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Reducing Severance Pay or
Introducing a Single Contract?**

by

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Dual Labour Markets and the Tenure Distribution: Reducing Severance Pay or Introducing a Single Contract?*

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Abstract

This paper evaluates Spain's recent labour market reform concerning the reduction in severance pay from 45 to 33 days of wages per year of seniority and the introduction of a new subsidized permanent contract. We also compare this policy with the introduction of a single open-ended labour contract with increasing severance payments for all new hirings. We use an equilibrium search and matching model to generate the main properties of this segmented labour market. Our steady-state results show this reform will reduce unemployment (by 20%) and job destruction (by 29%). However, in terms of wage subsidies, the cost of implementing this reform will be very high. A cheaper and more effective way to decrease the duality in the labour market would be to eliminate temporary contracts and introduce a single contract. Unemployment and job destruction in this case would be reduced by 28% and 42%, respectively. Most interestingly, tenure distribution would be even smoother than under the designed reform: 21% more workers would end up having tenures of more than three years, and there would be 32% fewer one-year contracts. The transition shows that both changes would benefit a majority of workers: only 8.1% would be jeopardized under the approved reform (5.8% in the transition to the single contract) due to improvement in job stability.

Keywords: Permanent and Temporary contracts; Severance Payments; Job seniority; Tenure distribution; Job destruction; Entrepreneurs' Permanent Contract; Single open-ended labour contract.

JEL-Code: J23, J32, J63, J64, J65, J68

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1 Introduction

The “Great Recession” has once again revealed the poor performance of dual labour markets. The most striking case is the Spanish one. Up until recently, the Spanish labour market was one of the most dynamic in the Euro Area (EA). During the decade preceding the current crisis, and according to the European Labour Force Survey, almost one third of total job creation in the EA took place in Spain. However, during the current crisis, Spain has recorded the highest rate of job destruction, particularly regarding temporary jobs, leading to a huge increase in the unemployment rate, from 8% in 2007 to 23% in 2011.¹ According to Costain, Jimeno and Thomas (2010), Spain provides a high degree of external protection, but only for workers in permanent contracts (PCs), which partially explains the enormous volatility in employment. In fact, the gap between the severance payments of workers with PCs (45 days of wages per year of seniority (p.y.o.s) for unfair dismissal) and temporary ones (8 days of wages p.y.o.s) accounts for almost one half of job destruction over the past four years, when temporary contracts (TCs) have been used as the basic adjustment mechanism (see Bentolila, Cahuc, Dolado and Le Barbanchon, 2012).

In order to reduce this volatility and the excessively high use of TCs in Spain, different governments have launched several labour market reforms over the past twenty years.² In 1997, Permanent Employment-promotion Contracts (PECs) with lower severance costs were introduced for some worker categories. In addition, permanent job creation, either by directly hiring workers under PECs or by converting TCs into PCs, was heavily subsidized through substantial rebates in social security contributions. The 2006 reform extended these subsidies to more worker categories. In fact, Spain is one of the European countries that devotes more resources to this type of active labour market policy (0.3% of GDP, on average, over the past ten years). However, García-Pérez and Rebollo (2009) have shown that these measures have had negligible effects on both the temporary employment rate and the TC-PC conversion rate.

Given the huge increase in the unemployment rate, and guided in some sense by the idea of “Flexicurity” (see, for example, Boeri, Conde-Ruiz and Galasso, 2012), the present Spanish government has launched a far-reaching labour market reform (“the 2012 Reform”), comparable in its importance only with the reform that liberalized TCs in 1984. This reform has introduced major changes in external and internal flexibility by bringing them closer to the *modus operandi* in the rest of Europe. Regarding internal flexibility, the reform allows for an internal devaluation by facilitating the

¹The Spanish Labour Force Survey shows that during the first three years of the current crisis (2008-2010), more than two thirds of the total number of workers dismissed had a temporary contract.

²See Bentolila, Dolado and Jimeno (2008) for a summary of these reforms.

adjustment of hours and wages to changes in a firm's economic conditions as an alternative to job destruction. Regarding the external aspect, there has been a considerable reduction in severance payments, from 45 to 33 days of wages p.y.o.s in unfair dismissals, bringing this indemnity closer to the mean European compensation.³ Moreover, the new definition of dismissals for economic reasons will allow firms with financial difficulties to do so fairly more easily.⁴ In addition, the reform introduces a new PC, which is referred to as "Entrepreneurs' permanent contract" (EPC), with a one-year probationary period, zero severance costs during such period and large wage subsidies for young and older workers hired in small firms (those with fewer than 50 workers).

An alternative strategy to combat the dual character of the Spanish labour market is the introduction of a single open-ended labour contract (SOEC) for new hires with increasing severance payments. In the document "Proposal to Restart the Spanish Labor Market",⁵ a group of Spanish economists argue that severance pay should increase steadily in order to prevent massive redundancies before the deadline when a TC has to be converted into a PC (between the second and the third year in Spain, depending on the contract type). They propose replacing the existing system of TCs and PCs with a single contract for new hires with severance payments smoothly increasing with seniority until reaching a value similar to the mean European indemnity.⁶ Based on this idea, Bentolila and Jansen (2012) suggest replacing the recently introduced EPC's severance cost arrangement with an increasing indemnity starting from a low level and reaching (after three years) the same amount that would have been awarded under the present structure. This amendment would not only reduce the burden of the fiscal externality generated by the intensive use of wage subsidies, but could also have consequences in terms of longer tenure and a firm's investment in human capital.

This paper evaluates all these alternatives, focusing on Spain's recent labour market reform and comparing its expected effects with the ones that would prevail under a SOEC for new hirings.⁷ Accordingly, we use an equilibrium model of job creation and destruction of the search and matching type that extends the model proposed by Mortensen and Pissarides (1994)

³The previous 2010 reform took steps to narrow the gap between the severance costs of PCs and TCs by extending the use of PECs for many worker categories and by progressively increasing the severance costs in TCs from 8 days in 2011 to 12 days of wages p.y.o.s. in 2015.

⁴The 2010 reform sought to clarify the concept of fair dismissal, but it was not successful.

⁵<http://www.crisis09.es/PDF/restart-the-labor-market.pdf>

⁶Similar proposals have been advocated by Blanchard and Tirole (2004) and Cahuc and Kramarz (2005) for France, and Boeri and Garibaldi (2008) and Ichino (2009) for Italy.

⁷Osuna (2012) evaluates the effects of the 2012 reform concerning internal flexibility.

by introducing certain elements to capture the specific features of the Spanish labour market: (i) the existence of a *Segmented Labour Market* with two types of jobs (permanent and temporary), which differ in the maximum length of the contract and in the associated severance costs; (ii) endogenous job conversion of TCs into PCs; (iii) severance costs modeled as a transfer from the firm to the worker, and as a function of seniority; and (iv) downward wage rigidities, so that severance costs have real effects.⁸ In this labour market, firms will be heterogeneous agents and use these two types of contracts to endogenously adjust their employment levels when facing idiosyncratic persistent shocks. Finally, we will follow Mortensen-Pissarides (MP) by assuming one-job firms.

The model is calibrated to the Spanish economy so that we can generate its main labour market statistics. We then use the model to quantify the effects of the changes in the design of severance pay implied by the 2012 reform and by a particular SOEC - the alternative mentioned above. We first make a steady-state comparison, and then analyze the transition to see who wins and who loses with the implementation of both policies.

Our steady-state results show this reform will reduce unemployment (by 20%) and job destruction (which is almost halved in contracts with a tenure of fewer than four years) and will smooth both the probability of being fired and tenure distribution as severance pay is reduced. Almost 15% more workers will end up having tenures of more than three years, and there will be 23% fewer one-year contracts. We also find that the EPC need to be coupled with a subsidy in order to prevent too many layoffs at the end of the probationary period. However, a cheaper and more effective way to decrease the duality in the labor market would be to eliminate TCs and replace the current EPC severance cost structure with an appropriate increasing indemnity, similar in spirit to the SOEC proposal (see Andrés et al., 2009). The results would be much better: unemployment and job destruction would be reduced by 28% and 42%, respectively. Most interestingly, tenure distribution would be much smoother: 21% more workers would end up having tenures of more than three years and there would be 32% fewer one-year contracts.

On the other hand, the transition results contradict the perception whereby such reform would increase precariousness in the labour market. It is true that almost 40% of workers would experience a decrease in severance pay of around 47% of the average status quo's indemnity, but this is basically

⁸Lazear (1990) notes that if contracts were perfect, severance payments would be neutral. If the Government forced employers to make payments to workers in the case of dismissal, perfect contracts would undo those transfers by specifying opposite payments from workers to employers. Thus, in order for severance pay to have any effect, some form of incompleteness has to be introduced. Most studies have avoided this problem by modeling dismissal costs as firing taxes, so that the effects cannot be undone by private arrangements.

a result of the decrease in firing probabilities. In fact, the reform would have a non-negligible impact on expected employment durations: on average, tenure would be 16% higher under the passed reform (24.7% under the SOEC). Moreover, the proportion of people unaffected by the reform would be very high (27%).

There are many theoretical papers that study the effects of employment protection legislation (EPL) on job creation and destruction and on the unemployment rate. Most of these works are inspired by the seminal paper in the search and matching literature: the stochastic endogenous job creation and destruction model by Mortensen and Pissarides (1994), and therefore introduce firing costs.⁹

However, while these models might be appropriate for most OECD countries, there are not so for Spain, where one third of contracts are of a temporary nature. A complementary strand of the literature focuses on the consequences the introduction of TCs has on turnover, employment, productivity and wages. Most of these studies analyze the Spanish case because of its singularity, tending to relate the existence of TCs to the dismissal costs of PCs.¹⁰

The papers closest to our own are by Bentolila, Cahuc, Dolado and Le Barbanchon (2012) and Costain, Jimeno and Thomas (2010). The former explores the extent to which the significantly larger increase in unemployment in Spain vis-à-vis France during the ongoing recession can be accounted for by the difference in EPL between the two countries. The main difference between our model and theirs is that we introduce seniority as part of the state space, which is an essential ingredient for properly matching the duality in the Spanish labour market. In addition, our model treats severance pay as a transfer rather than a purely wasted tax. On the other hand, Costain, Jimeno and Thomas (2010) study the extent to which the coexistence of permanent and temporary jobs accounts for the volatility of employment. The main difference with our paper is the focus. These authors are mainly interested in the model's business cycle properties, while we compare steady states, compute the transition and focus on the effects on job seniority. In addition, our model provides many statistics of interest that the referred papers are unable to provide.¹¹ Finally, the detailed man-

⁹The most relevant research in this tradition is by Garibaldi (1998), Cahuc and Zylberberg (1999), Mortensen and Pissarides (1999), and Garibaldi and Violante (2002). Others, such as Hopenhayn and Rogerson (1993), Díaz and Galdón (1999), and Alvarez and Veracierto (2001), use real business cycle models to the same end.

¹⁰See, for instance, the matching models of Wasmer (1999), the collective bargaining models of Bentolila and Dolado (1994) and Jimeno and Toharia (1993), the efficiency wage models of Güell (2000), the dynamic partial equilibrium demand models of Bentolila and Saint-Paul (1992), Cabrales and Hopenhayn (1997), and Aguirregabiria and Alonso (1999), and the general equilibrium models of Alonso, Fernández and Galdón (2002).

¹¹We can keep track of contracts and compute distributions of JC and JD by type of contract, wages, seniority and employment loss by reason of separation.

ner in which the calibration exercise is performed allows us to use the model to perform quantitative policy evaluations.

The outline of the paper is as follows. In Section 2, we present the model. In Section 3, we discuss its calibration. In Section 4, we evaluate the reform. Finally, Section 5 draws conclusions.

2 The model

2.1 Population

The economy is populated by a continuum of workers with unit mass and a continuum of firms. Workers can either be employed or unemployed.¹² Unemployed workers look for employment opportunities; employed workers produce and do not search for jobs. Firms post vacancies or produce. The cost of posting a vacancy is c . Posting a vacancy is not job creation, unless it is filled. Each firm is a one-job firm and the job might be occupied and producing or vacant. We assume free entry.

The source of heterogeneity is due to the existence of matchings with different quality levels and durations. Therefore, the state space that describes the situation of a particular worker is $S = \{\{0, 1\} \times \mathcal{E} \times D\}$, where $\mathcal{E} = \{\epsilon_1, \dots, \epsilon_n\}$ is a discrete set for the quality levels and $D = \{1, \dots, N\}$ is also a discrete set denoting the duration of a job (worker's seniority). Each triple indicates whether the worker is unemployed (0) or employed (1) and, in that case, the quality and the duration of the match.

2.2 Preferences

Workers have identical preferences, live infinitely and maximize their utility, which is taken to be linear in consumption. We assume that they supply work inelastically, i.e., they will accept every opportunity that arises. Thus, each worker has preferences defined by $\sum_{t=1}^{\infty} \beta^t c_t$, where β , $0 \leq \beta < 1$, is the discount factor and c_t is consumption. Firms are also risk neutral.

2.3 Technologies

There are two technologies in this economy: production and matching.

Production technology

Each job is characterized by an irreversible technology and produces one unit of a differentiated product per period, whose price is $y(\epsilon_t)$, where $\{\epsilon_t\}$ is an idiosyncratic component, i.e., the quality of the match. This idiosyncratic component is modelled as a stationary and finite Markov chain. This

¹²We do not consider other labour market states outside the labour force.

process is the same for each matching, and the realizations ϵ_{t+1} are independent and identically distributed with conditional transition probabilities $\Gamma(\epsilon'|\epsilon) = Pr\{\epsilon_{t+1}|\epsilon_t\}$, where $\epsilon, \epsilon' \in \mathcal{E} = \{1, 2, \dots, n_\epsilon\}$. Each new matching starts with the same entry level ϵ_e and from this initial condition the quality of the match evolves stochastically due to these idiosyncratic shocks. We assume that agents know the law of motion of the process and observe their realizations at the beginning of the period.

Matching technology

Every job is created as a temporary job. In each period, vacancies and unemployed workers are stochastically matched. We assume the existence of an homogeneous of degree one matching function $m = m(u_t, v_t)$, increasing and concave in both arguments, where v_t is the number of vacancies and u_t the number of unemployed workers, both normalized by the fixed labour force. Given the properties of the matching function, the transition rates for vacancies, q , and unemployment, α , depend only on $\nu = v/u$, a measure of tightness in the labour market. The vacancy transition rate, q , is defined as the probability of filling a vacancy, and the transition rate for unemployed workers, α , is defined as the probability of finding a job. They are given by

$$q(\nu) = \frac{m(v,u)}{v} = m\left(1, \frac{u}{v}\right); \alpha(\nu) = \frac{m(v,u)}{u} = m\left(\frac{v}{u}, 1\right)$$

On the other hand, job conversion leads to permanent job creation. Job conversion will take place for productivity realizations (at the end of the TC's maximum length) above a specific threshold, $\{\epsilon_c\}$, which firms will endogenously determine.

2.4 Equilibrium

The concept of equilibrium used is recursive equilibrium. Before showing the problems that agents solve, it is convenient to explain the timing and agents' decisions. At the beginning of the period, firms' idiosyncratic shocks are revealed. Firms and workers then renegotiate wages. Given these wages, firms choose between two options: i) continue producing with the current match, or ii) terminate the match and dismiss the worker.¹³ The nature of the problem depends on whether the firm has a PC or a TC. PCs entail high severance costs that depend on the quality of the match and on the duration of the contract, while severance costs for TCs are, in comparison, very low. In addition, the problem is not the same for all firms with a TC. Let d denote the duration of the contract. We will assume that a temporary contract cannot last more than d_{max}^t periods, so the maximum number of renewals is $d_{max}^t - 1$. Therefore, firms whose TCs cannot be renewed anymore decide

¹³Note that job destruction will not be efficient here, since firms will unilaterally opt for match continuation (see Mortensen and Pissarides (1999a) for discussion).

between these two options: i) convert the TC into a PC, taking into account the consequences regarding future severance costs, or ii) to terminate the match. Once all these decisions have been made, production starts both in firms where workers have not been fired during this period and in those that were matched with unemployed workers at the end of the last period. Finally, search decisions are made: firms post vacancies and unemployed workers apply for jobs. This search process generates new matches that will be productive in the next period. There follows a formal description of the problems of firms and workers.

2.4.1 The Firm's Problem

The problem of firms with existing PCs

The vector of states at the beginning of the period for a firm with a permanent job is (ϵ, d) . The firm must decide whether to continue with the actual match (first row), or whether to fire the worker and look for a new one (second row). This problem can be written as

$$J^p(\epsilon, d) = \max\{y(\epsilon) - w(\epsilon, d) + \beta \sum_{\epsilon t} \Gamma(\epsilon t|\epsilon) J^p(\epsilon t, dt), \\ -s^p(\epsilon, d-1) - c + \beta q(\nu) J^t(\epsilon_e, 1) + \beta(1 - q(\nu)) J^0\}$$

where $J^p(\epsilon, d)$ and $J^p(\epsilon t, dt)$ are, respectively, the firm's value function for this period and the next period, $w(\epsilon, d)$ is the wage, $\Gamma(\epsilon t|\epsilon)$ is the conditional transition probability for the quality of the match, $s^p(\epsilon, d-1)$ is the severance cost, J^0 is the value of a vacant job and $J^t(\epsilon_e, 1)$ is the value function of a firm with a first-period TC.¹⁴ If it is more profitable to continue with the actual match, the decision rule will be $g^p(\epsilon, d) = 1$. Otherwise, $g^p(\epsilon, d) = 0$, and the firm will incur the severance cost, $s^p(\epsilon, d-1)$, plus the vacancy cost and, with probability $q(\nu)$ at the end of this period, the firm will fill the vacant job with a TC that will be productive in the next period.

The problem of firms with expired TCs (or prospective PCs)

The problem is slightly different for a firm whose TC reached the maximum length allowed at the end of the previous period. If the worker is not fired at the beginning of this period, the TC will be automatically transformed into a PC. Note that $d = d_{max}^t + 1$, where $d_{max}^t + 1$ denotes the first period in a PC and that severance costs are given by $s^t(\epsilon, d-1)$ in this case.

¹⁴Note that the value function $J^t(\epsilon_e, 1)$ has a t superscript, instead of a p superscript, to denote the value function of a firm with a TC and that in the first period the quality of the match is the entry level.

The problem of this firm can be written as¹⁵

$$J^p(\epsilon, d) = \max\{y(\epsilon) - w(\epsilon, d) + \beta \sum_{\epsilon'} \Gamma(\epsilon'|\epsilon) J^p(\epsilon', d), \\ -s^t(\epsilon, d - 1) - c + \beta q(\nu) J^t(\epsilon_e, 1) + \beta(1 - q(\nu)) J^0\}$$

and its decision rule is $g^p(\epsilon, d_{max}^t + 1) = 1$ if the firm converts the TC (first row) or $g^p(\epsilon, d_{max}^t + 1) = 0$ if the firm fires the worker and looks for another one (second row).

The problem of firms with TCs

The vector of states for a firm with a TC, whose length at the end of the last period was less than d_{max}^t , is (ϵ, d) , and severance costs are given by $s^t(\epsilon, d - 1)$. The problem of this firm is

$$J^t(\epsilon, d) = \max\{y(\epsilon) - w(\epsilon, d) + \beta \sum_{\epsilon'} \Gamma(\epsilon'|\epsilon) J^t(\epsilon', d), \\ -s^t(\epsilon, d - 1) - c + \beta q(\nu) J^t(\epsilon_e, 1) + \beta(1 - q(\nu)) J^0\}$$

The firm must decide whether to continue with the match, $g^t(\epsilon, d) = 1$, or to fire the worker and look for another one, $g^t(\epsilon, d) = 0$.

2.4.2 The Worker's Problem

These problems are trivial. The worker simply negotiates with the firm over the wage before the firm decides upon his or her continuation. The worker's problem can be written as

$$V^p(\epsilon, d) = \tilde{\Phi}(g^p = 1)[w(\epsilon, d) + \beta \sum_{\epsilon'} \Gamma(\epsilon'|\epsilon) V^p(\epsilon', d)] + \\ \tilde{\Phi}(g^p = 0)[V^0 + s^p(\epsilon, d - 1)]$$

where $V^p(\epsilon, d)$ denotes the worker's value function, $\tilde{\Phi}(x)$ is an indicator function that takes the value 1 if the assessment is true and zero otherwise, and V^0 is the value function of an unemployed worker. If the firm decides to continue with the actual match, $\tilde{\Phi}(g^p = 1)$, the worker gets the wage; otherwise, the firm pays the worker the severance cost and the worker becomes unemployed.

¹⁵This equation plays the same role as the asset pricing equation for the initial value of the match in Mortensen and Pissarides (1999a), where the initial wage is lower because termination costs are not incurred if no match is formed initially, but must be paid if an existing match is destroyed.

The problem of a worker in a temporary job is similar. The value function of a worker with a TC is

$$V^t(\epsilon, d) = \tilde{\Phi}(g^t = 1)[w(\epsilon, d) + \beta \sum_{\epsilon'} \Gamma(\epsilon'|\epsilon)V^t(\epsilon', d)] + \tilde{\Phi}(g^t = 0)[V^0 + s^t(\epsilon, d - 1)]$$

Finally, unemployed workers look for employment and accept a job whenever an opportunity arises. The value function of an unemployed worker is

$$V^0 = b + \beta\alpha(\nu)V^t(\epsilon_e, 1) + \beta(1 - \alpha(\nu))V^0$$

where $V^t(\epsilon_e, 1)$ is the value function of a worker in a first-period TC. The parameter b can be interpreted as some kind of unemployment subsidy or the return to home production. An unemployed worker receives b today and, at the end of the period, with probability $\alpha(\nu)$, the worker will find a job and, with probability $1 - \alpha(\nu)$, the worker will remain unemployed.

2.4.3 Wage Determination

Wages are the result of bilateral bargaining between the worker and the firm, unless the legally imposed minimum wage, w_{min} , is binding.¹⁶ Bargaining is dynamic, i.e., wages are revised for each period upon occurrence of new shocks. The assumption of bilateral bargaining is reasonable due to the existence of sunk costs (search costs) once the match has been produced. This creates local monopoly power and generates a surplus to be split among the participants in the match. In PCs, this surplus is defined as

$$S^p(\epsilon, d) = [J^p(\epsilon, d) - (J^0 - s^p(\epsilon, d - 1))] + [V^p(\epsilon, d) - (V^0 + s^p(\epsilon, d - 1))]$$

Wages are the result of maximizing the following Nash product with respect to the wage

$$[J^p(\epsilon, d) - (J^0 - s^p(\epsilon, d - 1))]^{1-\theta} [V^p(\epsilon, d) - (V^0 + s^p(\epsilon, d - 1))]^\theta$$

The first order condition of this maximization is such that the surplus is split into fixed proportions according to the worker's bargaining power, θ

$$\begin{aligned} (1 - \theta)S^p(\epsilon, d) &= J^p(\epsilon, d) - s^p(\epsilon, d - 1) \\ \theta S^p(\epsilon, d) &= V^p(\epsilon, d) - (V^0 + s^p(\epsilon, d - 1)) \end{aligned}$$

¹⁶Downward wage rigidity is modelled here as a lower bound on the outcome of the wage negotiations. We need to impose a wage floor in order to prevent too much internalization.

By making the appropriate substitutions of firms' and workers' value functions, the wage can be computed as¹⁷

$$\begin{aligned}
w(\epsilon, d) = & \max\{w_{min}, \theta y(\epsilon) + (1 - \theta)V^0 + s^p(\epsilon, d - 1) + \\
& \theta\beta \sum_{\epsilon t} \Gamma(\epsilon t|\epsilon) J^p(\epsilon t, dt) \\
& - \beta(1 - \theta) \sum_{\epsilon t} \Gamma(\epsilon t|\epsilon) V^p(\epsilon t, dt)\}
\end{aligned}$$

Similar conditions hold in TCs. Note that, as in Osuna (2005), wages in first-period PCs will be lower than those prevailing in the following periods because high severance costs are not incurred if no job conversion takes place, but will be due in latter periods if the existing PC is destroyed in the future. Firms try to internalize higher future wages by pushing down wages in first-period PCs.

2.4.4 Definition of Equilibrium

A recursive equilibrium is a list of value functions $J^p(\epsilon, d)$, $J^t(\epsilon, d)$, $V^p(\epsilon, d)$, $V^t(\epsilon, d)$, J^0 , V^0 , transition rates $q(\nu)$, $\alpha(\nu)$, prices $w(\epsilon, d)$ and decision rules $g^p(\epsilon, d)$, $g^t(\epsilon, d)$ such that¹⁸

1. *Optimality*: Given functions $q(\nu)$, $\alpha(\nu)$ and $w(\epsilon, d)$, the value functions $J^p(\epsilon, d)$, $J^t(\epsilon, d)$, $V^p(\epsilon, d)$ and $V^t(\epsilon, d)$ satisfy the Bellman equations.
2. *Free entry*: This condition and the profit maximization condition guarantee that, in equilibrium, the number of vacancies adjust to eliminate all the rents associated with holding a vacancy; that is, $J^0 = 0$, implying $c = \beta q(\nu) J^t(\epsilon_e, 1)$.
3. *Wage bargaining*: The equilibrium conditions from maximizing the surplus in PCs are

$$\begin{aligned}
(1 - \theta)S^p(\epsilon, d) &= J^p(\epsilon, d) + s^p(\epsilon, d - 1) \\
\theta S^p(\epsilon, d) &= V^p(\epsilon, d) - (V^0 + s^p(\epsilon, d - 1))
\end{aligned}$$

Similar conditions hold for other types of contracts.

4. Rational Expectations

¹⁷As in the MP framework, some terms in the wage equation are weighted by the worker's bargaining power, θ , while others are weighted by the firm's, $(1 - \theta)$. Note that severance costs increase wages.

¹⁸Cole and Rogerson (1999) show that an equilibrium always exists when wages do not depend on the unemployment rate but only on the idiosyncratic shock. The intuition is that, given free entry, vacancies adjust to the number of unemployed and the relevant variable becomes the ratio of unemployed workers to vacancies.

3 Calibration

In this section, we explain the data set, the procedure for assigning values to the model’s parameters and the selection of functional forms. In the calibration, parameters must be chosen so that the model economy maps several statistics of the real economy.

3.1 The Data Set and Model Period

In order to calibrate the main parameters in our model, we use Spanish administrative data from the “*Muestra Continua de Vidas laborales*” (MCVL). This data set is based on a random draw from the Social Security archives. Each year, it provides a sample of 4% of all affiliated workers, employed or unemployed, and pensioners in that year. The MCVL reports information for about 1.1 million people on their personal characteristics and employment and non-employment spells throughout their entire labour history. For each worker, we have the date when each job begins and ends. This provides us with quite detailed information about employment duration. Periods of unemployment can also be identified from the dates when the firm ceases to pay Social Security contributions for the worker.¹⁹ Furthermore, we also have information about the type of contract, so we are able to differentiate between workers with a TC or a PC in each of their employment spells.

Here we use the 2009 wave, supplemented by the employment histories of workers present only in some of the previous three waves (2006-2008).²⁰ Our calibration sample includes the complete labour career for a sample of more than 700,000 workers in the period 1997-2007. We use all employment and non-employment spells in the sample lasting more than six months and taking place between 1997, the first year where type of contract information is available, and 2007, just before the current economic crisis began. We have chosen a year as the model period for consistency with these data, and because it is reasonable from a computational point of view.

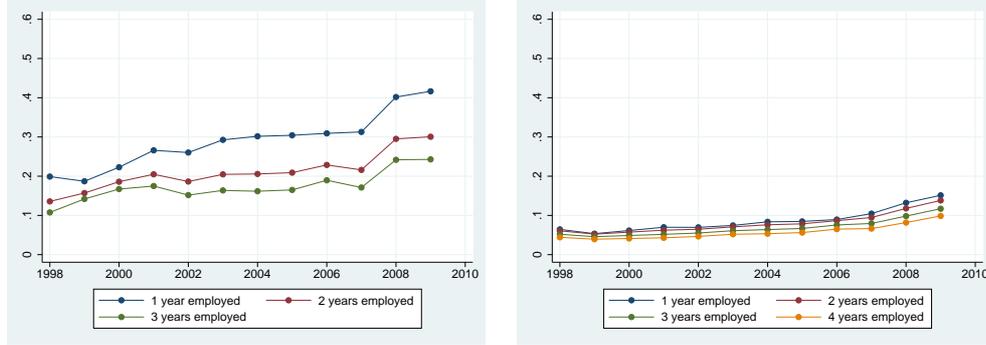
Figure 1 shows the exit from employment to unemployment for both temporary and permanent workers, the empirical hazards that we use in the calibration strategy. The exit from a TC is much higher for any employment duration than from a PC. These hazard rates have substantially increased since 2008, as a clear indication of the increasing firing risk in the current

¹⁹The MCVL has no information to distinguish between unemployment and from out-of-the-labour-force spells. Hence, we refer to all these *non-employment* spells, with and without unemployment benefits, as unemployment spells. In any case, we consider any spell lasting more than 48 months to be right-censored, that is, they are not used to measure unemployment duration.

²⁰Hence, our sample is representative of those workers with at least one day of affiliation to Social Security during the period 2006-2009. The 2004 wave is not fully comparable to the others, and the 2005 wave was not used due to space restrictions.

economic crisis.

Figure 1: Empirical hazard rates from temporary (left) and permanent (right) employment to unemployment, by employment duration



3.2 Calibrated Parameters and Functional Forms

There are two types of parameters. Those that have a clear counterpart in the real economy, and those that do not. For the former, we use the implied parameter values. For some of the latter, we use the values estimated in empirical studies. For the rest, we use the simulated method of moments.²¹

Preferences

The utility function is linear in consumption, as usual in this literature. The value of the discount factor β is fixed so that it is consistent with the mean annual real interest rate in the reference period, 3%.

Production Technology

The production function is assumed to be linear in the idiosyncratic shock, $y(\epsilon) = \epsilon$. The idiosyncratic shock is modeled as a Markov chain, $\Gamma[(\epsilon')|(\epsilon)]$. In addition, we assume five possible quality levels. In general, these two assumptions would imply 20 restrictions to fix the values of the conditional transition probabilities between different quality levels. Assuming that the expected duration of good and bad idiosyncratic shocks coincides, $\Gamma[(\epsilon_1)|(\epsilon_2)] = \Gamma[(\epsilon_2)|(\epsilon_1)]$, we need only to estimate 15 transition probabilities. Given that we do not have direct information on the quality of the match, we use Tauchen's procedure²² to parameterize the five quality levels, as well as the transition probabilities. To apply this procedure, we

²¹This optimization method involves finding the parameter values that minimize the distance between the statistics of the model economy and those of the real data.

²²See Tauchen (1986).

need to know the mean (μ), the standard deviation (σ_v) and the autocorrelation coefficient (ρ) of the underlying idiosyncratic process. We use quarterly GDP in the period 2000-08 to approximate that process. Finally, in order to properly match the statistics of interest, we need to make certain additional assumptions. We assume that temporary workers are less productive than ordinary permanent workers, y_{gap} , and that firms incur a training cost, tr_{cost} , in the first period of a PC.²³ Finally, we assume a positive experience effect, exp , on the productivity of permanent workers.²⁴

Matching Technology

We assume a Cobb-Douglas homogeneous of degree one matching function, $m = m(v, u) = Av^\eta(u)^{1-\eta}$, where A is the degree of mismatch and η is the value of the elasticity of the number of matches with respect to vacancies.

Unemployment Benefits

The parameter b can be understood as the income flow of unemployment or the return to home production. Both interpretations have drawbacks. In order to properly discuss unemployment benefits, we should include a Government and its budget constraint. On the other hand, the fact that there are no good estimates of the value of home production makes it very difficult to properly calibrate this parameter. We chose the first interpretation because average unemployment benefits can be easily measured and related to real numbers.²⁵ We obtain b as the product of unemployment benefits and coverage for the period 2006-08 and normalize it by average productivity.

To summarize, the calibration exercise involves the assignment of values to two types of parameters. The discount rate, β , the parameters of the idiosyncratic process (μ , σ_v and ρ), unemployment benefits, b , and the minimum wage in collective agreements²⁶, w_{min} , are set independently from the rest, since they have clear counterparts in the real economy. The value for the elasticity of new matches with respect to the vacancy input, η , the workers' bargaining power, θ , the cost of posting a vacancy, c , and the pro-

²³Bentolila and Dolado (1994) offer empirical evidence supporting these assumptions. Moreover, using data from the Spanish Data Set "Muestra Continua de Vidas laborales", the ratio of wages in permanent and temporary contracts was 14.3% for the period 2006-08.

²⁴García-Perez and Rebollo (2011) show that wages rise with experience in PCs, especially when compared with workers who suffer involuntary job transitions.

²⁵Monthly average unemployment benefits and coverage are, respectively, 764 euros and 26.2%. The sources of these data are the Bulletin of Labour Statistics edited by the Ministry of Labour and Social Affairs, the Spanish Labour Force Survey, and the National Employment Office.

²⁶The parameter w_{min} is set using information on the average minimum wage set in collective agreements (see Lacuesta et al., 2012).

ductivity gap, y_{gap} , have been set using the values estimated in empirical studies. Abowd and Lemieux (1993) estimate $\theta = 0.3$, the value for η in empirical studies lies in the range $[0.4 - 0.6]$, Bentolila and Dolado estimate an y_{gap} of about 15% and we follow Costain et al. (2010) by setting c as .3 of average worker productivity, which is roughly the midpoint of the estimates suggested in the literature.²⁷ The three remaining parameters: the mismatch parameter, A , the training cost, tr_{cost} , and the experience parameter, exp , are calibrated using the method of simulated moments. We need to impose three conditions to set these three parameters. These conditions are:

1. The permanent job destruction rate, $JDp = 6.19\%$.
2. The temporary job destruction rate, $JDt = 23.95\%$.
3. Unemployment duration, u_{dur} , is 10.38 months.

Table 1: **Baseline Economy Parameters.**

β	μ	ρ	σ_v	b	w_{min}		
0.97	0.3	0.75	0.11	0.07	0.3		
η	c	θ	y_{gap}	tr_{cost}	exp	A	
0.51	0.09	0.3	0.158	0.92	0.007	0.67	

3.3 Policy Parameters

To compute the equilibrium, we need a severance cost function that stands for the severance costs in Spain in the period under study. We use the following pieces of information to estimate the severance cost function in PCs: legal compensation in fair dismissals (20 days of wages p.y.o.s. with a maximum of 12 monthly wages) and unfair ones (45 days of wages p.y.o.s. with a maximum of 42 monthly wages),²⁸ interim wages of around two monthly

²⁷Shimer (2005) proposes a value of .213, whereas Hall and Milgrom (2008) use a value of .43, in both cases as a fraction of worker productivity.

²⁸The 33-day rule introduced in 1997 for PECs is not used in this calculation because only a small percentage of the new PCs signed in Spain in the last ten years are of this type. Moreover, it has not been clear at all, at least until the recent change in legislation, whether the severance payment for these new contracts is 33 or 45 days p.y.o.s. in the event of unfair dismissals.

wages, and the fact that, on average, 73.2% of all severance processes were declared unfair in the period 2006-08.²⁹ Regarding the dismissal distribution, on average 4.3% were collective dismissals, 18.7% were agreed at the Units of Mediation, 67% following the procedure specified in Spain’s Law 45/2002 and only 10% finally involved litigation.³⁰ Using those observations, the severance cost function in PCs is $s^p = 44.96 * \frac{w}{365} * (d - 1) + 16.08 * \frac{w}{365}$, where d and w stand for a worker’s seniority and annual wage, respectively.³¹ Note that legal severance costs depend on the wage. Since making the severance cost function depend on wages is computationally very difficult to manage, we take the quality of the match as an approximation of the wage.

Finally, TCs entail a severance cost of eight days of wages p.y.o.s and no interim wages have to be paid. Therefore, the severance cost function in TCs is $s^t = \frac{8}{365} * w * (d - 1)$.

4 Main Findings

In this section, we report the answers to the questions posed. In Section 4.1, we report the results of the calibration exercise to test whether the baseline model is a good starting point to make counterfactual experiments. We also offer the prediction of our model concerning “the 2006 labour market reform” that expanded wage subsidies for almost all workers hired under a PC: only 30-44 year-old workers unemployed for less than six months were excluded. In Section 4.2, we show the predicted steady-state effects of the 2012 labour market reform, under different assumptions, and compare them with the alternative of introducing a SOEC with severance payments increasing with seniority for all new hirings. Finally, in Section 4.3, we perform a transition and welfare analysis according to these scenarios.

²⁹The distribution of dismissals is taken from data on new entries into the Unemployment Benefit System (Bulletin of Labour Statistics).

³⁰The number of days actually agreed upon is not made public (only the amounts paid), but they are presumed to be very close to the legal limit. On the other hand, the 2002 reform (Law 45/2002) abolished a firm’s obligation to pay interim wages when dismissed workers appeal to labour tribunals, as long as the firm acknowledged the dismissal as being unfair and deposited the severance pay (45 days of wages p.y.o.s.) in court within two days of the dismissal.

³¹The severance cost function displayed in the text is a simplification of the following expression: $s^p = 4.3\%[73.2\% * 45 * \frac{w}{365} * (d - 1) + 26.8\% * 20 * \frac{w}{365} * (d - 1)] + 18.7\%[45 * \frac{w}{365} * (d - 1) + 60 * \frac{w}{365}] + 67\%[45 * \frac{w}{365} * (d - 1)] + 10\%[73.2\%(45 * \frac{w}{365} * (d - 1) + 60 * \frac{w}{365}) + 26.8\%(20 * \frac{w}{365} * (d - 1) + 60 * \frac{w}{365})]$, which takes into account all the information provided above. Note, in particular, that the second additive term of the severance cost function displayed in the main text is not multiplied by tenure because this term reflects interim wages. If we instead simply set 45 days of wages p.y.o.s for every dismissal and eliminate interim wages, the severance cost function is indeed very similar, $s^p = \frac{45}{365} * w * (d - 1)$, as most firings end up incurring a similar amount, regardless of whether the dismissal is a fair or an unfair one.

Table 2: **Calibration results**

Statistics	Spanish Data	SQ	2006-reform
JDp	6.19	5.58	6.48
JDt	23.95	23.11	21.09
u_{dur}	10.38	10.80	10.05

4.1 Calibration results

There are two kinds of statistics: those we use to match the economy, and those we want to ask questions about. The status quo (SQ) has been calibrated to map the following set of statistics: the permanent job destruction rate JDp , the temporary job destruction rate JDt , and unemployment duration u_{dur} . On the other hand, the set of statistics in which we are interested consists of: unemployment rate u and tenure distribution.³² We focus on JD rates instead of JC rates because permanent job creation in our model is possible only via job conversion.

Table 2 shows the baseline model is a good starting point for investigating the workings of this economy because it matches real data fairly closely. Table 3 shows the other set of statistics. The unemployment rate, u , is slightly higher when compared with the actual data.³³ Regarding tenure distribution, the model reproduces reasonably well the average tenure for those with a tenure equal to or under six years, $d \leq 6$, in the SQ. In fact, the model is able to reproduce quite accurately the proportion of people with seniorities $d = 2$, $d = 3$, $d = 4$ and $d = 5$, but underestimates the proportion of people with a tenure equal to or under one year.

It is very interesting to note that the model is also able to reproduce the small effects the 2006 reform had on the Spanish labour market. There is no clear evidence about the causal effect this reform had on the unemployment rate, but it is quite likely that the observed unemployment rate reduction, 2.5 percentage points, is merely the product of good economic conditions. Our simulation sample shows that between 2006 and 2008 job destruction increased by less than one percentage point, whereas Table 3 shows almost

³²To compute the statistics, we have generated a series of unemployment, job creation and destruction rates (aggregated and disaggregated by type of contract), distributions of permanent and temporary job destruction rates by reason of separation and distributions of job seniority in TCs and PCs. Since all the variables are stationary, it is not necessary to detrend the series to make the calculations.

³³For comparability reasons with our data, which include only workers affiliated to the Social Security, we have computed the unemployment rate by excluding from the employment series public servants not paying Social Security contributions (those affiliated to MUFACE, the special regime for public servants).

Table 3: **Simulation results**

Statistics	Spanish Data	SQ	2006-Reform
JD	10.51	13.77	13.24
u	12.92	15.57	14.94
$d = 1$	29.42	18.44	17.58
$d = 2$	17.7	17.22	16.42
$d = 3$	11.2	11.08	12.12
$d = 4$	7.83	7.63	7.83
$d = 5$	6.2	7.44	7.63
$d = 6$	4.97	6.93	7.10
$d = 7$	3.6	6.33	6.48
$d = 8$	2.96	5.74	5.88
$d = 9$	2.42	5.19	5.31
$d = 10$	1.93	4.67	4.77
$d > 10$	11.77	9.33	8.88
$d \leq 6$	1.91	1.95	1.99
$d \leq 10$	2.81	3.79	3.87

the same JD in the SQ than under the 2006 reform. Furthermore, the temporary employment rate decreased in Spain by 0.75 percentage points during the three years after the implementation of the reform, and our model predicts a reduction of around 0.62 points. Hence, we understand these figures provide some confidence about the ability our model has to reproduce the observed features of the Spanish labour market.

4.2 Steady-state effects of the 2012 reform

In this section, we use the baseline model to quantify the steady-state effects of reducing severance costs from 45 to 33 days of wages p.y.o.s. and the effects of introducing the EPC. We are particularly interested in the effects on the unemployment rate, job destruction and tenure distribution. We show the results of the 2012 reform for two different scenarios. In the first one, we maintain the baseline parametrization regarding parameters y_{gap} and tr_{cost} : workers are less productive during their first three years in the contract and the firm incurs the training cost in the fourth period. In the second scenario, we assume that firms bring forward their human capital investments to period two, leading to an increase in productivity from that period on. The first period (the probationary period) is therefore the only one in which there is a productivity gap, y_{gap} . Additionally, we present an

alternative scenario in which all new hirings are made under a single contract with increasing severance payments, as suggested by Bentolila and Jansen (2012).

Law 3/2012, on Urgent Measures for reforming the Spanish Labour Market, specifies that only small firms, those with fewer than 50 workers, can make use of the EPC contract. Using our calibration sample, we find that for the 1997-2007 period the proportion of new hirings accounted for by small firms is 55%. We take this rate and assume that all small firms will make use of the EPC contract because the EPC is cheaper.³⁴ Given the median wage in our sample (1,117.5 euros), it is easy to see why this might be the case. The cost of firing a temporary worker (nine days of wages p.y.o.s in 2012) is higher than the cost of firing a worker under an EPC (zero indemnity at the end of the probationary period or 33 days of wages p.y.o.s once tenure is greater than one year) because firms receive an annual subsidy of around 1,167 euros during the first three years if they hire under an EPC.³⁵ In addition, we take into account that only workers belonging to certain categories (younger than 30 and long-term unemployed over the age of 44) qualify for the subsidies. This implies that only 12.21% of the new contracts signed under the reform are EPC (22.2% is the percentage in our sample of hirings entitled to wage subsidies, and they are only available for 55% of the contracts - the ones signed by small firms).

On the other hand, the ordinary PC severance cost function needs to be adjusted in two dimensions. First, we replace 45 by 33 days of wages p.y.o.s and second, we eliminate interim wages, since the 2012 reform abolished them. This implies the following severance cost function in PCs: $s^p = \frac{33}{365} * w * (d - 1)$.³⁶ We also need to adjust the TC severance cost function to the current level of severance costs, nine days of wages p.y.o.s., due to the aforementioned progressive increase in TC severance costs (one day a year until 12 days of wages p.y.o.s in 2015), which was introduced in the 2010 reform. This implies the following severance cost function in TCs $s^t = \frac{9}{365} * w * (d - 1)$.

Column 3 in Table 4 shows that the 2012 reform reduces unemployment

³⁴Until September 2012, only 10 out of 100 PCs signed by small firms have been of the EPC type. We contend that uncertainty about the details of this contract, the availability of subsidies for other PCs and the more favorable treatment of dismissals for “economic reasons” are behind this low use of the EPC in the first months after the introduction of this contract. The recent elimination of wage subsidies for all PECs should make firms more prone to use the EPC in the near future.

³⁵For males aged 30 or under the subsidy amounts to 1,100 euros per year, and it is even higher, 1,300 euros per year, if they are aged over 45 and have been unemployed for at least 12 months. Women hired in under-represented occupations are entitled to a yearly subsidy of 1,300 euros for three years.

³⁶Based on the fact that most firings in the past reached an amount very close to the legal limit, we have set 33 days of wages p.y.o.s for every firing regardless of whether the dismissal is a fair or an unfair one.

and job destruction by 20.2% and 28.8%, respectively. This result is consistent with Bentolila, Dolado and Le Barbanchon (2012). They find that reducing firing costs should decrease unemployment if there is a large gap between PC and TC firing costs.

What is very interesting is the change in the probability of being fired in contracts with a tenure equal to or below four years (the so-called temporary job destruction rate in the status quo). Before the reform, the temporary job destruction rate was very high because the large gap in severance costs induced massive firings at the beginning of period $d = 4$ in order to prevent the high future severance costs of PCs in the event of job conversion. After the reform, the pervasive incentives to destroy jobs at the beginning of period $d = 4$ largely diminish. The opposite happens, however, for the probability of being fired in contracts with a tenure above four years (the so-called permanent job destruction rate in the status quo). After the reform, this probability has almost doubled, from 5.6% to 8.2%. This composition effect explains the decrease in the aggregate job destruction rate, which might seem surprising if one takes into account the well-known result whereby a decrease in severance costs should increase job destruction (see, for instance, Bentolila and Bertola, 1990).

These changes in job destruction rates have an impact on tenure distribution. The average seniority for workers with six or fewer years of tenure, $d \leq 6$, and ten or fewer years of tenure, $d \leq 10$, increases by 5.6% and 10.6%, respectively. Moreover, the number of workers with a tenure equal to or under one year is 23% lower, and the number of workers with a tenure of more than three years is 15% higher after the reform.

However these results depend largely on the receipt of wage subsidies. If no subsidy was awarded to the EPC, the reform would imply a smaller reduction both in unemployment and in the probability of being fired in contracts with a tenure equal to or under four years, and a higher proportion of people with a tenure of less than one year, as the zero indemnity in the probationary period induces more job destruction at the end of this period, 22.6% against 6.5% in the previous scenario.

As mentioned above, we also compute the effects of the 2012 reform in a second scenario, where we assume that firms bring forward their human capital investments to period two, leading to an increase in productivity from that period onwards (see Column 4 in Table 4).³⁷ The results improve because the increase in productivity translates into lower job destruction rates

³⁷The reasons that may justify these assumptions are twofold. First, the fact that fiscal deductions must be reimbursed if firms do not keep workers for at least three years might further reduce job destruction rates in the first periods of the working relationship, and might therefore foster human capital investments, since jobs would be perceived as more stable. Second, the fact that the EPC is preferable to an ordinary TC (in terms of the indemnity the worker is granted) might make workers show more endeavour in the early stages, and so foster human capital investment (see Dolado and Stucchi, 2008).

at the end of periods two and three. However, the quantitative changes with respect to the previous scenario are not very large because the proportion of contracts made under the EPC is very low (12.21%) and its positive effects are hardly noticeable. In fact, if every firm and worker could make use of the EPC under the assumptions made in this second scenario, the results would be substantially better: unemployment would fall by more than 4 p.p., the probability of being fired in contracts with a tenure equal to or under four years would fall by almost three quarters and tenure distribution would become much smoother. However, this measure would be too onerous from a fiscal point of view (around 3,500 euros, on average, for each EPC contract).

Given the present context of restrictive fiscal policies, a more economical way to decrease the duality in the labor market would be to eliminate TCs and replace the actual EPC severance cost structure with an increasing indemnity, similar in spirit to the indemnity in the SOEC proposal made by Andrés et al. (2009). The indemnity could start at a low level and grow at a moderate rate, whereby after three years on the contract the same amount would be awarded as under the current EPC (the proposal made by Bentolila and Jansen, 2012). The results in this case would be much better: unemployment and job destruction rates would decrease by 28.4% and 42%, respectively. In fact, job destruction rates in contracts with a tenure of fewer than four years would decrease by 73.5% with respect to the status quo. Most interestingly, tenure distribution would be much smoother: the average seniority for workers with six or fewer years of tenure, $d \leq 6$, and ten or fewer years of tenure, $d \leq 10$, would increase by 7.5% and 14%, respectively. Moreover, 21% more workers would end up having tenures of more than three years, and there would be 32% fewer one-year contracts. The reasons are twofold. First, the increasing indemnity prevents a high turnover because there is no gap in severance costs to induce such behavior. Second, as in the second scenario, the likely greater effort exerted by workers in the early stages, given the smoother increase in severance costs, might induce firms to invest earlier in human capital, leading to an increase in productivity. There is no doubt that our findings are affected by these assumptions. Henceforth, our findings should be taken with care. An explicit consideration of worker's effort and firm's investment in human capital (and its consequences in terms of an improvement in productivity) as endogenous decisions is out of the scope of the current paper, but they are part of our research agenda.

4.3 The transition

Steady-state comparisons are useful because they provide an idea of the policy's long-term effects, but these comparisons should not be used to seriously assess the implications of economic reforms, since pre- and post-reform

Table 4: **Effects of the 2012 Reform versus the SOEC**

Statistics	SQ: 45 days	33 days + EPC	33 days + EPC-Prod.	Single Contract
u	15.57	12.43	12.27	11.14
JD	13.77	9.81	9.59	7.98
$JD_{d \leq 3}$	23.11	12.33	11.56	6.12
$JD_{d > 4}$	5.58	8.21	8.31	9.00
$d = 1$	18.44	14.19	13.99	12.54
$d = 2$	17.22	13.27	13.08	11.72
$d = 3$	11.08	11.34	11.33	11.23
$d = 4$	7.63	9.40	9.52	10.37
$d = 5$	7.44	8.90	8.97	9.44
$d = 6$	6.93	8.15	8.20	8.54
$d = 7$	6.33	7.40	7.44	7.71
$d = 8$	5.74	6.68	6.71	6.94
$d = 9$	5.19	6.01	6.04	6.25
$d = 10$	4.67	5.41	5.44	5.63
$d > 10$	9.33	9.25	9.29	9.63
$d \leq 6$	1.95	2.06	2.06	2.10
$d \leq 10$	3.79	4.19	4.21	4.32

economies have very different initial conditions. The appropriate way to assess the implications of reforms is to analyze the transition.

To perform this exercise, we take a sub-sample of workers from the MCVL data set previously described that differ in several dimensions: whether they are employed or unemployed, the type of contract, tenure on the contract and their productivity level (proxied by qualification), and we follow them for 12 years. We study the transition from the status quo to a post-reform steady state (the reform 2012 or the SOEC) and compare the resulting labour market careers.

4.3.1 The transition from 45–days to 33 days severance payment and EPC

In this section we show the results of the transition from the status quo, characterized by the 45 days of wages p.y.o.s indemnity (the pre-reform steady state) to a post-reform steady state that is characterized by lower severance payments, 33 days of wages p.y.o.s., and by the introduction of an EPC for small firms and for the aforementioned worker groups.

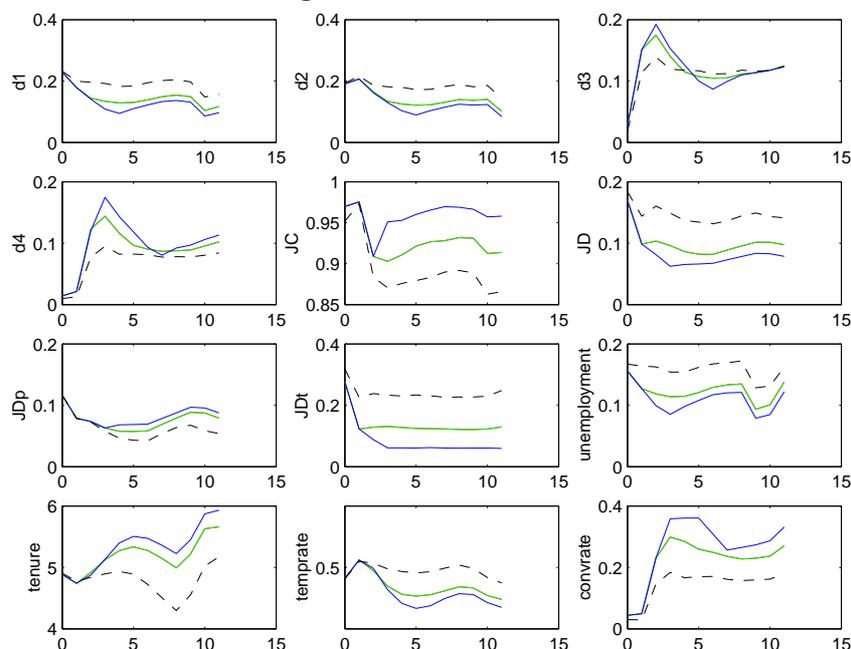
In both scenarios, workers are subject to the same shocks, but their employment histories are different because the policy rules are different. Under the status quo, the policy rules are those prevailing in the pre-reform steady state. In the transition scenario, the policy rules are those prevailing under the post-reform steady state for those individuals that start as unemployed.

However, in order to obtain the appropriate policy rules for those individuals that start the transition in a TC, a new problem has to be solved, because once the transition starts job conversion will still take place, albeit to a PC with lower severance payments. Regarding those individuals starting the transition in PCs, there is no incentive to fire permanent workers and hire new ones under the cheaper PC because the Law 3/2012 establishes that every PC (both preexisting and new ones) will be subject to the 33 days of wages p.y.o.s. indemnity once the law becomes effective. However, this will not be applied retroactively. That is, for workers with preexistent PCs, severance payments will be 45 days of wages p.y.o.s. for the years worked before the law became effective and 33 days of wages p.y.o.s. afterwards. However, this does not mean we can use status quo policy rules for preexistent PCs. In fact, the problems have to be solved again by considering that match's expected values change because of the lower future indemnity expected in preexistent PCs. Obviously, once temporary or permanent workers lose their jobs and are unemployed again, they re-enter the labour market under the 33 days of wages PC or the EPC, depending on the size of the firm and of the worker group, and the policy rules will be the appropriate ones.

Dotted black and green lines in Figure 2 show the evolution of several labour market variables related to tenure distribution and job creation and

destruction according to the status quo and the transition to the reform scenario. As the transition evolves, every variable moves towards its steady-state value. The first four panels show the evolution of the percentage of people in the first four durations (d1, d2, d3 and d4) over the twelve-year span. The percentage of people in the first two durations decreases in the transition, with the opposite occurring for the percentage of people in the remaining durations. These changes are due to the variation in the structure of severance costs; that is, to the reduction in the severance cost gap between PCs and TCs in ordinary contracts and to the smoother increase in the effective severance costs³⁸ of workers holding an EPC, which tends to alter the incentives to destroy jobs, especially in durations d3 and d4, allowing people a longer tenure.³⁹

Figure 2: The transition



Note: 33-days and EPCb (green), SOEC (blue), status quo (black).

Figure 2 also shows the job creation and destruction rates, aggregated and disaggregated by type of contract. The job creation rate is higher under the transition, while the opposite is true for the aggregate job destruction rate. This result might seem somewhat surprising if one takes into account the well-known result whereby a decrease in severance costs should increase not only job creation but also job destruction (see, for instance, Bentolila

³⁸The effective firing costs firms face are severance costs minus the wage subsidy.

³⁹We have shown only the percentage of people for the durations where most action takes place.

and Bertola, 1990). Here, this is true for job creation but not for aggregate job destruction because there is a composition effect. The job destruction rate in durations equal to or under four years (the so-called temporary job destruction rate in the dual labour market), decreases sharply in the transition, while the opposite occurs for the job destruction rate in durations above four years (the so-called permanent job destruction rate in the dual labour market). Again, these effects are related to the reduction in the severance costs gap in ordinary permanent contracts and to the smoothing effect of severance pay under the EPC.

As expected, the unemployment rate and the percentage of people in the first four durations under the transition (the so-called temporary employment rate in the dual labour market) decrease, while average tenure and the percentage of people that transit from d3 to d4 (the so-called job conversion rate in the dual labour market) increase.

In order to see who actually gains or loses from the implementation of this policy, we compute the severance payments and average tenure once the transition has been completed for each worker in the sample, and compare them to the ones that would have been obtained under the status quo. The upper panel in Table 5 shows that in the transition scenario 56% of the workers are better off (or the same) in both dimensions: 16.8% are strictly better off and only 2.78% are worse off in both dimensions. The unemployed group of workers is where more people improve (21.9%), and this is also the group where fewer people are worse off (0.09%), against 5.17% in the case of temporary workers.

The upper panel in Table 6 shows that the unemployed are the ones gaining more in terms of the percentage of people whose severance payments increase (38.8%), but temporary workers experience the highest average increase in the number of days of wages p.y.o.s (121.5). However, it is problematic to consider the compensation workers finally receive as a criterion for measuring how well they perform because the indemnity can be higher, both because tenure is higher and because the worker has been fired more times. If we concentrate on tenure, Table 6 shows that 41.8% have a higher tenure and only 8.11% are worse off in this dimension. Again, the unemployed are the ones gaining more, now in terms of the percentage of people whose tenure increases (49.1%), but temporary workers experience the highest increase in the number of years of seniority, 3.20, that amounts to almost 50% of the average tenure in the SQ. The unemployed is also the group of workers losing less in terms of the percentage of people negatively affected by the reform (only 5.11% of them experienced a decrease in tenure as opposed to 11.9% in the case of temporary workers), but those affected record the highest decrease in tenure (on average 3.72 years).

The reason temporary workers do not perform so well in the transition has to do with the fact they already had a TC when the transition started. Under the status quo, some of these temporary workers will end up having

Table 5: **Winners and Losers - I**

TR-Reform vs. SQ	All	Permanent	Temporary	Unemployed
$s >, t >$	16.8%	13.4%	20.0%	21.9%
$s >, t =$	11.6%	12.2%	9.94%	11.9%
$s >, t <$	5.33%	4.72%	6.73%	5.02%
$s =, t >$	0.68%	0.00%	2.52%	0.00%
$s =, t =$	27.4%	30.9%	23.9%	22.3%
$s =, t <$	0.00%	0.00%	0.00%	0.00%
$s <, t >$	24.3%	24.8%	21.0%	27.2%
$s <, t =$	11.2%	11.3%	10.7%	11.6%
$s <, t <$	2.78%	2.55%	5.17%	0.09%

TR-SOEC vs. SQ	All	Permanent	Temporary	Unemployed
$s >, t >$	22.6%	17.9%	26.1%	30.6%
$s >, t =$	6.25%	5.98%	7.09%	5.79%
$s >, t <$	4.11%	3.51%	4.84%	4.75%
$s =, t >$	1.39%	0.05%	4.98%	0.10%
$s =, t =$	26.7%	30.9%	21.5%	22.3%
$s =, t <$	0.00%	0.00%	0.00%	0.00%
$s <, t >$	27.8%	30.5%	23.5%	26.4%
$s <, t =$	9.47%	9.50%	8.97%	10.09%
$s <, t <$	1.66%	1.59%	2.99%	0.00%

Notation: s and t stand for indemnity and tenure, respectively.

TR-Reform vs. SQ means transition under the reform versus status quo. TR-SOEC means transition under the single open-ended contract.

Table 6: **Winners and Losers II**

TR-Ref.	All %	All	Perm. %	Perm.	Temp. %	Temp.	U %	U
$s >$	33.7%	84.8	30.4%	48.2	36.7%	121.5	38.8%	115.8
$s <$	38.2%	50.8	38.7%	41.0	36.9%	66.9	38.9%	56.3
$t >$	41.8%	2.78	38.2%	2.53	43.6%	3.20	49.1%	2.81
$t <$	8.11%	1.36	7.3%	0.08	11.9%	2.20	5.11%	3.72

TR-SOEC	All %	All	Perm. %	Perm.	Temp. %	Temp.	U %	U
$s >$	32.9%	123.3	27.4%	94.8	38.0%	141.1	41.1%	153.0
$s <$	39.0%	48.4	41.6%	39.0	35.5%	66.1	36.5%	53.8
$t >$	51.8%	3.34	48.5%	2.98	54.6%	3.79	57.1%	3.56
$t <$	5.77%	1.83	5.10%	0.07	7.83%	3.21	4.75%	3.89

Columns 3,5,7 and 9 in the first two rows of each panel show the increase ($s >$)/decrease ($s <$) in the number of days of wages p.y.o.s. In the other two rows in each panel, columns 3,5,7 and 9 show the increase ($t >$)/decrease ($t <$) in seniority in years.

higher tenure because once their TCs have been converted into PCs their probability of being fired is much lower than under the new regime. Finally, 7.3% of permanent workers end up having lower job tenure because once they lose their old PC, they reenter the labour market under a cheaper PC with higher firing probabilities.

We can conclude that this exercise contradicts the perception whereby the reduction in severance costs implied by this reform would increase the precariousness of the Spanish labour market. It is true that 38.2% will experience a decrease in severance pay of around 47% of the average SQ's indemnity, but this is basically as a result of the decrease in the firing probability. Furthermore, only 8.11% will end up having a shorter tenure. In fact, the reform would have a non-negligible impact on expected employment durations: on average, tenure would be 16% longer. Note also that the proportion of people that would not be affected by the reform is very high: 27.4% would end up with the same severance payments and tenure as if no reform had been undertaken.

4.3.2 The transition to the SOEC

In this subsection, we show the results of the transition from the status quo, to a post-reform steady state characterized by the introduction of a particular SOEC for all workers and firms - the EPC with increasing indemnities. We proceed in the same way as in the previous section. The only difference is that once temporary or permanent workers lose their jobs and go through unemployment, they re-enter the labour market under the SOEC.

Dotted black and blue lines in Figure 2 show the evolution of the same labour market variables previously shown, now comparing the status quo with the transition path to the SOEC. Figure 2 confirms the steady-state results in the sense that the EPC with increasing indemnities display better results than the 2012 reform. Specifically, the aggregate job destruction rate, the unemployment rate, the job destruction rate in contracts with a tenure equal to or under three years (the so called "temporary job destruction rate" in the dual labour market), the proportion of people with a tenure equal to or under one year, and the proportion of people with a tenure equal to or under three years (the so-called "temporary employment rate") fall to a greater extent in this scenario. On the other hand, the job destruction rate in contracts with a tenure over three years (the so-called "permanent job destruction rate"), the transition rate from the third to the fourth year on the contract (the so-called "job conversion rate") and average tenure increase to a greater extent than in the previous scenario.

The lower panels in Tables 5 and 6 reproduce the "Winners and Losers" exercise of the preceding subsection: 57% of the workers are better off (or the same) in both dimensions: 22.6% are strictly better off and only 1.66% are worse off in both dimensions. The unemployed group of workers is again

where more people improve (30.6%), and this is also the group where fewer people are worse off (0.0%) against 2.99% in the case of temporary workers.

If we focus on severance payments, Table 6 shows that the unemployed are the winners in terms of the percentage of people whose severance payments increase (they also experience the highest increase in severance costs) and permanent workers are the losers. Regarding tenure, Table 6 shows that 51.8% have a higher tenure and only 5.77% are worse off in this dimension. Again, the unemployed are the ones that gain more, now in terms of the percentage of people whose tenure increases (57.1%), but temporary workers experience the highest increase in the number of years of seniority (3.79). The unemployed is also the group of workers losing less in terms of the percentage of people negatively affected by the reform (only 4.75% of them experienced a decrease in tenure as opposed to 7.83% in the case of temporary workers), but those affected record the highest decrease in tenure (on average 3.89 years).

These results agree with the steady-state results: the SOEC, by bringing forward the investment in human capital, that leads to increases in productivity, outperforms the results of the reform 2012 in terms of a longer tenure. On average, tenure would be 24% longer than in the status quo, as opposed to 16% in the 2012 reform.

5 Conclusions

One of the things the recent crisis has revealed is the enormous volatility of the Spanish labour market. The reasons behind this high volatility are linked to the specialization in low human capital sectors and the institutional characteristics of the Spanish labour market, especially, the labour market segmentation between temporary and permanent workers due to the gap in severance cost of PCs and TCs and the way wages are established. The fact that working conditions, basically wages and hours worked, cannot be easily adjusted to firms' changing economic conditions (since they are determined by collective agreements) has forced firms to use job destruction as the prevalent adjustment mechanism.

The 2012 labour market reform has, to some extent, extended job protection to a wider share of the population, and will probably reduce the temporary employment rate since permanent jobs have become less costly. To provide an idea of its quantitative effects, we have computed its steady-state effects in a model economy that matches the Spanish data reasonably well. Our steady-state results show that this reform will reduce unemployment (by 20%) and job destruction (which is almost halved in contracts with a tenure of fewer than four years) and will temper both the probability of being fired and tenure distribution as severance payments are smoothed. We also find the EPC need be coupled with a subsidy in order to prevent an

excessive number of layoffs by the end of the probationary period. However, we have argued that a cheaper and more effective way to decrease the duality in the labor market would be to eliminate TCs and replace the current EPC severance cost structure with an appropriate increasing indemnity, similar in spirit to the proposal made by Bentolila and Jansen (2012).

In addition, our transition exercise shows that the reform would be highly beneficial for a majority of workers, especially the unemployed, because job stability would increase: on average, tenure would be 16% higher under the 2012 reform and 24.7% larger under the SOEC. According to our calculations, only 8.1% would be jeopardized (in terms of reduced tenure) under the passed reform (5.8% in the transition to the single contract) and 27% would not be affected by the reform, ending up with the same severance payments and tenure as if the system remained unchanged.

Obviously, these aspects of the reform will not be enough to improve the general performance of the Spanish labour market. The effects of this policy measure should be considered together with the other measures implied by the reform, such as the increase in internal flexibility and developments in active labour market policies.

Finally, there are certain caveats to our findings. First, as stated before, our model should explicitly consider the worker's effort as an endogenous decision in order to fully justify our assumption about the firm's investment in human capital when the single contract is introduced. Second, we have not taken into account the likely interactions between internal and external flexibility. As pointed in Bentolila and Jansen (2012), the 2012 reform introduces interesting links between severance pay and the wage bargaining process, making both external and internal flexibility to increase. A lower degree of employment protection makes it easier to reach agreements, that is, it allows breaking the deadlock in the wage bargaining process, because the alternative (firing) is less rewarding now for the worker. These complementarities are also beyond the scope of this paper, although they are again part of our research agenda. Hence, we consider the role of this paper to be a first step in the formal discussion about the possible implications of introducing a single open-ended contract for new hires.

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