\tau) \in (\hat{s}^l, \tilde{s}_I)$ . Regardless of their current status, high-skill individuals will prefer to set  $s_i^h(\tau) = \hat{s}^l$  with  $i = I, O$ . Hence, we have  $s_O^l(\tau) < s_I^h(\tau) = s_O^h(\tau) = \hat{s}^l < s_I^l(\tau)$ .

How do these preferences over the strictness of EPL depend on the UB level? The decision of the high-skill individuals is unaffected by the tax rate financing the UB system, as long as this tax is positive. As shown in figure 5, if the median voter over  $s$  is a high-skill type, the reaction function  $s(\tau)$  is vertical. For a low-skill insider, instead, there is a negative relationship between EPL and UB (see proposition A.1 in the Appendix), since a higher level of unemployment insurance for the low-skills reduces the cost, in terms of consumption, of being unemployed; thus leading a low-skill insider to require less EPL. An example of the reaction function of  $s$  with respect to  $\tau$  for a low ability insider is given in Figure 5.

#### 4.2. Voting over UB<sup>13</sup> ( $\tau$ )

In determining the tax rate that finances the UB, for any given level of EPL,  $\tau(s)$ , every individual trades off the costs represented by the stream of contributions when employed with the benefit of receiving a UB transfer when unemployed. If the UB system entails no redistribution (when  $\phi = 0$ ), insiders – both low and high-skill – oppose any positive contribution to the system. In fact, due to the linearity in consumption of their utility function, they have no incentive to buy insurance against unemployment risk; moreover, given their current status of insiders, they would receive a negative net present value from the program, since this introduces a distortion in the economy, through the UB contribution on the labor income. Low and high ability outsiders, on the other hand, support the system, due to their current status of unemployed.

The presence of a redistributive element in the UB system ( $\phi > 0$ ) modifies the

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<sup>13</sup>Proposition A.2 in the appendix derives all the results presented in this section.

individuals' preferences by making low (high) skill types more (less) willing to support the system. In particular, for a sufficiently large degree of redistribution, even low skill insiders will vote for a positive tax rate. Given the (three) possible ordering of preferences over  $\tau$ , it is important to notice that the median voter is always a low-skill insider, as shown in the appendix.

The median voter most preferred tax rate will be increasing in the progressiveness of the UB system,  $\phi$ , and in the wage differential between high and low skill workers,  $\delta$ , but decreasing in the strictness of EPL (see proposition A.2 in the Appendix). The intuition is straightforward. More earning inequality or a more progressive UB system involve more cross-skill redistribution operated by the UB system, thereby making unemployment benefits more appealing to low skill types. For  $s \in (\hat{s}^l, \tilde{s}_I)$ , more EPL reduces the low-skill insiders' probability of being unemployed and hence to cash in the transfer. Moreover, an increase in EPL reduces also the level of UBs, by raising the share of unemployed. The reaction function of  $\tau$  with respect to  $s$  (see Figure 5) is thus negatively sloped.

### 4.3. Political Equilibria

In order to fully characterize the political equilibria of this issue-by-issue voting game, one needs to obtain the duple  $(s^*, \tau^*)$  at the intersection of the two reaction functions of the median voter. This is described in the next two propositions and characterized graphically in Figures 5, 6, and 7 where the reaction functions,  $\tau_I^l(s)$ ,  $s_I^l(\tau)$  and  $s_I^h(\tau)$  are portrayed. Proposition 4.1 explains locations along the UB-EPL trade-off, notably along the  $\tau_I^l(s)$  function, as different political equilibria that arise because of different proportions of high and low skilled individuals in the population. Starting from these equilibria, Propositions 4.2 accounts for additional locations involving more or less of both institutions<sup>14</sup>, due to different specifications in the redistributiveness of the UB

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<sup>14</sup>In this case also shifts of the UB reaction function are at work.

system and in the degree of wage compression in the economy.

**Proposition 4.1.** *For  $\phi > 0$ , two issue-by-issue equilibria of the voting game may emerge: (i) if  $\rho(1 - u^l) > 1/2$ , there exists an equilibrium  $(s^*, \tau^*)$ , such that  $s^*(\tau^*) = s_I^l(\tau^*) \in (\widehat{s}^l, \widetilde{s}_I)$  and  $\tau^*(s^*) \in [0, \bar{\tau}]$ ; (ii) if  $\rho(1 - u^l) < 1/2$ , there exists an equilibrium  $(s^{**}, \tau^{**})$ , such that  $s^{**}(\tau^{**}) = \widehat{s}^l$  and  $\tau^{**}(s^{**}) \in [0, \bar{\tau}]$ . Comparing equilibria, we have  $s^* > s^{**}$  and  $\tau^* \leq \tau^{**}$ . For  $\phi = 0$ , there exists a unique equilibrium characterized by  $(\widetilde{s}_I, \tau = 0)$ .*

Figure 5 displays the equilibrium outcomes described in this Proposition. If they constitute a majority of the voters, low-skill insiders will dictate both labor market policies – EPL and UB. In this case, the above Proposition suggests that they will adopt a strict labor market regulation  $s^* > \widehat{s}^l$ , which may or may not be accompanied by a UB system, depending on its degree of progressiveness,  $\phi$ . If low-skill insiders are not a majority, they will still be pivotal in determining the UB system, but the decision over the rigidity of the labor market (EPL) will be taken by a high-skill individual. In this case, which may occur for a large share of high-skill individuals in the population, a lower degree of EPL will emerge, since high-skill types will prefer to minimize the unemployment rate among the low-skill workers – due to the fiscal externality in the UB system. Faced with less EPL, low-skill insiders will then be willing to support a larger UB system, provided that this entails some redistribution from high to low-skill types. This Proposition explains the existence of a trade-off between EPL and UB across groups of countries with the difference in their share of low-high ability individuals in the population. Countries with a substantial proportion of high-skill individuals will not feature a low-skill insider as a median voter over the EPL decision and will have a more flexible labor market and more UB spending.

The mechanism driving the trade-off in the above proposition is based on the redistributive features of UB and EPL. If some of these redistributive elements are modified,

so are the incentives faced by the median voter, particularly when she corresponds to a low-skill insider. The next proposition analyzes how a change in the degree of progressiveness of the UB system,  $\phi$ , and in the wage differential between high and low-skill workers,  $\delta$ , (recall that  $w^h = (1 + \delta)w^l$ ) modifies the politico-economic equilibrium outcomes of the political game.

**Proposition 4.2.** *Consider an interior equilibrium outcome for cases (i) and (ii) at Proposition 4.1, that is,  $s^* \in (\hat{s}^l, \tilde{s}_I)$ ,  $\tau^* \in (0, \bar{\tau})$ , and  $s^{**} = \hat{s}^l$ ,  $\tau^{**} \in (0, \bar{\tau})$ . An increase in the wage differential between high and low-skills workers,  $\delta$ , or an increase in the progressiveness of the UB system,  $\phi$ , induce a change in these equilibrium outcomes from  $(s^*, \tau^*)$  to  $(s^{*'}, \tau^{*'})$  with  $s^{*' } < s^*$  and  $\tau^{*' } > \tau^*$ , and from  $(s^{**}, \tau^{**})$  to  $(s^{**'}, \tau^{**'})$  with  $s^{**'} = s^{**}$  and  $\tau^{**'} > \tau^{**}$ .*

This proposition, which has its graphical representation at figure 6, provides an additional political economic explanation for the observed trade-off between EPL and UB. Consider a country with a high proportion of low-skill individuals, so that  $\rho(1 - u^l) > 1/2$ . An increase in the wage differentials or in the progressiveness of the UB system will induce the low-skill insiders, which constitute the pivotal political players, to favor flexibility configurations with generous UB schemes, in order to appropriate more resources – when unemployed – from the high-skill individuals, and low EPL. In the jargon of the issue-by-issue voting described in section 4, this involves an upward shift in the reaction function  $\tau(s)$ , as displayed in Figure 6. Because of the higher unemployment benefit, due to the wider wage differential or to a more progressive design of the system, the difference in utility between the good state – employment – and the bad state – unemployment – is reduced, and hence the low-skill insiders vote for less EPL. The reaction function  $s(\tau)$  shifts downwards, and a new equilibrium with more UB and less EPL is reached, as displayed at point B in Figure 6. Even in a country with a low proportion of low-skill individuals ( $\rho(1 - u^l) < 1/2$ ), an increase in the wage differentials or in the

progressiveness of the UB system will still induce the low-skill insiders to increase the generosity of the UB system, in order to benefit from the larger transfers, although no changes will occur in the strictness of EPL, which is determined by the high-skill types. In other words, there will still be an upward shift in the reaction function  $\tau(s)$ , but the reaction function  $s(\tau)$  will not change and the new equilibrium will feature more UB but the same level of EPL.

#### 4.4. Extensions

The results in the previous section identify a clear trade-off between EPL and UB across countries. Despite the economic and political environment being quite stylized, these results are robust to several modifications. This section discusses some of these extensions<sup>15</sup>.

##### 4.4.1. Risk aversion

The political economic explanation of the UB-EPL trade-off hinges largely on the redistributive components embedded in both programs. In particular, a more redistributive UB system – or a large wage differential that allows more resources to be redistributed through UB – increase the support for this program among the low skill individuals, while reducing the popularity of EPL. Yet, both UB and EPL are typically advocated as insurance mechanisms against the risk of job loss. The log-linear specification of the utility function introduced in section 3 does not allow for this specific role – particularly for the UB. Would the qualitative results change if we consider risk averse individuals? Not really. Now, even in absence of any redistribution ( $\phi = 0$ ), the (risk averse) insiders are willing to demand some UBs, to ensure against the risk of low (or no) consumption when unemployed<sup>16</sup>. The trade-off between UB and EPL will thus still emerge, with a larger level of UB.

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<sup>15</sup>A formal treatment of all these extensions is available from the authors upon request.

<sup>16</sup>In particular, with logarithmic (in consumption) utility, the UB contribution rate chosen by the low skill insiders would correspond to  $\theta_l^*$ .

#### 4.4.2. Moral hazard

The stylized economic model described at section 3.1 does not allow for the existence of an UB to affect the probability of an unemployed to find a job, although a large empirical literature has pointed out how the provision of UBs may disincentive job search (see the surveys by Atkinson and Micklewright, 1991 and Krueger and Meyer, 2002). To address this issue, we assume that the unemployment outflow rate of low skill types is negatively related to the UB contribution rate. This extension introduces substantial modifications to the structure of the model. In particular, the degree of EPL chosen by the different agents will now negatively depend on the UB level. And the UB contribution rate chosen by the median voter will decrease, due to the additional negative effect of the UB on the outflow rate – and hence on the unemployment rate. Despite these changes, however, a trade-off between the degree of EPL and the generosity of unemployment benefits still arises, depending on the skill composition of the economy.

#### 4.4.3. Alternative political environments

Also the political system may be subject to further exploration. To deal with a multidimensional policy space, in which both the degree of EPL and the UB contribution rate have to be determined, we relied on a steady state version of the structured induced equilibrium, which expands the logic of the median voter into a multidimensional setting. Yet, would the existence of an EPL-UB trade-off survive in another political environment? To test the robustness of this result, we consider two alternative political regimes.

In a *party unanimity Nash equilibrium* (PUNE), as introduced by Roemer (1999), voters chose between two parties or coalitions according to their policy platform. Each party appeals to its own electorate, and within party decisions over the economic policy require unanimity. Consider two parties – right and left. The left party seeks the support of low skill insiders and outsiders, while the right party seeks the support of

high skill agents and of low ability insiders. Parties are assumed to be uncertain about the distribution of voter types, and the expected utility of a party coincides with the expected utility of its constituency, which is composed of three groups of actors: i) militants, who want the party to adhere as closely as possible to its principles, i.e. to its partizan ideology; ii) opportunists, who only care about winning the elections; and iii) reformists who wish to maximize the expected utility of the party's constituency. Given a proposal by the opposition, in every party the final decision about the policy requires inner-party unanimity, which coincides with unanimity between opportunists and militants, since the agreement of the reformists would automatically follow. It is easy to see that the policy outcome associated with the issue-by-issue voting game in the previous political environment is also a party unanimity Nash equilibrium. In fact, the policy platform chosen by both parties targets the low skill insiders – which also in the previous political game at section 4.1 coincided with the pivotal (median) voters. A deviation in the policy platform by a party towards more extreme positions, such as its partizan ideology – given the other party's platform – would be welcome by the militants, but be opposed by the opportunists, since it would reduce the party's probability of winning the election. The existence of the UB-EPL trade-off according to the population skill composition thus carries over to this alternative political scenario.

Another commonly used political environment is the *probabilistic voting model* (see Coughlin, 1992, and Persson and Tabellini, 2000). In this setting, two political candidates compete in a majoritarian election by adopting a political platform, which in our example would consist of a combination of EPL and UB, in order to maximize their probability of winning the election. The winning candidate becomes the policy-maker and implements the proposed policy. Agents vote according to the indirect utility associated to each candidate's platform, and to their degree of political ideology. Hence, both candidates will end up determining the (same) combination of EPL and UB in order to maximize a welfare function that weights the indirect utility function of all

four groups of voters: low and high skill insiders and outsiders. The solution of this political process thus resembles the issue-by-issue case in that each political candidate will determine – contemporaneously but independently – the degree of EPL and of UB. In the formulation with logarithmic utility, it is easy to show that two political equilibria exist, giving rise to the UB-EPL trade-off, with different locations depending on the relative weight of the low and high skill individuals in the economy.

#### 4.4.4. Labor mobility

A final extension is related to the recent contributions by Hassler et al. (2002 and 2005), which suggest that the large difference in the UB systems between the US and the European countries may be due to the interplay between the agents individual characteristics, such as the cost of changing location, and the political decision over UB. More mobile agents with more general (i.e., less firm specific) skills are more likely to move, when unemployed, to find a job. They hence enjoy a higher hiring rate, and have a lower demand for UB. It is straightforward to show that this implication hold also in our bidimensional voting environment. Countries featuring more mobile individuals, as proxied by a *ceteris paribus* higher hiring rate, enjoy a lower degree of EPL and may choose a lower UB. Figure 7 provides a graphical representation of this result, which may help to account for the institutional characteristics of the US (and partly the British) labor market – low EPL and low UB – as shown in figure 1.

## 5. Empirical Relevance

Our model implies that configurations with more UB and less EPL arise in presence of more dispersed wage structures<sup>17</sup> and unemployment benefits allowing for a relatively high degree of progressiveness. It also suggests that shifts of the trade-off towards the origin – with less UB per any given level of EPL – should be present when workers are

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<sup>17</sup>A correlation between wage compression and EPL, yet not UB generosity, was also in Bertola and Rogerson (1997), who viewed them as complementary policies.

more mobile and more than 50 per cent of the population is highly educated.

Table 3 displays results of a panel regression of the country location along the UB/EPL trade-off against measures of the key explanatory factors identified by our model. In particular we run the following regression over data from the European Commission Household Panel (ECHP)

$$\ln(UB_{it}/EPL_{it}) = a + \beta EDU_{it} * IMMOB_{it} + \gamma BEV_{it} * GINIWAGE_{it}$$

where  $UB$  and  $EPL$  are the summary generosity and strictness measures, respectively, which were introduced in Section 2,  $EDU$  is a dummy variable taking value 1 when more than 50% of the population has tertiary education or more and 0 otherwise,  $IMMOB$  measures the fraction of households leaving in owner-occupied dwellings, and  $BEV$  is the 67/150 replacement rate (see Table 2), a measure of progressiveness in the UB design. Finally  $GINIWAGE$  measures the Gini coefficient over the unexplained component of the cross-sectional wage dispersion in each country, that is, the variance of the residuals from the Mincer-type wage equation:

$$\log(w_i) = \alpha + \beta SCHOOL_i + \gamma_1 TEN_i + \gamma_2 TEN_i^2 + \lambda_i + \varepsilon_i$$

where  $SCHOOL$  represents years of education and  $TEN$  denotes tenure in the current job, while  $\lambda$  is a Heckman correction term.

As can be seen from Table 3, the two key variables are highly significant and have the expected sign: more exogenous wage dispersion (i.e., related to weaker unions or decentralized wage bargaining) coupled with a progressive design of UBs yield configurations with more UBs and less EPL; less mobility in presence of a highly educated workforce also increases the UB content of the equilibrium configuration.

### 5.1. Lessons from the Reformers

Further insights as to the factors affecting countries location along and across the UB/EPL trade-off come by contrasting the experience of the few Governments that

succeeded in partly reducing EPL for regular workers in the period covered by data with that of countries with similar initial institutional configurations that did not reform EPL for regular workers. Although our model is not dynamic, it suggests that moves towards flexicurity require more dispersed wage structures or more progressive UBs. As recalled in section 2, the only major reformers were Korea, Finland, Spain and Greece. The reforms of EPL that occurred in Finland and Spain were split into a number of milder liberalization measures. In particular, in Finland, there were three waves of reforms: in 1991, 1996 and 2001, while in Spain mild reductions of EPL for regular workers were enacted in 1994 and 1997. In Korea, reforms were carried out in 1998. In Greece, EPL was modified in the late 1980s (a period not covered by ECHP data) and the reform was even milder than in Finland and Spain. Hence, we concentrate on Finland, Spain and Korea.

Table 4 compares the experience of Spain with that of Greece, the experience of Finland with that of Denmark, and the experience of Korea with that of Japan. These “matches” are chosen by drawing on a taxonomy of labour market and social policy institutions in the EU (Bertola and Boeri, 2002), pulling together, on the one hand, Nordic and, on the other hand, Southern European countries, and taking Japan as the closest match to Korea in the 1990s. Importantly, the changes to the dispersion of earnings before the reforms are likely to be associated to exogenous factors, such as a spread of ICT technologies (e.g., the percentage of households using personal computers users increased by 34 base points in Spain compared with only 15 per cent in Greece) or women participation in the labour market (the employment rate of women increased by 2.7 base points in Finland compared with only 0.8 for Denmark).

As shown by Table 4, Spain reduced EPL after having experienced an increase in the dispersion of its earning distribution (the Gini coefficient over earnings had increased by 6 base points). The reduction in EPL was also associated with an increase in the progressiveness of UBs, while the opposite happened in Greece. Moving to another

match, Finland reduced EPL for regular workers without having experienced an increase in earning dispersion, but – unlike Denmark – it adjusted the design of its UB system by making it more progressive. Turning to the last match, table 4 shows that also in Korea EPL reduction was associated with an increase in earning dispersion, unlike developments in Japan. UB adjustments were also made in Korea in line with the predictions of our model.

Overall, there is some indication that countries succeeding in partly reducing EPL for regular workers experienced an increase in earning inequality or in the progressiveness of UBs compared with countries with similar institutional configurations at the outset, which did not reform EPL for regular workers.

## 6. Conclusions

OECD countries provide different types of insurance to workers against labor market risks, by combining different degrees of employment protection and unemployment insurance. The European Commission and several national Governments are often arguing in favour of adopting “flexicurity”, assigning a greater weight to UB and less importance to EPL in protecting workers against labor market risk. However, the institutional configurations of the different countries are remarkably stable.

Unlike previous literature, this paper characterizes EPL and UBs as schemes redistributing not only between insiders and outsiders, but also across skill groups. Our theoretical model suggests that “flexicurity” configurations, characterized by less EPL and more UB, should emerge in countries with less compressed wage structures and a more progressive design of the welfare state. It also suggests that shifts to less protective configurations (with less UB per any given level of EPL, like in the US or UK) are associated with more mobility and higher education of the workforce.

Empirical findings are in line with this theoretical implication.

Our analysis may inspire a political feasibility theorem: reforms of employment pro-

tection need to trade labor market flexibility with state-provided unemployment insurance which redistributes in favor of the low-skill segments of the workforce. The dynamic adjustment to a new equilibrium is a subject for future research.

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## A. Appendix

**Proposition A.1.** *When voting over the degree of EPL,  $s$ , for a given  $\tau \in [0, \bar{\tau}]$ , we have that:*

1. *high ability (insiders and outsiders) set  $s_i^h(\tau) = \hat{s}^l$  with  $i = I, O, \forall \tau$ ;*
2. *low ability outsider set  $s_O^l(\tau) \in (\tilde{s}_O, \hat{s}^l)$ ;*
3. *low ability insider set  $s_I^l(\tau) \in (\hat{s}^l, \tilde{s}_I)$ . This level  $s_I^l(\tau)$  is decreasing in  $\tau$ , in  $\delta$  and in  $\phi$ ;*
4. *The median voter over  $s$  is a low ability insider if  $(1 - u^l)\rho > 1/2$ , and a high ability individual otherwise*

### Proof of Proposition A.1.

1. For high ability individuals, the first order condition resulting from the maximization problem of choosing  $s$  for a given  $\tau$  amounts to

$$\theta_i^h \frac{\partial b^h}{\partial s} = - \frac{\theta_i^h}{1 - \beta(1 - \rho)} \frac{\tau \phi w^l l^l \rho}{u^h} \frac{\partial u^l}{\partial s}. \quad (\text{A.1})$$

Due to the fiscal externality (their UB depends on the resources collected from the low ability workers) the utility of the high ability is thus maximized when the low ability unemployment rate is minimized, i.e., for  $s_i^h(\tau) = \hat{s}^l$  for both insiders and outsiders and for all  $\tau$ .

2. For low ability individuals, the first order condition resulting from the maximization problem of choosing  $s$  for a given  $\tau$  amounts to

$$-\Delta^l \frac{\partial \theta_i^l(s)}{\partial s} + \theta_i^l(s) \frac{\partial b^l}{\partial s} \quad (\text{A.2})$$

with  $i = I, O$ , where

$$\frac{\partial b^l}{\partial s} = - \left[ \frac{b^l}{u^l} + \frac{\tau(1 - \phi)w^l l^l}{u^l} \right] \frac{\partial u^l}{\partial s}.$$

It is easy to see that – for a low ability outsider, i.e.,  $i = O$  – the FOC at eq. A.2 is positive if evaluated at  $s = \tilde{s}_O$ , since the former term is equal to zero, while the latter is positive (notice that  $\frac{\partial u^l}{\partial s} < 0$  at  $s = \tilde{s}_O < \hat{s}^l$ ). On the other hand, if evaluated at  $s = \hat{s}^l$ , the FOC at eq. A.2 is negative, since the former term is negative (notice that  $\frac{\partial \theta_O^l}{\partial s} > 0$  at  $s = \hat{s}^l$ ), while the latter equals zero. Finally, simple algebra shows that preferences are single-peaked and that the second order condition of the above maximization problem evaluated at  $s_O^l(\tau)$  is negative, so that  $s_O^l(\tau) \in (\tilde{s}_O, \hat{s}^l)$  is a maximum.

3. For low ability insider, the maximization problem of choosing  $s$  for a given  $\tau$  is characterized by the FOC at eq. A.2, with  $i = I$ . It is easy to see that this is positive if evaluated at  $s = \hat{s}^l$ , since the former term is positive (notice that  $\frac{\partial \theta_I^l}{\partial s} < 0$  at  $s = \hat{s}^l$ ), while the latter is equal to zero. Moreover, if we evaluated at  $s = \tilde{s}_I$ , the FOC at eq. A.2 is negative, since the former term is equal to zero, while the latter is negative (notice that  $\frac{\partial u^l}{\partial s} > 0$  at  $s = \tilde{s}_I > \hat{s}^l$ ). Finally, simple algebra shows that preferences are single-peaked and that the second order condition of the above maximization evaluated at  $s_I^l(\tau)$  is negative, so that  $s_I^l(\tau) \in (\hat{s}^l, \tilde{s}_I)$  is a maximum. To prove that  $s$  is decreasing in (i)  $\tau$ , (ii)  $\delta$  and (iii)  $\phi$ , we use the total differential on the FOC at eq. A.2. Since the SOC is negative at  $s_I^l(\tau)$ , the sign of  $ds/d\tau$  corresponds to the sign of  $dFOC(s)/d\tau$ , and analogously for  $\delta$  and  $\phi$ .

- It is easy to see that  $ds/d\tau < 0$ . From the FOC at eq. A.2, we have

$$\frac{dFOC(s)}{d\tau} = \left[ w^l l^l + \frac{\partial b^l}{\partial \tau} \right] \frac{\partial \theta_I^l(s)}{\partial s} + \theta_I^l(s) \frac{\partial^2 b^l}{\partial s \partial \tau}$$

where

$$\frac{\partial^2 b^l}{\partial s \partial \tau} = -\frac{\partial u^l}{\partial s} \left[ \frac{1}{u^l} \frac{\partial b^l}{\partial \tau} - \frac{w^l (1 - \phi)}{u^l} \left( 1 - \frac{\tau \gamma}{(1 - \tau)^2} \right) \right] < 0$$

since  $\partial u^l/\partial s > 0$  for  $s > \tilde{s}^l$ , and  $\partial b^l/\partial \tau \geq 0$  and  $(1 - \tau\gamma/(1 - \tau)^2) \geq 0$  for  $\tau \in [0, \bar{\tau}]$ . Since  $\partial \theta_I^l/\partial s < 0$  for  $s < \tilde{s}_I$ , then  $dFOC(s)/d\tau < 0$ .

- To show that  $ds/d\delta < 0$ , notice that

$$\frac{dFOC(s)}{d\delta} = \frac{\partial b^l}{\partial \delta} \frac{\partial \theta_I^l(s)}{\partial s} + \theta_I^l(s) \frac{\partial^2 b^l}{\partial s \partial \delta} < 0$$

since

$$\frac{\partial b^l}{\partial \delta} = \frac{\phi}{\rho u^l} \frac{\partial T^h}{\partial \delta}, \quad \frac{\partial^2 b^l}{\partial s \partial \delta} = -\frac{\phi}{\rho (u^l)^2} \frac{\partial u^l}{\partial s} \frac{\partial T^h}{\partial \delta} \quad \text{and} \quad \frac{\partial T^h}{\partial \delta} > 0.$$

- To show that  $ds/d\phi < 0$ , notice that

$$\frac{dFOC(s)}{d\phi} = \frac{\partial b^l}{\partial \phi} \frac{\partial \theta_I^l(s)}{\partial s} + \theta_I^l(s) \frac{\partial^2 b^l}{\partial s \partial \phi}$$

where

$$\frac{\partial b^l}{\partial \phi} = \frac{T^h - T^l}{\rho u^l} > 0, \quad \text{and} \quad \frac{\partial^2 b^l}{\partial s \partial \phi} = -\frac{\partial u^l}{\partial s} \left[ \frac{T^h - T^l}{\rho (u^l)^2} - \frac{\tau w^l l^l}{u^l} \right]$$

with  $\frac{\partial^2 b^l}{\partial s \partial \phi} < 0$  for  $(1 + \delta) > \frac{\rho}{(1-\rho)(1-u^l)}$ .

4. Given the results obtained above, the preferences of the voters can be ranked as follows:  $\tilde{s}_O < s_O^l(\tau) < s_I^h(\tau) = s_O^h(\tau) = \tilde{s}^l < s_I^l(\tau) < \tilde{s}_I$ . For  $(1 - u^l)\rho > 1/2$ , the low ability insiders constitute a majority of the population and hence the median voter over  $s$  is a low ability insider. Given the ordering above, if  $(1 - u^l)\rho < 1/2$ , the median voter over  $s$  is a high ability individual, since the low ability outsiders cannot be a majority of the voters, since  $u^l < 1/2$ . **q.e.d.**

**Proposition A.2.** *When voting over the size of the UB system,  $\tau \in [0, \bar{\tau}]$ , for a given degree of EPL  $s$ , we have that:*

1. *given an individual type, outsiders are weakly more favorable to the UB system than outsiders.*

2. For  $\phi = 0$  (no redistribution), low and high ability insiders oppose the system, while low and high ability outsiders support  $\tau > 0$ ;
3. An increase in  $\phi$  weakly increases (reduces) the support for the system among the low (high) ability individuals;
4. the median voter over  $\tau$  is a low ability insider;
5. the median voter most preferred tax rate,  $\tau_I^l(s)$ , is increasing in  $\delta$  and in  $\phi$ , and decreasing in  $s$ .

**Proof of Proposition A.2.**

1. the first order condition resulting from the maximization problem of choosing  $\tau$  for a given  $s$  is equal to

$$-\left(1 - \theta_i^j\right) w^j l^j + \theta_i^j \frac{\partial b^j}{\partial \tau} = 0 \quad i = I, O; \quad j = l, h \quad (\text{A.3})$$

Simple algebra shows that, for every  $i$  and  $j$ , the second order condition is negative for  $\beta > \bar{\beta} = \max \left\{ \frac{1}{1+H^l}, \frac{1}{1+H^l \frac{(1-\rho)(1-u^h)}{\rho(1-u^l)}} \right\}$ . Moreover, given  $j = l$  or  $h$ , since  $\theta_I^j < \theta_O^j$ , it follows that  $\tau_I^j \leq \tau_O^j$ .

2. For  $\phi = 0$ , the FOC at eq. A.3 becomes

$$-\left(1 - \theta_i^j\right) \left( w^j - \frac{\gamma}{1 - \tau} \right) + \theta_i^j \frac{1 - u^j}{u^j} \left( w^j - \frac{\gamma}{(1 - \tau)^2} \right) \quad (\text{A.4})$$

which, evaluated at  $\tau = 0$ , is positive for  $\theta_O^j > u^j$ , and negative for  $\theta_I^j < u^j$ . Hence, given  $j = l$  or  $h$ , outsiders will support some UB while insiders will oppose the system.

3. An increase in  $\phi > 0$  will increase  $\frac{\partial b^l}{\partial \tau}$  while decreasing  $\frac{\partial b^h}{\partial \tau}$  in eq. A.3. Hence, for a given  $i = I$  or  $O$ , the tax rate chosen by a low (high) ability individual will weakly increase (decrease).

4. The above results imply that  $\tau_I^j \leq \tau_O^j \forall j$  and  $\tau_i^l(s) \geq \tau_i^h(s) \forall i$ . Hence, three ranking are possible: (1)  $\tau_O^l \geq \tau_I^l \geq \tau_0^h \geq \tau_I^h$ ; (2)  $\tau_O^l \geq \tau_O^h \geq \tau_I^l \geq \tau_I^h$ ; and (3)  $\tau_O^h \geq \tau_O^l \geq \tau_I^l \geq \tau_I^h$ . For all this ranking the median voter will be a low skill insider, since  $w^j < 1/2 \forall j$  and  $\rho > 1/2$ .
5. The maximization problem of the median voter is characterized by the FOC at eq. A.3, with  $i = I$  and  $j = l$ . To prove that  $\tau$  is (i) decreasing in  $s$ , and increasing in (ii)  $\delta$  and (iii)  $\phi$ , we use the total differential on the FOC at eq. A.3. Since the SOC is negative, the sign of  $d\tau/ds$  corresponds to the sign of  $dFOC(\tau)/ds$ , and analogously for  $\delta$  and  $\phi$ .

- It is easy to see that  $d\tau/ds < 0$ . From the FOC at eq. A.3, we have

$$\frac{dFOC(\tau)}{ds} = \left[ w^l l^l + \frac{\partial b^l}{\partial \tau} \right] \frac{\partial \theta_I^l(s)}{\partial s} + \theta_I^l(s) \frac{\partial^2 b^l}{\partial s \partial \tau}$$

where

$$\frac{\partial^2 b^l}{\partial s \partial \tau} = -\frac{\partial u^l}{\partial s} \left[ \frac{1}{u^l} \frac{\partial b^l}{\partial \tau} - \frac{w^l(1-\phi)}{u^l} \left( 1 - \frac{\tau\gamma}{(1-\tau)^2} \right) \right] < 0$$

since  $\partial u^l/\partial s > 0$  for  $s > \tilde{s}^l$ , and  $\partial b^l/\partial \tau \geq 0$  and  $\left( 1 - \tau\gamma/(1-\tau)^2 \right) \geq 0$  for  $\tau \in [0, \tau_{\max}]$ . Since  $\partial \theta_I^l/\partial s < 0$  for  $s < \tilde{s}_I$ , then  $dFOC(\tau)/ds < 0$ .

- To show that  $d\tau/d\delta > 0$ , notice that

$$\frac{dFOC(\tau)}{d\delta} = \theta_I^l(s) \frac{\partial^2 b^l}{\partial \tau \partial \delta} > 0$$

since

$$\frac{\partial^2 b^l}{\partial \tau \partial \delta} = \frac{w^l \phi (1-\rho) (1-u^h)}{\rho u^l} > 0.$$

- To show that  $d\tau/d\phi > 0$ , notice that

$$\frac{dFOC(\tau)}{d\phi} = \theta_I^l \frac{\partial^2 b^l}{\partial \tau \partial \phi}$$

where

$$\frac{\partial^2 b^l}{\partial \tau \partial \phi} = \frac{w^l \left[ (1 + \delta)(1 - \rho)(1 - u^h) - \rho(1 - u^l) \right]}{\rho u^l} + \frac{\gamma \left[ (1 - \rho)(1 - u^h) - \rho(1 - u^l) \right]}{\rho u^l (1 - \tau)^2} > 0.$$

**q.e.d.**

**Proof of Proposition 4.1:** We need to show that the reaction functions  $\tau(s)$  and  $s(\tau)$  cross at least once. Recall that,  $\tau_I^l(s)$  is decreasing in  $s$ , that  $s_I^l(\tau) \in (\hat{s}^l, \tilde{s}_I)$  is decreasing in  $\tau$ , and that  $s_i^h = \hat{s}^l \forall i, \tau$ . Consider case (ii). Since  $s(\tau) = \hat{s}^l \forall \tau$ , there will be an equilibrium with  $s = \hat{s}^l$ , and  $\tau \in [0, \bar{\tau}]$  implicitly defined at eq. A.3 for  $s = \hat{s}^l$ .

Now consider case (i). For  $\tau = 0$ , i.e., no UB system, the low ability insider median voter will set  $s_I^l(0) = \tilde{s}_I$ , whereas for  $\tau = \bar{\tau}$ , she will choose  $s_I^l(\bar{\tau}) \geq \hat{s}^l$ . For  $s = \tilde{s}_I$ , the low ability insider median voter will set  $\tau(\tilde{s}_I) \geq 0$ , with the disequality holding for large values of  $\phi$ . If  $\tau(\tilde{s}_I) = 0$ , we clearly have an issue-by-issue voting equilibrium  $(\tilde{s}_I, \tau = 0)$  with no UB and an extremely rigid labor market. If  $\tau(\tilde{s}_I) > 0$ , we can still have an equilibrium. If for  $s = \hat{s}^l$   $\tau(\tilde{s}_I) \leq \tau(\hat{s}^l) < \bar{\tau}$ , the two reaction functions cross in an interior, i.e., for  $\tau \in (0, \bar{\tau})$ . If  $\tau(s) = \bar{\tau}$  for  $\hat{s}^l < s < \tilde{s}_I$ , then the two reaction functions cross at  $\tau = \bar{\tau}$  and  $s = s_I^l(\bar{\tau}) \geq \hat{s}^l$ .

By comparing case (i) and (ii), we have that  $s^* \geq \hat{s}^l = s^{**}$ . Since  $\tau^*(s) = \tau^{**}(s) = \tau_I^l(s)$  is weakly decreasing in  $s$ , it follows that  $\tau^* \leq \tau^{**}$ . Finally, notice that for  $\phi = 0$ , all insiders set  $\tau^* = 0$  and the high ability types abstain from voting over  $s$ , so that the median voter over  $s$  is always a low ability insider. It follows that there exists an equilibrium with  $\tau = 0$  and  $s = \tilde{s}_I$ .

**Proof of Proposition 4.2.** To prove this proposition, we use the results at Propositions A.1 and A.2 that (i) an increase of  $\delta$  or  $\phi$  moves the reaction function  $s(\tau)$  to the left for  $\rho(1 - u^l) > 1/2$ , since  $ds_I^l(\tau)/d\delta < 0$  and  $ds_I^l(\tau)/d\phi < 0$ , but does not affect

$s(\tau) = s^h(\tau) = \hat{s}^l$ . (ii) an increase of  $\delta$  or  $\phi$  moves the reaction function  $\tau_I^l(s)$  upward, since  $d\tau_I^l(s)/d\delta < 0$  and  $d\tau_I^l(s)/d\phi < 0$ . **q.e.d**

**Proof of Proposition 4.3.** In the interior equilibrium,  $s^h(\tau) = s^*(\tau) = \hat{s}^l$  and  $\tau^* = \tau_I^l(s) \in (0, \bar{\tau}]$ , consider the new outflow rate function  $\tilde{H}(s)$  such that  $\tilde{H}(s) > H(s) \forall s$  and such that  $\eta_{\tilde{H}s} = -\frac{\tilde{H}'s}{\tilde{H}} = \eta_{Hs} = -\frac{H's}{H}$ . Moreover, this is easy to see that  $\tilde{u} = \frac{F}{F+\tilde{H}} < u = \frac{F}{F+H}$ . To prove this proposition, we need to consider how the decisions of (a) the median voter over  $s$  and (b) the median voter over  $\tau$  change. And thus how the reaction functions  $s^h(\tau)$  and  $\tau_I^l(s)$  move.

(a) the high skill median voter will still want to minimize the low ability unemployment rate by choosing  $s$  so that  $\tilde{u}$  is minimized. Recall that  $u$  is minimized for  $s = \hat{s}^l$  such that  $F'/F = H'/H = -\eta_{Hs}/s$ . Consider the median voter decision evaluated at  $s = \hat{s}^l$

$$\frac{\partial \tilde{u}}{\partial s} = \frac{F'\tilde{H} - F\tilde{H}'}{(F+\tilde{H})^2} = \frac{(H'/H - \tilde{H}'/H)F\tilde{H}}{F(F+\tilde{H})^2}$$

Clearly,  $\partial \tilde{u}/\partial s = 0$  at  $s = \hat{s}^l$  if  $\eta_{\tilde{H}s} = \eta_{Hs}$ . Thus, in the new equilibrium the reaction function will still be  $s^h(\tau) = s^{**}(\tau) = \hat{s}^l$ .

(b) the decision of the low skill insider on the UB is still represented at eq. A.3. To see that this reaction function,  $\tau_I^l(s)$ , swifts downward for a higher hiring rate, i.e.,  $d\tau_I^l(s)/dH < 0$ , we can use the total differential on the FOC at eq. A.3. Since the SOC is negative, the sign of  $d\tau/dH$  corresponds to the sign of  $dFOC(\tau)/dH$ :

$$\frac{dFOC(\tau)}{dH} = \frac{\partial \theta_I^l}{\partial H} \left( w^l l^l + \frac{\partial b^l}{\partial \tau} \right) + \theta_I^l \frac{\partial^2 b^l}{\partial \tau \partial H} \quad (\text{A.5})$$

where

$$\frac{\partial \theta_I^l}{\partial H} = -\frac{\beta^2 F}{(1-\beta + \beta(F+H)^2)} < 0$$

and

$$\frac{\partial^2 b^l}{\partial \tau \partial \phi} = \frac{\partial b^l}{\partial \tau} \frac{1}{H} + \left( w^h - \frac{\gamma}{(1-\tau)^2} \right) \frac{\phi(1-\rho)(1-u^h)}{\rho H}.$$

It is convenient to define  $\tilde{w}^h = \left(w^h - \frac{\gamma}{(1-\tau)^2}\right)$  and  $\tilde{w}^l = \left(w^l - \frac{\gamma}{(1-\tau)^2}\right)$ . By substituting the two expressions above in eq. A.5, we have that

$$\begin{aligned} \frac{dFOC(\tau)}{dH} &= \frac{1-\beta}{1-\beta+\beta H} \frac{\partial^2 b^l}{\partial \tau \partial \phi} - \frac{\beta}{1-\beta+\beta H} \frac{\tilde{w}^h \phi (1-\rho) (1-u^h)}{\rho} = \\ &\simeq (1-\beta) \tilde{w}^l (1-\phi) + (1-\beta-\beta F) \frac{\tilde{w}^h \phi (1-\rho) (1-u^h)}{\rho} \end{aligned}$$

Simple algebra shows that  $dFOC(\tau)/dH < 0$  for  $\beta \in [\tilde{\beta}, 1)$ , where  $\tilde{\beta} = \frac{1}{1+F\kappa}$  and  $\kappa = \frac{\tilde{w}^h \phi (1-\rho) (1-u^h)}{\tilde{w}^l (1-\phi) \rho + \tilde{w}^h \phi (1-\rho) (1-u^h)} < 1$ .

Thus, since the reaction function  $s^h(\tau) = \hat{s}^l$  is unaffected while  $\tau_I^l(s)$  moves downward, the new equilibrium outcome will be  $s^{*l} = s^* = \hat{s}^l$  and  $\tau^{*l} < \tau^*$ . **q.e.d.**

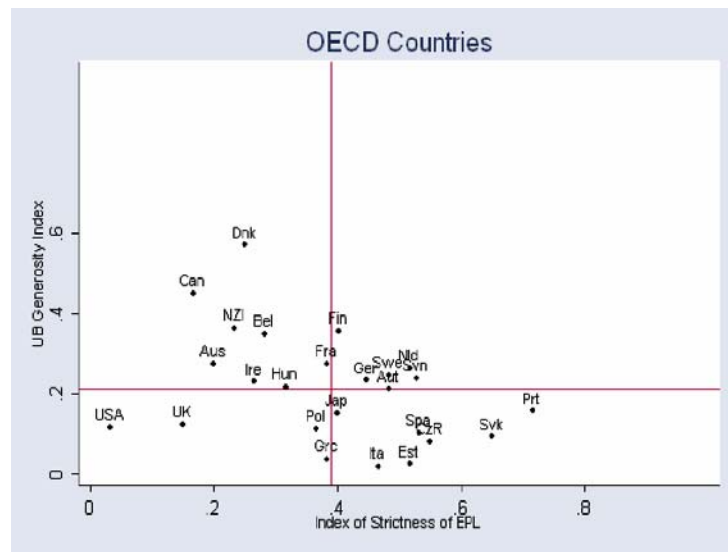


Figure 1: the UB/EPL Trade off

Notes: UB generosity index: Average gross replacement rates in the first year of unemployment times unemployment benefit coverage. Index of strictness of EPL for regular contracts compiled by OECD on the basis of analysis of national legislation (increasing in strictness).

Sources: OECD (2004) for EPL index and UB net replacement rate; ECHP (1994-2001) for measures of UB coverage.

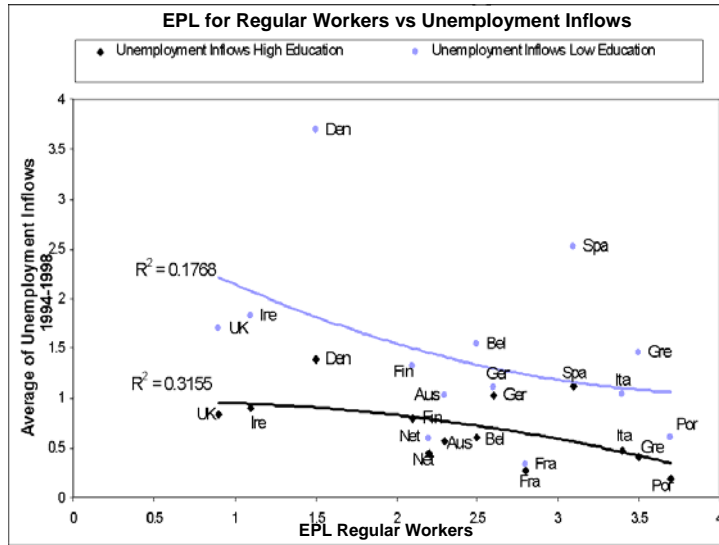


Figure 2: EPL Regular Workers Unemployment Inflows by Skill Level

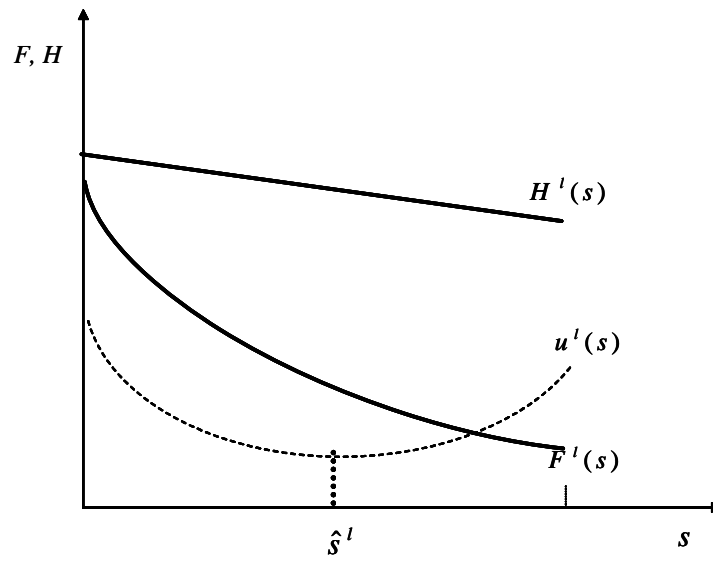


Figure 3: Unemployment Inflow and Outflow Rates

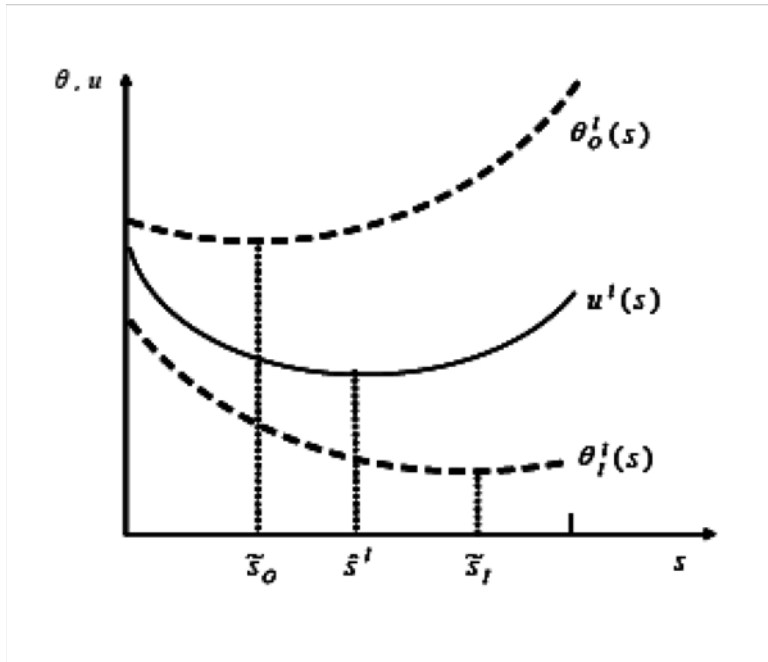


Figure 4: Unemployment and EPL

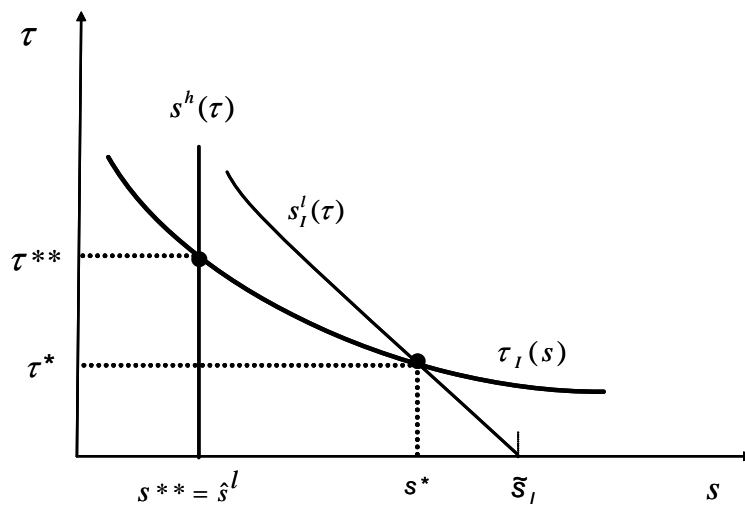


Figure 5: Political Equilibria and UB/EPL Trade-off

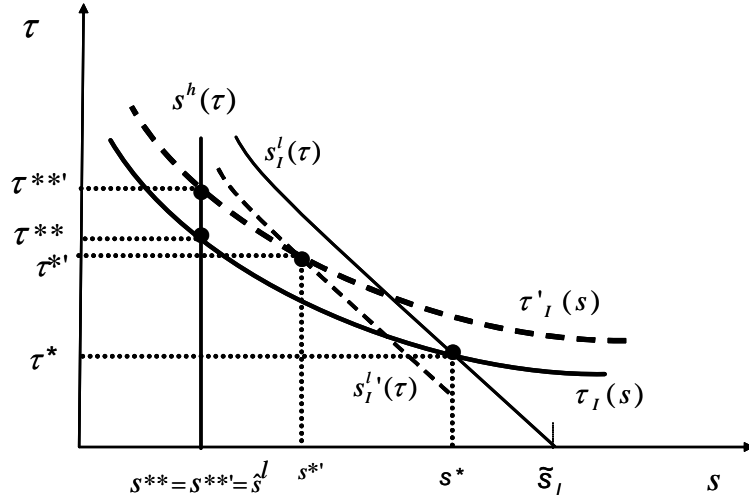


Figure 6: Redistribution and the UB/EPL Trade-off

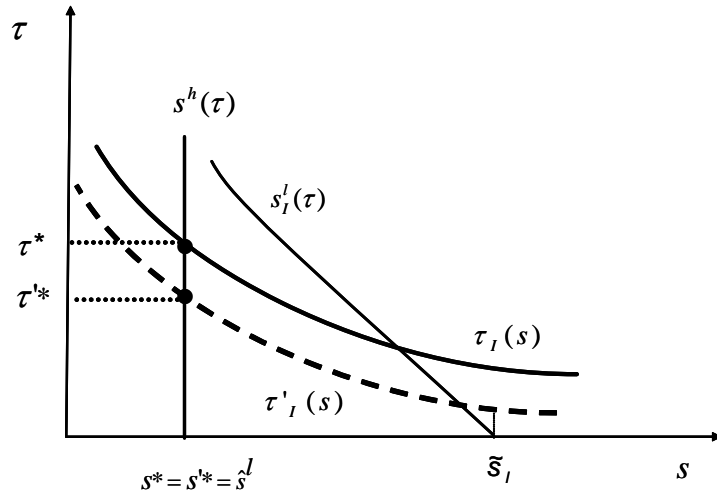


Figure 7: Workers' Mobility and the Trade-off

**Table 1: Alternative measures of the trade-off (late 1990s)**

<i>EPL correlated with</i>	<i>Working-age population</i>	<i>Male prime-age (25 to 45)</i>
<i>a. UB coverage</i>	-.63**	-.71**
<i>b. UB net replacement rate</i>	-.34*	—
<i>a * b</i>	-.55**	-.66**
** significant at 99	* significant at 95	nr of observations =14

Source: European Community Household Panel (ECHP) for data on coverage of UBs; OECD (2004) for the EPL index.

**Table 2: Progressiveness of Unemployment Benefit System**

<b>Country</b>	<b>67/100</b>	<b>67/150</b>
Australia	1.45	1.96
Austria	1.00	1.00
Belgium	1.32	1.80
Canada	1.05	1.51
Czech Republic	1.00	1.00
Denmark	1.38	1.79
Finland	1.22	1.52
France	1.05	1.15
Germany	1.02	1.00
Greece	1.48	2.09
Hungary	1.35	1.71
Iceland	1.35	1.86
Ireland	1.40	1.83
Italy	0.93	1.09
Japan	1.17	1.40
Korea	1.06	1.50
Luxembourg	0.99	0.97
Netherlands	1.14	1.37
New Zealand	1.43	2.04
Norway	0.98	1.23
Poland	1.44	2.14
Portugal	1.04	0.96
Slovak Republic	0.95	1.24
Spain	1.10	1.58
Sweden	1.06	1.49
Switzerland	1.14	1.13
UK	1.40	2.03
USA	1.00	1.18

Notes: The replacement rates are estimated after one year of unemployment and are referred to an average production worker (APW) single and aged 40.

(1) Ratios of the net replacement rate (rr) at 2/3 of the APW wage to the rr at 100 % of the APW wage.

(2) Ratio of the net rr at 150 % of the APW wage to 2/3 of the APW wage.

**Table 3: Locations along and across the tradeoffs: panel regression results**

dependent variable: $\log(\text{UB}/\text{EPL})$ (1)	coeff (t-stat)
<b>EDU * IMMOB</b>	<b>0.0014</b> <b>(5.45)</b>
<b>BEV * GINIWAGE</b>	<b>2.8852</b> <b>(4.28)</b>
constant	0.3050 (1.30)
number of observations = 101	$\bar{R}^2 = .34$

Notes: See the text for details about the covariates

Source: ECHP (1994-2001)

**Table 4: Lessons from the reformers**

	$\Delta\text{EPL}_{\text{reg}}$	$\Delta\text{Gini earnings}$	$\Delta\text{UB}_{\text{gen}}$	$\Delta\text{UB}_{\text{prog}}$
<b>Spain</b>	<b>-0.36</b>	<b>0.06</b>	<b>0.01</b>	<b>0.03</b>
<b>Greece</b>	0.00	-0.02	-0.01	-0.03
<b>Finland</b>	<b>-0.14</b>	<b>0.00</b>	<b>0.00</b>	<b>0.03</b>
<b>Denmark</b>	0.00	-0.04	-0.13	-0.02
<b>Korea</b>	<b>-0.85</b>	<b>0.25</b>	<b>0.00</b>	<b>n.a.</b>
<b>Japan</b>	0.00	-0.05	-0.02	n.a.

Note:  $\Delta\text{EPL}$ : change in the value of the OECD EPL index for regular workers, over reform period (1994-2001 for Spain and Greece; 1996-2001 for Finland and Denmark; 1994-2001 Korea and Japan).

$\Delta\text{Gini earnings}$ : change in the Gini coefficient before the reform (period 1994-1997 for Spain; 1996-2001 for Finland; 1998-1994 for Korea).

$\Delta\text{UB Generosity}$ : change in the generosity of UBs, that is, the coverage of UBs (the fraction of unemployed receiving UBs) multiplied by the average gross replacement rate in the first-year of receipt of benefits.

$\Delta\text{UB Progressiveness}$ : change in the ratio of the replacement rates at two earning levels (100 per cent or 2/3 of the wage of the average production worker).