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RESUMEN

A mediados de los 80 muchos países europeos liberalizaron los contratos temporales con objeto de abaratar la contratación, en lugar de reducir los costes de despido de los contratos indefinidos. Ello generó mercados laborales segmentados, siendo el caso español el más destacado, con una tasa de temporalidad del 33% a mediados de los 90. Desde entonces se han propuesto varias reformas, algunas de las cuales se cuantifican en este trabajo. Para ello, construimos un modelo de creación y destrucción de empleo de búsqueda y emparejamiento capaz de replicar las propiedades del mercado laboral español. A continuación, cuantificamos los efectos de la eliminación de los salarios de tramitación y de una reducción aún más drástica de los costes de despido. Los resultados son: (i) un incremento leve de la tasa de destrucción permanente, (ii) una reducción significativa de la tasa de temporalidad debido al incremento de la conversión de contratos temporales en permanentes, y (iii) una significativa reducción de la segmentación medida a través de la reducción del gap salarial.

Palabras clave: Costes de despido; tasa de temporalidad; destrucción de empleo; mercados segmentados; creación de empleo.

JEL classificación: E24,J63,J42,J32,J23.

ABSTRACT

In the mid 80's, many European countries liberalized the use of fixed-term contracts in order to lower firm's non-wage labor costs, instead of reducing firing costs associated with indefinite duration contracts. This policy generated segmented labor markets, being the Spanish case the most striking with a share of temporary employment of 33% by mid 90's. Ever since, several reforms have been proposed and in this paper we quantify the effects of some of them. First, we build a model of job creation and destruction of the search and matching type that is able to replicate the main properties of a segmented labor market like the Spanish one. Then, we use this model to quantify the effects of eliminating procedural wages and further reducing firing costs associated with permanent contracts. The main results are: (i) a small increase on permanent job destruction, (ii) a significant reduction of temporary job destruction, mainly driven by the increase in job conversions from temporary contracts into permanent ones, and (iii) a significant reduction in labor market segmentation measured as the reduction in the wage gap of temporary versus permanent ones.

Keywords: Firing costs; Temporary Employment; Job destruction; Job conversions; Segmented labor markets; job creation.

JEL classification: E24,J63,J42,J32,J23.

1 Introduction

In the mid 80's, many European countries liberalized the use of fixed-term (temporary) contracts in order to lower firm's non-wage labor costs, instead of reducing firing costs associated with indefinite duration (permanent) contracts. This policy generated segmented labor markets, being the Spanish case the most striking with a share of temporary employment of 33% by mid 90's. Ever since, several reforms have been proposed and in this paper we quantify the effects of some of them. First, we build a model of job creation and destruction of the search and matching type that is able to replicate the main properties of a segmented labor market like the Spanish one. Then, we use this model to quantify the effects of eliminating procedural wages and further reducing firing costs associated with permanent contracts. We are particularly interested in the effects on job creation (JC) and job destruction (JD), the temporary employment rate and the conversion of temporary contracts (TC's) into permanent contracts (PC's).

There is a debate about the link between employment protection legislation (EPL) and job reallocation (JR)[1]. One of the main conclusions drawn from the theoretical literature is that higher firing costs negatively affect JC and JD. Economies with lower dismissal costs are considered more efficient in the sense that they are more able to adapt to new conditions. On the contrary, high firing costs prevent the necessary reallocation from taking place and, since entry into unemployment is as a consequence reduced, there is less exit, which means less JC. However, when we look at JR across countries with different degrees of employment protection, there does not seem to be significant differences (see Garibaldi, Konings, and Pissarides (1996), OECD (1994), OECD (1996), OECD (1999)). This apparently contradiction with what the theory would predict does not mean that EPL is irrelevant for JC and JD. As argued in Bertola and Rogerson (1997), this might be due to the lack of quality of the data or to the existence of other institutions that counteract the negative effects of firing costs on job turnover. Therefore, all else being equal, EPL should negatively affect JR.

[1]Job reallocation is defined as the sum of job creation and job destruction.

In this sense, the Spanish labor market is a very interesting case of study because of its remarkably dual character, which allows us to disentangle the effects of EPL per se from the effects of EPL when interacted with other institutions by exploiting within country variation[2]. Since the liberalization of temporary contracts in 1984, the temporary job's share in hiring has increased from 12% to 96% in the mid 90's, and the share of the stock from 11% to 34%[3]. Most TC's do not entail dismissal costs or they are very low. This, together with the high firing costs that protect PC's has generated a segmented labor market, which may appear quite dynamic just by looking at aggregate rates of JC and JD, but this might be misleading. On the one hand, firms fire permanent workers less than it would be efficient (labor hoarding) and very rarely hire on a permanent basis and, on the other hand, temporary workers suffer the main adjustments. Table 1 shows averages of JC and JD rates disaggregated by type of contract and firm size (less or equal than 200 employees or more than 200) for the period 1990-96, which is the period of reference in this paper[4]. Most JR is driven by the behavior of temporary employment, which is evidence of the relevance of dismissal costs.

Table 1: **Job creation and Job destruction.**

	Job creation > 200 - ≤ 200	Job destruction > 200 - ≤ 200
Aggregate Employment	[3.3 - 4.7]	[6.3 - 9.9]
Permanent Employment	[2.9 - 5.1]	[5.7 - 9.7]
Temporary Employment	[17.9 - 19.3]	[22.3 - 28.0]

[2]It is difficult to isolate the effects of EPL from those of other institutional features. Most studies carrying cross country pairwise correlations between EPL and several labor market variables suffer from this drawback.

[3]Other European countries have also experienced increases in the share of temporary employment as a result of the liberalization of TC's in the mid 80's, but not that high as in Spain

[4]These numbers have been taken from Ruano (2000) who uses the survey "Encuesta de Estrategias Empresariales", a firm level data survey covering the period 1990-97.

The Spanish experience has shown the inefficiency of doing reforms at the margin and the need of fighting against the real problem: the high firing costs associated to PC's. Starting in 1994 there have been several reforms towards reducing temporary employment. Most of them have proved to be insufficient, being the most successful those that reduced non-wage labor costs, i.e. firing costs and social security contributions in 1997 and 2001. The last reform took place in May 2002 by means of a decree "Real Decreto-Ley 5/2002" that, among other things, eliminated procedural wages. However, in September 2002 the reform was revoked. In this paper we want to quantify what would have been the effects had the government not revoked the decree "Real Decreto-Ley 5/2002" that eliminated procedural wages.

For that purpose, we build a equilibrium model, similar in spirit to the job creation and destruction model proposed by Mortensen and Pissarides (1994), and introduce some elements to capture the specifics of the Spanish labor market: (i) the existence of a *Segmented Labor Market* with two types of jobs (permanent and temporary), differing in the maximum duration of the contract and in the associated firing costs, and held by homogeneous workers; (ii) endogenous job conversion of TC's into PC's; (iii) firing costs modelled as a transfer from the firm to the worker, and being a function of tenure and past wages approximated by past match quality; and (iv) downward wage rigidities, so that firing costs have real effects[5]. In this labor market firms will be heterogeneous agents and will use these two types of contracts to endogenously adjust their employment levels when facing idiosyncratic persistent shocks. We follow Mortensen and Pissarides (1994) by assuming one-job firms.

Before going into the details of the model, it is convenient to explain the timing and agent's decisions. At the beginning of the period, idiosyncratic shocks affecting firms are revealed. Then, firms and workers renegotiate wages. Given new wages, each firm with a

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

PC decides whether to fire its actual worker, taking into account that firing costs depend on previous match quality. Firms with temporary workers take a similar decision. However, firms whose TC's cannot be renewed anymore[6], decide at the beginning of this period whether to convert or not the TC into a PC, taking into account the consequences regarding future firing costs. Once all these decisions have been made, production starts both, in firms where workers have not been fired this period and in those that were matched with unemployed workers at the end of last period. Finally, search decisions are made: firms post vacancies and unemployed workers apply for jobs. This search process will generate new matches that will be productive next period. We will also assume that every job is created as a temporary job.

The model is calibrated to the Spanish economy and we test its validity to replicate the main labor market statistics. Then, we quantify the effects of the elimination of procedural wages, i.e. a 17% reduction in firing costs, on the magnitude of temporary and permanent job destruction, temporary employment, job conversion, unemployment, unemployment duration, and on the distributions of tenure, wages and job separations. The main predictions of this exercise are (i) a small increase on permanent job destruction, (ii) a significant reduction of temporary job destruction mainly driven by the increase in job conversions, and (iii) a significant reduction in labor market segmentation measured as the reduction in the wage gap of temporary versus permanent workers.

The outline of the paper is as follows. In Section 2, we briefly present the institutional background. In Section 3, we review previous literature. In Section 4, we present the model. In Section 5, we discuss its calibration. In Section 6, we show simulation results from the calibration exercise and from the reduction in firing costs. In Section 7, we present some robustness exercises regarding the minimum wage constraint. And finally, Section 8 draws some conclusions.

[6]We will assume that the maximum number renewals is 2, so that TC's can last at most 3 periods and we will keep track of contract duration.

2 Institutional background

In 1984 TC's were liberalized and since then, firms have made widespread use of them. There are two reasons for that behavior. First, they allow employment adjustments at a low cost. Second, until 1994, firms could freely use TC's without having to justify the temporary nature of the activity, using the so called "temporary employment promotion contract". The introduction of these cheap contracts, joint with the high firing costs associated to PC's, has generated a dual labor market, where workers in PC's have a very low probability of being fired while temporary workers suffer the main adjustments.

This experienced has shown the inefficiency of doing reforms at the margin and the need of fighting against the real problem: the high firing costs associated to PC's. From 1994 onwards there have been several reforms in that direction. In 1994, the government eliminated the "temporary employment promotion contract" and conditions for fair dismissals were slightly relaxed. This reform did not decrease temporary employment because firms used other types of TC's to continue hiring people on a temporary basis.

In 1997, the government introduced the so called "permanent employment promotion contract". This new PC was heavily subsidized and entitled to lower firing costs (33 days' wages per year of seniority with a maximum of 24 monthly wages) than ordinary PC's (45 days' wages per year of seniority with a maximum of 42 monthly wages) in case of unfair dismissal. This reform was so successful (see Dolado, Jimeno, and García-Serrano (2002) and Hernanz, Jimeno, and Kluger (2003)), that in 2001 the government extended the new PC to more population groups, increased the subsidies and subsidized the conversion of TC's into PC's.

In May 2003, the decree "Real Decreto-Ley 5/2002" eliminated procedural wages, which are those wages that firms have to pay upon dismissal until it is declared unfair or null. However, in September 2002, the government got cold feet and restored them. Procedural wages have till now been very relevant because most dismissals have been sued to court and

declared unfair. According to Bentolila (1997), from those sued in 1996, 79% were agreed at the Units of Intermediation (MAC's), while the rest, 21%, were left to the judge; however, only 15% of them were finally judged. From those, 72% were favorable to the worker. Bentolila (1997) explains that, the high probability of a dismissal being sued is due to the rational answer to legal incentives. Traditionally, firms have argued "disciplinary reasons"[7] (while, in fact, the reasons were in most cases of "economic nature"), for several reasons: (i) there was no need to give a notice period, (ii) the economic reasons were very difficult to prove, and (iii) because if finally sued, there was a positive probability of the dismissal being declared fair. The worker also had incentives to sue the disciplinary dismissal, since agreement conveyed no severance payment and no unemployment subsidy. Even in case of a dismissal for objective reasons, the worker had always incentives to sue because (i) there was a rebate in the income tax that could only be applied if there was disagreement, (ii) severance payments were higher if the dismissal was declared unfair, and (iii) because consultancy costs were usually paid by unions. In addition, workers knew the proportion of cases that were usually declared favorable to the worker, as well as the high probability of being offered a reasonable indemnity before going to court.

3 Related literature

The pioneer empirical studies in the literature of job flows are due to Davis and Haltinwanger (1990). Using firm-level data, they document significant amounts of JC and JD flows co-existing in all phases of the cycle and a lot of heterogeneity among plants. A number of

[7] In Spain, firms are allowed to dismiss workers for "disciplinary" or "objective" (economic) reasons. The dismissal cost for objective reasons involves a notice period or 30 days' wages, plus 20 days' wages per year of seniority with a maximum of 12 monthly wages. If the worker does not agree, he has the right to sue the case to the court. Before going to court, the firm and the worker usually try to reach an agreement at the Units of Intermediation (MAC's). If an agreement is reached, firing costs are the sum of procedural wages, the agreed severance pay and the consultancy costs. If no agreement is reached at the MAC's, the judge decides about the case. If the dismissal is declared fair, firing costs are the sum of the legal costs (20 days' wages per year of seniority with a maximum of 12 monthly wages), plus the consultancy costs. If, on the contrary, the dismissal is declared unfair, the costs are the procedural wages, the legal costs (45 days' wages per year of seniority with a maximum of 42 monthly wages), plus the consultancy costs. If the dismissal is declared null, the firm must readmit the worker and pay the consultancy costs plus the procedural wages.

empirical studies have applied the same methodology to some European countries: Boeri and Cramer (1993) for Germany, Contini and Revelli (1987) for Italy, Konings (1995) for the United Kingdom (UK), Dolado and Gómez (1995), García-Serrano and Jimeno (1998) and Ruano (2000) for Spain, finding very similar rates of JR across economies despite significant differences in institutions.

At the same time, a number of theoretical studies have been developed trying to rationalize these facts. The most important contribution is the stochastic endogenous job creation and destruction model by Mortensen and Pissarides (1994), in which the exogenous JD rate in the classic search and matching model by Pissarides (1990) is endogenized. For the EU, the relevant models are those that relate the behavior of JC and JD to the degree of employment protection. Most of them are of the *search and matching type*, for instance Garibaldi (1998), Cahuc and Zylberberg (1999) , Mortensen and Pissarides (1999b), and Garibaldi and Violante (2002). Others are in the tradition of the *real business cycle* literature, for instance, Hopenhayn and Rogerson (1993), Díaz and Galdón-Sánchez (1999) that applies that model to the Spanish economy, but without introducing the dual structure characteristic of the Spanish labor market, and Alvarez and Veracierto (2001) that extends that model to an economy with frictions and absence of insurance contracts. There are also models in the *efficiency wage* tradition, such as Guell (1999) and Saint-Paul (1996). Finally, Ljungqvist (2002) explains why all those general equilibrium models with layoff costs have delivered mixed messages on the implications for employment.

These models with layoff costs might be appropriate for most EU countries, but not for an economy like the Spanish one, where one third of the contracts has temporary nature. Thus, a complementary strand of literature is one that focuses on the consequences of the introduction of TC's on turnover, employment, productivity and wages. Most of these studies analyze the Spanish case because of its singularity and tend to relate the existence of TC's and the dismissal costs associated to PC's. For instance, the matching model of Wasmer (1999), the partial equilibrium demand models of Bentolila and Saint-Paul (1992) and Cabrales and Hopenhayn (1997), the collective bargaining models of Bentolila and Dolado (1994) and

Jimeno and Toharia (1993), the efficiency wage model of Guell (2000), the dynamic partial equilibrium demand model of Aguirregaribia and Alonso-Borrego (1999) and the general equilibrium model of Alonso-Borrego, Fernandez-Villaverde, and Galdón-Sánchez (2002).

Probably, the most similar to ours are Blanchard and Landier (2002), Cahuc and Postel-Vinay (2002) and Hernanz, Jimeno, and Kluger (2003). Blanchard and Landier (2002) and Cahuc and Postel-Vinay (2002), using different models, find that the liberalization of TC's is inefficient in order to reduce unemployment if there is no simultaneous reduction in firing costs associated to PC's. Blanchard and Landier (2002) use a matching model to study the effects on unemployment, unemployment duration, turnover, productivity and welfare. Cahuc and Postel-Vinay (2002) focus on the effects on unemployment, job destruction, temporary employment, welfare and income distribution. Hernanz, Jimeno, and Kluger (2003) use a version of Blanchard and Landier (2002) model, in which they introduce social security contributions and endogenous job destruction, and find a moderately elastic response of PC's to non-wage labor costs.

Our model differs from these 3 models in the following. First, these models are not appropriate to talk about labor force adjustments primarily made with TC's vs. PC's due to low productivity matches, but about TC's used as a screening device. Second, we model firing costs as a transfer from the firm to the worker instead of as a pure waste tax. Third, minimum wage constraints are introduced to avoid firing costs' neutrality. Fourth, the model is much more structural, that is, we can keep track of contracts and compute distributions by type of contract of JC and JD, wages, tenure and employment loss by reason of separation (TC's reaching the maximum duration allowed, low productivity or retirement). Finally, the calibration exercise is performed in a very detailed manner. Since none of the above mentioned models look appropriate to answer the question we pose and to account for the facts in which we are interested, the first goal in this paper is to build a model that has enough structure to provide those statistics and that is able to account for that.

4 The model

4.1 Population

The economy consists of a continuum of workers with unit mass and a continuum of firms. Workers can either be employed or unemployed[8]. Unemployed workers look for employment opportunities; employed workers produce and do not search on the job. Firms post vacancies or produce. There is a cost associated to posting a vacancy, 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, durations, and firing costs that depend on previous match quality. Therefore, the state space that describes the situation of a particular worker is $S = \{\{0,1\} \times \mathcal{E} \times D \times \mathcal{E}\}$, where $\mathcal{E} = \{\epsilon_1, ..., \epsilon_n\}$ is a discrete set for the quality levels and $D = \{d_1, ..., d_N\}$ is also a discrete set denoting tenure on a particular job. Therefore, each quadruple indicates whether the worker is unemployed (0) or employed (1) and, in that case, the quality of the match, worker's tenure and his previous match quality.

4.2 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, that is, 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.

[8] We do not considered other labor market states out of the labor force

4.3 Technologies

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

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 process is the same for every 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 ϵ, $\epsilon' \in \mathcal{E} = \{1, 2, ..., n_\epsilon\}$. Each new matching starts with the same entry level ϵ_e and from this initial condition, the quality of the match will evolve 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 labor 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 labor 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, permanent jobs are created when firms decide to convert a TC into a PC. This can be motivated by a good realization of the process $\{\epsilon_t\}$ at the end of the

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maximum period that a contract can last. In particular, job conversion will take place for realizations above a specific threshold that firms determine.

4.4 Equilibrium

The concept of equilibrium used is the recursive equilibrium. In each period, the aggregate state of the economy is described by μ, which represents the matching distribution by quality levels, tenure on the job and previous quality levels. In the following, I will describe firms and workers problems. Note that job destruction will not be efficient in this context, in the sense that firms will unilaterally decide upon match continuation (see Mortensen and Pissarides (1999a) for a discussion).

4.4.1 Firms' Problems

The vector of states at the beginning of a period for a firm with a permanent job is $(\epsilon, \epsilon_{-1}, \mu)$, and its problem the following

$$\begin{aligned} J^p(\epsilon, \epsilon_{-1}, \mu) &= max\{y(\epsilon) - w(\epsilon, \epsilon_{-1}, \mu) + \beta \sum_{\epsilon\prime} \Gamma(\epsilon\prime|\epsilon) J^p(\epsilon\prime, \epsilon, \mu\prime), \\ &\quad -cf(\epsilon_{-1}) - c + \beta q(\mu\prime) J^t(\epsilon_e, d_1, \mu\prime) + \beta(1 - q(\mu\prime)) J^0(\mu\prime)\} \end{aligned}$$

$$\text{s.t. } \mu' = G(\mu)$$

where $J^p(\epsilon, \epsilon_{-1}, \mu)$ is the firm value function, $w(\epsilon, \epsilon_{-1}, \mu)$ is the wage, previously determined in a bilateral negotiation between the firm and the worker or fixed by a minimum wage when binding, $cf(\epsilon_{-1})$ is the firing cost that depends on previous match quality, $J^t(\epsilon_e, d_1, \mu')$ is the value function of a firm with a first period temporary job, $J^0(\mu\prime)$ is the value of a vacancy and the function $G(\mu')$ describes the law of motion of the distribution. The decision rule for this firm is denoted by $g^p(\epsilon, \epsilon_{-1}, \mu)$. The firm must decide whether to continue with

the actual match, $g^p(\epsilon, \epsilon_{-1}, \mu) = 1$, or whether to fire the worker and look for a new one, $g^p(\epsilon, \epsilon_{-1}, \mu) = 0$.

Note that the problem is different for a firm whose TC reached the maximum duration allowed at the end of the previous period. Let us denote by n the maximum number of periods that a TC can last. In this case, the vector of states at the beginning of the period is (ϵ, d_{n+1}, μ), where d_{n+1} indicates that if the worker is not fired at the beginning of this period, this worker will start this period as a permanent worker. His previous quality level is not part of the state vector yet because the firing cost at the beginning of this period is still zero. The problem of this firm can be written as[9]

$$\begin{aligned} J^p(\epsilon, d_{n+1}, \mu) &= max\{y(\epsilon) - w(\epsilon, d_{n+1}, \mu) + \beta \sum_{\epsilon\prime} \Gamma(\epsilon\prime|\epsilon) J^p(\epsilon\prime, \epsilon, \mu\prime), \\ &\quad -c + \beta q(\mu\prime) J^t(\epsilon_e, d_1, \mu\prime) + \beta(1 - q(\mu\prime)) J^0(\mu\prime)\} \end{aligned}$$

$$\text{s.t. } \mu' = G(\mu)$$

and its decision rule is $g^p(\epsilon, d_{n+1}, \mu) = 1$ if the firm converts the TC into a PC and $g^p(\epsilon, d_{n+1}, \mu) = 0$ if the firm decides to fire the worker and start looking for another one.

The vector of states at the beginning of the period of a firm with a temporary job is (ϵ, d, μ), where d represents tenure on the contract at the beginning of the period. Note that the previous quality level is not part of the state vector, since firing costs are zero for this type of contracts. The problem of this firm is

[9] This equation plays the same role as the asset pricing equation of 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.

$$\begin{aligned} J^t(\epsilon, d, \mu) &= max\{y(\epsilon) - w(\epsilon, d, \mu) + \beta \sum_{\epsilon\prime} \Gamma(\epsilon\prime|\epsilon) J^t(\epsilon\prime, d+1, \mu\prime), \\ &\quad -c + \beta q(\mu\prime) J^t(\epsilon_e, d_1, \mu\prime) + \beta(1 - q(\mu\prime)) J^0(\mu\prime)\} \end{aligned}$$

$$\text{s.t. } \mu\prime = G(\mu) \text{ and } d = \{d_1, ..., d_{n-1}\}$$

where $J^t(\epsilon, d, \mu)$ is the value function for this firm and $w(\epsilon, d, \mu)$ the wage, previously determined in a bilateral negotiation between the firm and the worker or fixed by a minimum wage. The firm must decide whether to continue with the match, $g^t(\epsilon, d, \mu) = 1$, or to fire the worker and look for another one, $g^t(\epsilon, d, \mu) = 0$. Note that due to the limited duration of TC's, the problem of a firm with a TC at the beginning of the last period (period n) is

$$\begin{aligned} J^t(\epsilon, d_n, \mu) &= max\{y(\epsilon) - w(\epsilon, d_n, \mu) + \beta \sum_{\epsilon\prime} \Gamma(\epsilon\prime|\epsilon) J^p(\epsilon\prime, d_{n+1}, \mu'), \\ &\quad -c + \beta q(\mu\prime) J^t(\epsilon_e, d_1, \mu\prime) + \beta(1 - q(\mu\prime)) J^0(\mu\prime)\} \end{aligned}$$

$$\text{s.t. } \mu' = G(\mu)$$

4.4.2 Workers' Problems

The problem of a worker in a permanent job is trivial. In fact, his decision is indirect since he negotiates with the firm over the wage before the firm decides upon his continuation. Similarly, $V^p(\epsilon, \epsilon_{-1}, \mu)$ is 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 $V^0(\mu)$ is the value function for an unemployed worker.

$$V^p(\epsilon, \epsilon_{-1}, \mu) = \tilde{\Phi}(g^p = 1)[w(\epsilon, \epsilon_{-1}, \mu) + \beta \sum_{\epsilon\prime} \Gamma(\epsilon\prime|\epsilon) V^p(\epsilon\prime, \epsilon, \mu\prime)] + \tilde{\Phi}(g^p = 0)[V^0(\mu) + cf(\epsilon_{-1})]$$

The problem of a worker in a temporary job is also trivial. As before, $V^t(\epsilon, d, \mu)$ is the value function of a worker in a TC.

$$V^t(\epsilon, d, \mu) = \tilde{\Phi}(g^t = 1)[w(\epsilon, d, \mu) + \beta \textstyle\sum_{\epsilon\prime} \Gamma(\epsilon\prime|\epsilon) V^t(\epsilon\prime, d+1, \mu\prime)] + \tilde{\Phi}(g^t = 0) V^0(\mu)$$

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

$$V^0(\mu) = b + \beta q(\mu\prime) V^t(\epsilon_e, d_1, \mu\prime) + \beta(1 - \alpha(\mu\prime)) V^0(\mu\prime)$$

where $V^t(\epsilon_e, d_1, \mu')$ is the value function of a temporary worker in his first period of contract. The parameter b can be interpreted in two ways. It could be some kind of unemployment subsidy or the return to home production.

4.4.3 Wage determination

Wages are the result of a bilateral bargaining between the worker and the firm, unless the legally imposed minimum wage is binding[10]. Bargaining is dynamic, that is, wages are revised every period upon occurrence of new shocks. The assumption of bilateral bargaining is reasonable due to existence of sunk costs (search costs) once the match is produced. This creates local monopoly power and generates a surplus to be split among the participants in the match. This surplus, in the case of a permanent contract, is defined as

$$S^p(\epsilon, \epsilon_{-1}, \mu) = [J^p(\epsilon, \epsilon_{-1}, \mu) - (J^0(\mu) - cf(\epsilon_{-1}))] + [V^p(\epsilon, \epsilon_{-1}, \mu) - (V^0(\mu) + cf(\epsilon_{-1}))]$$

[10]The downward wage rigidity is modelled as a lower bound on the outcome of wage negotiations. As we will show in Section 7, we need to impose a minimum wage in order to avoid too much internalization.

Wages are obtained by maximizing the following Nash product with respect to the wage and set so that the surplus of the match, $S^p(\epsilon, \epsilon_{-1}, \mu)$, is split in fixed proportions according to θ, which reflects worker's bargaining power.

$$[J^p(\epsilon, \epsilon_{-1}, \mu) - (J^0(\mu) - cf(\epsilon_{-1}))]^{1-\theta}[V^p(\epsilon, \epsilon_{-1}, \mu) - (V^0(\mu) + cf(\epsilon_{-1}))]^{\theta}$$

Wages associated to TC's are obtained by maximizing a similar expression, where $cf(\epsilon_{-1})$=0.

4.4.4 Definition of Equilibrium

A recursive equilibrium is a list of value functions $J^p(\epsilon, \epsilon_{-1}, \mu)$, $J^p(\epsilon, d_{n+1}, \mu)$, $J^t(\epsilon, d, \mu)$, $V^p(\epsilon, \epsilon_{-1}, \mu)$, $V^p(\epsilon, d_{n+1}, \mu)$, $V^t(\epsilon, d, \mu)$, $J^0(\mu)$, $V^0(\mu)$, transition rates $q(\mu)$, $\alpha(\mu)$, prices $w(\epsilon, \epsilon_{-1}, \mu)$, $w(\epsilon, d, \mu)$, decision rules $g^p(\epsilon, \epsilon_{-1}, \mu)$, $g^p(\epsilon, d_{n+1}, \mu)$, $g^t(\epsilon, d, \mu)$, and a law of motion for the aggregate state $G(\mu')$ such that[11]

1. *Optimality*: Given functions $q(\mu)$, $\alpha(\mu)$, $w(\epsilon, \epsilon_{-1}, \mu)$ and $w(\epsilon, d, \mu)$, the value functions $J^p(\epsilon, \epsilon_{-1}, \mu)$, $J^p(\epsilon, d_{n+1}, \mu)$,$J^t(\epsilon, d, \mu)$, $V^p(\epsilon, \epsilon_{-1}, \mu)$, $V^p(\epsilon, d_{n+1}, \mu)$ and $V^t(\epsilon, d, \mu)$ 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 rents associated to holding a vacancy; that is, $J^0(\mu) = 0$, implying $c = \beta q(\mu')J^t(\epsilon_e, d_1, \mu')$

3. *Wage bargaining:* The equilibrium conditions from maximizing the surplus are

$$(1-\theta)S^p(\epsilon, \epsilon_{-1}, \mu) = J^p(\epsilon, \epsilon_{-1}, \mu) + cf(\epsilon_{-1})$$

$$\theta S^p(\epsilon, \epsilon_{-1}, \mu) = V^p(\epsilon, \epsilon_{-1}, \mu) - (V^0(\mu) + cf(\epsilon_{-1}))$$

[11] Cole and Rogerson (1999) show that there always exists an equilibrium where wages do not depend on the unemployment rate, only on the idiosyncratic shock. The intuition is that, because of the free entry margin, vacancies adjust to the number of unemployed and the relevant variable becomes the ratio of unemployed workers to vacancies.

4. *Rational expectations:* Individual decisions generate a distribution over tomorrow's aggregate state that is equivalent to the distribution implied by $G(\mu')$.

5 Mapping the Model to Data

In this section we explain the procedure we use to assign values to the parameters of the model and the selection of functional forms. The calibration consists on assigning values to parameters such that the model economy is able to replicate certain statistics of the real data. For the parameters that have a clear counterpart in the real economy we use the implied values. For the rest, we prefer not to use arbitrary estimations and we use the simulated method of moments. This optimization method consists in finding the values that minimize the distance between the statistics of the model economy and those of the real data.

5.1 Model period and firm-level data

The JC and JD statistics have been taken from Ruano (2000), who uses the survey "Encuesta sobre Estrategias Empresariales", a firm-level annual data set covering the period 1990-97. The model period has been chosen such that it is consistent with this data and reasonable from a computational point of view. Hence, we have chosen a year.

5.2 Preferences

The utility function is linear in consumption as usual in this literature. The value of the discount factor β is fixed such that it is consistent with the mean annual real interest rate in the reference period, 6%. Therefore, the implied β is 0.94.

5.3 Production technology

The production function is assumed to be linear in the idiosyncratic shock, $y(\epsilon) = \epsilon$. The idiosyncratic shock is modelled as a Markov chain, $\Gamma[(\epsilon')|(\epsilon)]$. In addition, we assume that there are five possible quality levels. In general, this two assumptions would imply that we need to impose 20 restrictions to fix the values of the conditional transition probabilities between different quality levels, unless we assume that the expected duration of good idiosyncratic and bad idiosyncratic shocks coincide. This would imply that, for instance, $\Gamma[(\epsilon_1)|(\epsilon_2)] = \Gamma[(\epsilon_2)|(\epsilon_1)]$ and, therefore, we would only need to estimate 15 transition probabilities. Given that we do not have direct information on the quality of the match, we use Tauchen's procedure[12] to parameterize the five quality match levels, as well as the transition probabilities. To apply this procedure we need to know the mean (μ), standard deviation (σ_v) and autocorrelation coefficient (ρ) of the underlying idiosyncratic process. We use quarterly GDP in the period 1990-1996 to approximate that process.

5.4 Unemployment benefits

The parameter b can be given two interpretations, the return to household production or the value of unemployment benefits. Since we do not have good information about the first, we use the second interpretation. But instead of fixing the value of b, we fix the ratio of average unemployment benefits to the minimum wage, b/w_{min}. To compute this ratio we use the following pieces of information[13]: unemployment benefits in Spain in 1996 were about 540 Euro a month and coverage 0.3. We can consider average monthly unemployment pay as the product of the two, that is, 162 Euro a month. On the other hand, the monthly minimum wage in 1996 was 390.18 Euro. These two observations generate a ratio b/w_{min} of 0.41.

[12] See Tauchen (1986)

[13] The source for this data is Bulletin of Labour Statistics edited by the Ministry of Labour and Social Affairs, the Spanish Labor Force Survey (EPA), and National Employment Office (INEM) Statistics.

5.5 Matching technology

The matching function $m = m(v_t, u_t)$ is assumed to be a Cobb-Douglas homogeneous of degree one function, $m = m(v, u) = A * v^{\eta}(u)^{1-\eta}$. The scale parameter A reflects the degree of mismatch in the economy and η is the value of the elasticity of the number of matches with respect to vacancies.

In sum, the calibration exercise involves the assignment of values to two types of parameters. The discount rate and the parameters of the idiosyncratic process are the only ones that are set independently of the rest since they have clear counterparts in the real economy. The six remaining parameters: the cost of opening a vacancy c, the elasticity of new matches with respect to the vacancy input η, the scale parameter in the matching function A, workers bargaining power θ, unemployment benefits b, and the minimum wage w_{min} are obtained using the method of simulated moments. We need to impose six conditions to set these six parameters. The conditions that we impose are the following

1. The ratio b/w_{min} is 0.41 as explained before.

2. The distribution of temporary job destruction is: 0.15 percent of temporary employment losses are due to productivity reasons and 0.85 are due to the end of the maximum duration allowed[14].

3. The distribution of permanent job destruction is: 0.38 percent of permanent employment losses are due to productivity reasons and 0.62 are due to retirement[15].

4. Two statistics related to the tenure distribution: 51% of employment has a tenure of less than five years and 66% less than ten years[16].

[14] Author self–calculations using the data from the "Spanish Labor Force Survey" 1990-96.
[15] Author self–calculations using the data from the "Spanish Labor Force Survey" 1990-96.
[16] See Table 5.5 "Distribution of employment by employer tenure, 1995" in *Employment Outlook 1997* edited by the OECD.

Table 2: **Baseline Economy Parameters.**

β	μ	ρ	σ_v	b	w_{min}	A	η	c	θ	f
.94	.03	.75	.11	.10	.25	.50	.50	.15	.45	1.2

5. The share of aggregate consumption in output is assumed to be 0.85. In the model, aggregate consumption is the output generated by firms plus unemployment benefits less the costs of offering vacancies in the market.

The optimization procedure generates the six parameters values related to these statistics (see Table 2). Previous studies have used values for c in the range $[0.2 - 0.3]$ and the bargaining parameter has been set to 0.5 because of lack of information. Abowd and Lemieux (1993) estimate a value 0.3 for θ. The value for η is congruent with the range $[0.4 - 0.6]$ obtained in empirical studies.

5.6 Firing costs

To compute the equilibrium we need a firing cost function that reflects the average firing cost in the real economy for the period under study. We use the following pieces of information for 1996 to estimate the firing cost function: legal indemnities[17] for fair (20 days' wages per year of seniority with a maximum of 12 monthly wages) and unfair (45 days' of wages per year of seniority with a maximum of 42 monthly wages) dismissals, mean tenure of around 9 years[18], procedural wages of around two month wages, and the fact that 72% of all firing processes were declared unfair.

[17] In 1996 most dismissals were sued: 79% of them agreed at MAC's, and from the rest only 15% were finally judged. The precise number of days actually agreed is not known (only the amounts paid), but the presumption is that they are very close to the legal limit. Therefore, we focus on legal indemnities following Toharia (1999) and Malo (2002).

[18] See Table 5.5 "Distribution of employment by employer tenure, 1995" in *Employment Outlook 1997* edited by the OECD.

Using those observations, firing a permanent worker with a 9-year tenure amounts to 402 days of salary (including procedural wages). Since w refers to an annual wage, $cf = 1.1 * w_{-1}$ would be the implied firing cost function. Given an monthly before-tax wage of around 1082 Euro [19], that firing cost function implies an indemnity of 12.118 Euro. According to Bentolila (1997), the average indemnity reported in the "Bulletin of Labor Statistics" lied in the range $[6.460 - 14.430]$ Euro, depending on whether indemnities were agreed at the MAC's or imposed by the judge, but in his opinion they should not be that different[20]. Thus, we think that $[1 - 1.3]$ is a reasonable range for parameter f and $f = 1.2$ will be used in the baseline.

Note that legal firing costs depend on the previous wage. Since making the firing cost function depend on previous wages is computationally very difficult to manage, we take the previous quality of the match as an approximation of the previous wage and use the following general functional form $cf = f * \epsilon_{-1}$.

6 Main Findings

In this section we report the answers to the questions that we posed. In Section 6.1, we report the results of the calibration exercise to test whether the baseline model is a good starting point to make counterfactual experiments. In Section 6.2, we show the effects of the elimination of procedural wages. In Section 6.3, we report the results of larger reductions in firing costs.

6.1 Calibration results

We can distinguish two kinds of statistics: those that are used to match the economy, and those over which we want to ask questions. The model has been calibrated to match

[19] Source: Boletín Mensual de Estadística (INE).

[20] Bentolila (1997) argues that there is an upward bias in the indemnities agreed at MAC's because they may be capturing, not only the indemnities, but also procedural wages and the final discharge. On the other hand, the indemnities imposed by the judge are subject to other biases, i.e., a downward bias because indemnities are not always reported in the statistical questionnaires.

Table 3: **Calibration results.**

Statistics	Simulated Model	Spanish Data
b/w_{min}	.40	.41
$JDt - prod$	.19	.15
$JDp - prod$	.33	.38
$tenure < 5$	.44	.51
$tenure < 10$	.75	.66
C/Y	.81	.85

the following set of statistics: the ratio of unemployment benefits to the minimum wage (b/w_{min}), the temporary ($JDt - prod$) and permanent ($JDp - prod$) job destruction rates due to productivity reasons, the less than 5-years tenure employment rate ($tenure < 5$), the less than 10-years tenure employment rate ($tenure < 10$) and the share of aggregate consumption in output (C/Y). On the other hand, the set of statistics in which we are interested are: the permanent job destruction rate (JDp), the temporary job destruction rate (JDt), the temporary employment rate ($temp$), the rate of conversions from temporary into permanent jobs ($conver$), the unemployment rate ($u - rate$), unemployment duration ($u - dur$) and the wage gap. We focus on JD rates instead of JC rates for two reasons. First, in steady-state they should be the same. And second, focusing in JC is tricky because there are important differences between the process of *permanent* job creation in this model and in the real economy: (i) permanent job creation is only possible via conversion of TC's into PC's, and (ii) given the model assumptions, firms do not have incentives to convert these contracts prior to the n period of the TC[21].

Table 3 shows that the baseline model is a good starting point to ask questions about the

[21] To compute the statistics we have generated series of unemployment rates, job creation and destruction rates (aggregate and disaggregate by type of contract), temporary employment rates, job conversion rates, wage and consumption shares, distributions of temporary job destruction rates by reason of separation (productivity or TC-max-duration), distributions of permanent job destruction rates by reason of separation (productivity or retirement) and distributions of employment tenure in temporary and in permanent contracts. Since all variables are stationary, it is not necessary to detrend the series to make the calculations.

Table 4: **Simulation results.**

Statistics	Simulated Model	Spanish Data
JDp	.10	.10
JDt	.18	.22
$temp$	.37	.34
$conver$	.15	.11
$u-rate$	.18	.20
$u-dur$	1.63	1.4
$wage-gap$	.24	[.1-.47]

workings of this economy because it matches real data quite well. Table 4 shows the other set of statistics. The baseline model is able to reproduce the *means* of job destruction by type of contract, the temporary employment rate, the unemployment rate and the duration of unemployment [22] reasonable well. However, the share of temporary employment and the job conversion rate[23] are a little bit high when compared to the actual data.

The behavior of wages deserves comments. The existence of two types of workers, permanent workers protected by EPL and temporary workers not protected at all, implies that, in some sense, this is an insider-outsider model, where wages are going to be different for the two types of workers. In particular, wages for permanent workers, not only depend on the actual match quality level, but also on the previous quality of the match through its effect on firing costs: the higher the previous quality of the match, the higher the firing costs, and so the higher the actual negotiated wage. Moreover, one would expect that the wage be a positive function of the actual quality level, for any particular value of the previous match quality. This is not always true in this model due to the way wages are determined. For

[22]The Spanish average unemployment duration has been computed considering the following distribution of the duration of unemployment in 1996: 28% of the unemployed have been looking for employment less than 6 months, 19% between 6 and 12 months and 53% more than 12 months. Source: European Union Bulletin 7/8-1997.

[23]The job conversion rate has been taken from Toharia (1998).

sufficiently high firing costs, wages are not increasing in match quality since firms anticipate that future firing costs will be higher the higher the previous quality of the match and therefore, push down wages when bargaining.

On the other hand, wages for workers in TC's do not depend on the previous quality of the match. They are just an increasing function of match quality. What is very interesting is the evolution of wages when going from a TC to a PC. In the benchmark case, wages in PC's are 24% higher than wages in TC's[24], except for the first-period wage in a PC, which internalizes future firing costs, and therefore may be even lower than the wage of a temporary worker in a job with the same match quality.[25] Of course, minimum wage provisions will not always make it possible to fully internalize future firing costs. In that case, as we will see in Section 7, the negative effects of firing costs on employment will be higher.

6.2 Effects of the elimination of procedural wages

The elimination of procedural wages implies a 17% reduction in firing costs[26], which implies going from $f = 1.2$ (firing costs with procedural wages) to $f = 1$ (firing costs without procedural wages). The main results are shown in Table 5.

The elimination of procedural wages increases permanent job destruction because now it is less costly to fire permanent workers. However, the main effect is the increase in job conversions, as in Hernanz, Jimeno, and Kluger (2003), where they find a moderately response of permanent employment to non-wage labor costs and a significant increase in the transitions from TC's to PC's. Lower firing costs increase the incentives to convert TC's into PC's because doing so allows firms to avoid turnover costs and, in case of dismissal due

[24]OECD (2002) reports that average wage in a TC lags that of a PC by 13% in Britain, 17% in Germany, 20% in France and 47% in Spain. According to Jimeno and Toharia (1993) the wage gap is 10% in Spain.

[25]Frisen (1996) using Canadian data finds that incumbent workers, protected by these regulations, extract higher wages than those of not protected workers, and that starting wages (for non-union workers) appear to fall to offset subsequent wage increases.

[26]Procedural wages are around $57 - 65\%$ of the total firing cost for a one-year tenure contract; $21 - 27\%$ for a five-year tenure contract; and $11 - 15\%$ for a ten-to-fifteen-year tenure contract.

Table 5: **Elimination of procedural wages.**

Statistics	$cf = 1.2$	$cf = 1$	%var	$\frac{\%var}{\%f}$
JDp	.10	.11	4.52	-0.27
JDt	.18	.14	-22.91	1.37
$temp$	.37	.34	-10.71	0.74
$conver$	.15	.19	26.67	-1.6
$u - rate$	.18	.15	-17.5	1.06
$dur - u$	1.63	1.57	-3.68	0.22
$JDt - prod$	.19	.26	36.84	-2.21
$JDp - prod$	.33	.35	5.66	-.34
$wage - gap$	.24	.20	-16.67	1.00

to bad productivity shocks, firing costs are lower than in the baseline.

In fact, most of the reduction in the temporary job destruction rate is due to the increase in job conversions, which implies less temporary job destruction due TC's reaching the maximum duration allowed and not being renewed. This can best understood if we look at the effects on the distribution of temporary job destruction by reason of separation: the firing costs reduction lowers the proportion of temporary jobs destroyed due to TC's reaching the maximum duration allowed because more TC's are converted, while the proportion of temporary jobs destroyed due to productivity reasons increases despite the decrease in the productivity threshold that governs temporary job destruction. On the other hand, the distribution of permanent employment loss remains almost unchanged.

Concerning the behavior of wages, the elimination of procedural wages decreases the wage gap by 17% because permanent workers lose bargaining power and, as consequence, their wages get reduced. Finally, the temporary employment rate and the unemployment rate both fall by a 0.74% and 1%, respectively, relative to the 1% change in firing costs. The unemployment rate falls because the increase in job creation through job conversions more than compensate the increase in job destruction due to firing costs being lower.

6.3 Effects of lowering firing costs

In Table 6 we show the results for several values of parameter f going from the baseline value, $f = 1.2$, to the extreme case in which firing costs are nil, $f = 0$. First, lowering firing costs a bit more, further increases permanent job destruction, which is consistent with theoretical predictions, in the sense that, lower firing costs should make the dismissal of permanent workers easier.

Second, temporary job destruction decreases, not only due to the increase in job conversions as before, but also due to the lower duality in the labor market; that is, job destruction due to negative productivity shocks tends to be less concentrated in temporary employment as firing costs further decrease.

Third, the behavior of the share of temporary employment deserves some comments. From the obtained results, one could think that this share should be positively related to the degree of EPL because the lower the firing costs, the more job conversion there is, and so the lower the share of temporary employment. However, this need not be the case because the share of temporary employment is affected, not only by the behavior of the job conversion rate, but also by the permanent job destruction rate. And the permanent job destruction rate is also higher as it gets cheaper to fire. Note that all these fired workers must go through unemployment and then through a temporary job to be back to work. Thus, the final effect on the share of temporary employment depends on which of the two effects, the increase in permanent job creation (through job conversions) or the increase in permanent job destruction dominate.

Fourth, the non–monotonous behavior of the distribution of temporary job destruction also deserves a comment. One would expect a positive relation between the degree of EPL and temporary job destruction due to productivity shocks as job destruction tends to be less concentrated in temporary employment. However, the decrease in firing costs also reduces temporary job destruction due to TC's reaching the maximum duration allowed, because of the increase in job conversions, so that the final distributional effect depends on which of

Table 6: **Lowering firing costs.**

Statistics	$cf = 1.2$	$cf = 1$	$cf = .5$	$cf = 0$
JDp	.10	.11	.14	.15
JDt	.18	.14	.11	.05
$temp$	.37	.34	.33	.31
$conver$	.15	.19	.22	.24
$u - rate$	.18	.15	.18	.16
$dur - u$	1.63	1.57	1.72	1.70
$JDt - prod$	.19	.26	.29	.23
$JDp - prod$	.33	.35	.62	.65
$wage - gap$	.24	.20	.09	0

the two effects is higher.

Fifth, the effect on unemployment is ambiguous, as in Hernanz, Jimeno, and Kluger (2003) because there is more job creation, but there is also more job destruction. Lowering firing costs reduces the difference between the conversion and the dismissal productivity threshold for permanent jobs, both because the conversion threshold falls and because the dismissal threshold increases, so that the net effect on unemployment is ambiguous. Finally, the wage gap collapses to zero when firing costs are null. As firing costs decrease, wages of workers in PC's get lower while those of workers in TC's get higher due to changes in bargaining power; that is, firing cost regulations makes the wage profile steeper.

7 Robustness

In this section we explore whether the findings of the previous sections are specific to the baseline model economy or also hold for some variations of the model. In Section 7.1 we look at alternative values for the parameter w_{min}. This is very important because the combined effect of these two institutions, EPL and minimum wages, has often been blamed for the lack of flexibility and poor performance of European labor markets. Section 7.2 looks at what

Table 7: **Elim. of proc. wages with** $wmin = 0.3$

Statistics	$cf = 1.2$	$cf = 1$	%var	$\frac{\%var}{\%f}$
JDp	.14	.15	3.43	-.17
JDt	.27	.19	-29.0	1.45
$temp$	.55	.45	-18.2	1.09
$conver$	.10	.14	35.0	-2.1
$u - rate$	.28	.23	-19.3	-.96
$dur - u$	1.83	1.78	-2.72	.14
$JDt - prod$	.28	.39	39.3	-1.96
$JDp - prod$	.67	.69	.04	-.20

the findings would have been without the minimum wage constraint[27].

7.1 Higher minimum wage

We want to see whether a increase in w_{min} do alter results in a significant way, basically in terms of elasticities; levels do not convey much information because this version is not calibrated since the idea is to have the same configuration of parameters than in the baseline except for the value of w_{min}.

As in Section 6.2, the elimination of procedural wages leaves permanent job destruction almost unchanged, and reduces temporary job destruction and increases job conversion by a large extent (see Table 7). Comparing elasticities, a 1% reduction in firing costs reduces temporary job destruction by a similar magnitude, 1.45% (1.37% in the previous case), increases job conversion by 2.1% (1.6% in the baseline), and decreases the share of temporary employment accordingly by 1.14% (0.74% before). Also, the unemployment rate experiences a very similar change: it falls by .96% (1.06% in the baseline).

Regarding wages, those of temporary workers are much higher than in the baseline,

[27]We have also performed other robustness exercises (not reported here) considering the other parameters of the model. None of them show significant differences with respect to the baseline.

than those of permanent workers because wage constraints are more binding. This higher minimum wage tends to compress the wage distribution, and as a consequence, there is less scope for firing costs internalization.

It is interesting to compare the levels of these variables with the corresponding levels in the baseline (see again Table 5 and Table 7). Note that now both, permanent and temporary job destruction are much higher than in Section 6.2, being the only difference the higher minimum wage. Also the temporary employment rate and the unemployment rate are much higher. On the contrary, job conversion is lower and unemployment duration larger. Basically, every statistic performs worse than in the baseline because the higher minimum wage constraints firms more: they destroy jobs at a greater rate and they have less incentives to create permanent jobs.

In sum, this exercise supports the idea that the effect of firing costs on unemployment and other labor market variables depends very much on the level of wage rigidities and that these two institutions combined might be to a large extent responsible for the poor performance of European labor markets[28].

7.2 Without minimum wage constraints

In this section we look at what the findings would have been if no minimum wage constraint was imposed. In this paper we have assumed that firing costs are transferable from the firm to the worker because we are focusing on procedural wages and severance pay. Of course, in real economies there are also other components of firing costs that are non-transferable in nature, such as notice, consultancy, readmission, delay. Since Lazear (1990), we know that if firing costs are transferable, despite legally provisions, firms and workers can undo their effects by lowering the wage, so that there would be no effects on employment. This is actually what happens here. As you can see in Table 8, labor market variables do not change

[28] Mortensen and Pissarides (1999b) find that firing taxes increase employment if wages are flexible downwards. This is no longer the case if downward wage adjustment is limited.

Table 8: **Elim. of proc. wages without** *wmin*

Statistics	$cf = 1.2$	$cf = 1$	%var	$\frac{\%var}{\%f}$
JDp	.09	.09	0	0
JDt	.34	.34	0	0
$temp$	.21	.21	0	0
$conver$	.33	.33	0	0
$u - rate$	.10	.10	0	0
$dur - u$	1.51	1.51	0	0
$JDt - prod$	0	0	0	0
$JDp - prod$	0	0	0	0

after the firing costs reduction since the whole action takes place through wage adjustments. This compensation cannot take place if there is a minimum wage or any other form of wage rigidity. The elimination of procedural wages decreases wages of permanent workers instead of increasing permanent job destruction, except for the first-period wage of a PC, which is a little bit higher since there is less need of internalizing future firing costs. Wages of workers in temporary contracts remain the same.

8 Conclusions

In this paper we have asked what would have been the effects on the relevant labor market variables, had the Spanish government not revoked (in September 2002) the decree introduced in May 2002 that eliminated procedural wages. The advantage of our approach is the fact that we can exploit within country variation to disentangle the effects of EPL per se from the effects of EPL when interacted with other institutions, which the usual drawback from cross-country studies. This is possible due to the dual character of the Spanish labor market.

We have quantified the effects of this 17% firing costs reduction on job creation and

destruction by type of contract, temporary employment, job conversion, unemployment, unemployment duration, and on the distributions of tenure, wages and job separations. The main predictions of this exercise are (i) a small increase on permanent job destruction, (ii) a significant reduction of temporary job destruction mainly driven by the increase in job conversions, and (iii) a significant reduction in labor market segmentation measured as the reduction in the wage gap of temporary versus permanent workers.

Has this been again a lost opportunity to reduce labor market segmentation? Maybe not because the situation is not exactly the same as before May 2002. A novelty has been introduced in September 2002, in the sense that, firms can avoid having to pay procedural wages if they admit that the dismissal is unfair and deposit the corresponding legal indemnity immediately after the dismissal. This way firms not only avoid procedural wages, but also the uncertainty and delays that these procedures involve. Moreover, workers do not need to prove anymore the dismissal through a conciliation act or a judgement in order to get the indemnity. These two novelties will probably reduce both conciliations and judgements, and so the need to pay procedural wages[29]. However, this may not reduce expected firing costs at all because admitting that the dismissal is unfair from the beginning implies giving up the possibility that the dismissal is ruled fair, which is much cheaper. The only thing that has probably changed is the possibility of reducing uncertainty and delays. Since this is not the focus of the paper we leave this aside. Concluding, the point of this exercise has been to provide an idea of the quantitative effects of a reduction in firing costs in a model economy that matches the Spanish data reasonable well. This structure can be useful in order to evaluate possible reforms. In addition, the model is sufficiently general to incorporate other institutional details, like social security contributions or to focus in a particular population group.

[29]We have tried to find evidence of this lower incidence of conciliations and judgements from September on, but the series provided by the Ministry of Labor are still too short to see any trend. In fact, judgements in the first quarter of 2003 are higher than in the last quarter of 2002. Regarding conciliations, the monthly series from September 2002 does not show any clear trend.

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