Two-Tier Labor Markets in the Great Recession: France vs. Spain*

Samuel Bentolila
CEMFI

Pierre Cahuc†
Ecole Polytechnique and CREST

Juan J. Dolado
Universidad Carlos III

Thomas Le Barbanchon
Ecole Polytechnique

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Abstract

This paper analyzes the strikingly different response of Spanish unemployment relative to other major EU economies during the ongoing recession. We focus on a comparison with France because most labor market institutions in both countries are rather similar and their unemployment rates just before the crisis were quite close, around 8%. However, while the French unemployment rate has hardly increased, the Spanish unemployment rate has shot up to almost 19% by the end of 2009. We evaluate which part of this differential is due to the gap between dismissal costs of workers with permanent and temporary contracts, which is larger in Spain than in France. Using a calibrated search and matching model with both types of labor contracts, we estimate that about 40% of the surge in Spanish unemployment during the crisis would have been avoided if Spain had adopted French employment protection legislation before the crisis started.

Keywords: Temporary contracts, unemployment, search and matching.

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† *Corresponding author:* Pierre Cahuc, Department of Economics Ecole Polytechnique 91128, Palaiseau Cedex, France, pierre.cahuc@polytechnique.edu.

1 Introduction

The goal of this paper is to explain the strikingly different response of Spanish unemployment relative to other European economies, in particular France, during the ongoing *Great Recession*. We focus on a comparison with France because both countries share similar labor market institutions (employment protection legislation, unemployment benefits, wage bargaining, etc.) and had almost identical unemployment rates (around 8%) just before the crisis emerged. However, while French unemployment has only risen to 10% during the current slump, the Spanish unemployment rate, which fell from 22% in 1994 to 8% in 2007 –when Spain was creating a large share of jobs in the European Union (EU)– has surged to almost 19% by the end of 2009. Our main contribution is to analyze which part of this strikingly different evolution can be attributed to what we identify as the main difference between the French and Spanish labor market regulations: a larger gap between the dismissal costs of workers with permanent and temporary contracts in Spain than in France. We argue that this difference, often ignored in cross-country comparisons of overall employment protection legislation (EPL), can explain about one-third of the much higher rise of unemployment in Spain, both through its direct impact on labor turnover and through indirect effects on sectoral specialization.

France and Spain allow us to tell an interesting tale of two countries. Both are among those EU economies which most decidedly promoted fixed-term contracts in the past. Achieving labor market flexibility, which is often seen as a requirement to reduce unemployment, is always a politically difficult task given the resistance of protected insider workers. Creating two-tier labor market is a politically viable way to achieve this goal (see Saint-Paul, 1996 and 2000). However temporary employment is much more important in Spain, reaching around one-third of employees until recently, whereas this share has been slightly below 15% in France. Therefore it seems natural to ask whether the markedly different unemployment impact of the recession is due to this difference, controlling for other potential explanatory factors.

To explore these issues, we use a search and matching model inspired by previous work by Blanchard and Landier (2002) and Cahuc and Postel-Vinay (2002), who extend the seminal Mortensen-Pissarides (1994) model with endogenous job destruction to allow for the distinction between temporary and permanent jobs entailing different dismissal costs. In our model, firms can create both permanent and temporary jobs allowing for the possibility that a certain proportion of the latter can be converted into permanent contracts at their expiration, the rest being terminated at no cost. In this setup, it is now well understood that facilitating the creation of more flexible temporary jobs promotes job creation, but it also triggers an increase in job destruction, leading to an ambiguous effect on unemployment. However, one result that has drawn less attention is that the increase in job destruction induced by temporary jobs has a larger impact on unemployment when the firing costs gap in favor of permanent contracts is high. In effect, the higher is this gap, the lower will be the proportion of temporary jobs transformed into permanent jobs, because large firing costs for the latter induce employers to use temporary jobs in sequence rather than converting them into long-term contracts. As pointed out in the two above-mentioned references, this implies that the spread of temporary jobs is more likely to raise unemployment when it takes place in a labor market already regulated by stringent permanent job security provisions.

The spread of temporary jobs, which leads to high labor turnover, is also likely to increase labor market volatility. This phenomenon has been stressed by Bentolila and Saint-Paul (1992) and Boeri and Garibaldi (2007), who argue that two-tier labor market reforms have a transitional honeymoon (i.e., job creating) effect which can be followed by reductions in employment as a result of temporary workers' low labor productivity. Likewise, Sala *et al.* (2009) have studied the business cycle behavior of segmented labor markets with limitations in the use of fixed-term contracts. In particular they explore whether flexibility at the margin is the reason why labor markets with a relatively high degree of employment protection may display similar volatility as fully flexible ones. They find that flexibility at the margin provides an intermediate situation, in terms of unemployment volatility, between fully regulated and fully deregulated labor markets. Like

Sala *et al.* (2009), our approach focuses on the interactions between aggregate productivity shocks and employment protection legislation, including the regulation of temporary jobs. However, rather than analyzing a model calibrated on a representative European labor market, as these authors do, we focus on a specific event: a negative aggregate shock in France and Spain. We also differ in how wage bargaining is modelled. Contrary to Sala *et al.* (2009) we do not assume that employers have to pay firing costs if they do not agree on the initial wage contract once they are matched with a worker. Instead, we suppose that firing costs are paid when workers and employers separate only if a contract has already been signed. As Ljungqvist (2002) has shown, such a difference is important to the extent that assuming that firing costs are paid by the employer if there is a separation in the initial bargain –when the job starts– magnifies the impact of firing costs on unemployment. We think that our assumption is more plausible and captures better the institutions of France and Spain, where labor contracts are renegotiated by mutual agreement (Malcomson, 1999; Cahuc, Postel-Vinay, and Robin, 2006).

The rest of the paper is structured as follows. We start by documenting the relative performance of the French and Spanish labor markets in the crisis vis-à-vis the preceding expansionary period in Section 2. In Section 3 we present the main features of the regulation affecting these two labor markets, devoting special attention to fixed-term contracts and their consequences on sectoral specialization and labor mobility. Then, in Section 4, we introduce a stylized search and matching model focusing on equilibrium behavior of firms and workers in an economy with both permanent and temporary contracts, where it is possible to transform the latter into the former. In Section 5 we show the extent to which the model can account for the change in the performance of the French and Spanish labor markets from the boom (represented by 2005-2007) to the recession (2008-2009). We simulate our search and matching model using stylized parameters calibrated separately for the French and Spanish economies during the expansion, aiming at reproducing a set of relevant labor market stylized facts. To compute the share of the increase in Spanish unemployment induced by the recession which is due to the differences in employment protection with France, we run counterfactual simulations and follow a difference-in-differences approach. Section 6 concludes.

2 Labor market performance before and during the crisis

As depicted in Figure 1, France and Spain had an unemployment rate of 3.8% at the end of 1976. From then on both rates rose in tandem, but the Spanish rate was always on top and showed much higher volatility. The difference increased up until the end of 1994 and shrank thereafter. By the end of 2005, the two unemployment rates seemed to have come full circle, reaching similar values around 8%. Convergence was however a mirage. Since the onset of the worldwide recession in mid-2007, unemployment in Spain has shot up from 8% to 19%. In stark contrast with this wild ride of Spanish unemployment, French unemployment kept on falling, to 7.2%, and then has grown to 9.3%. What explains such a striking difference? In the rest of this section, we briefly discuss some potential explanations.

Table 1 shows a few key labor market magnitudes from 1998:1 to 2007:4, a boom period, and 2008:1-2009:2, the recession period we will use in our simulation exercise below. It becomes apparent that, throughout the boom period, both labor force and employment growth rates have been much higher in Spain. It is the Spanish figures that are remarkable, while the French ones are typical of the Euro-area experience. The labor force in Spain received a boost from large immigration flows amounting to around 1% of the population per year –whereas the share of foreigners in the French labor force was stable– and also from an increase in the female labor participation rate –for natives that rate increased by 8.4 percentage points, against 2.9 points in France.[1] Focusing on private sector employees, it can be observed that the employment surge in Spain stems especially from construction and market services (8.1% and 6.8% per year, respectively). The corresponding figures were more moderate in France, including a fall in manufacturing

[1] See Bentolila *et al.* (2008a) for a discussion of immigration flows in Spain.

employment. The disparity was reinforced by the behavior of working hours per employee: the implementation of the 35 hours law caused a significant drop in France, while they rose slightly in Spain

In the downturn, the French labor force has experienced an atypical acceleration, while its growth rate in Spain is very high by historical standards, though it has slowed down recently. France has suffered a non-negligible employment fall (1.8% p.a.), which is however small compared with the Spanish free fall (6.3% p.a.). The latter stems especially from a striking collapse of almost one-fourth of employment in construction and a 10.8% drop in manufacturing.

It is very hard to explain the extreme volatility in the Spanish labor market without recourse to the type of contracts prevailing in it. As shown in Table 1, fixed-term contracts in 1998 reached almost 14% of employees in France and 33% in Spain. During 1998-2007, the vast majority of (quarterly) flows from unemployment to salaried employment were under these contracts: 78.4% in France and 87.2% in Spain. Correspondingly, they also represented the majority of employment outflows, in particular (from administrative, non-LFS sources): 88% in France and 80.1% in Spain. Consequently, more than the full brunt of job losses in both economies since the end of 2007 has been borne by temporary jobs: 182.000 net jobs where destroyed in France, but actually 362.000 temporary jobs disappeared, while the respective figures for Spain have been 1.14 and 1.25 million jobs.

Table 1 also shows that the share of temporary jobs in Spain slightly decreased – from 33% to 31%– between 1998 and 2007. One may wonder how this matches with the idea that the drop in unemployment is a result of the spread of temporary jobs over this period. There are two explanations for this fact. On the one hand, this was a very long expansion, where Spanish GDP was growing at an average annual rate of 3.7%. In line with the insights provided by Wasmer (1999), a long expansionary phase like this induces a so-called capitalization effect whereby high growth increases future profits and thus strengthens firms' incentives to increasingly offer permanent contracts so as to retain their workers. On the other hand, the Spanish government passed a labor reform in 1997 aiming to reduce the severance pay gap between permanent and temporary contracts. They did so through two new policy measures: a new type of permanent contract with lower dismissal costs (33 days instead of 45 days), from which males aged 31-44 years old unemployed for less than 6 months were excluded, and the introduction of a severance pay of 8 days (previously there was none) upon termination of fixed-term and interim contracts. The 1997 reform also included generous social security contribution rebates for the new permanent contracts. Thus, in principle, the latter became more attractive. However, all these changes induced a very small reduction in the rate of temporary employment, since the lower 33-days firing costs do not apply to dismissals for disciplinary reasons (e.g. worker misconduct), which are the ones often employed by firms to avoid red-tape costs (see more on this below). Therefore, even for these less protected contracts, firms end up paying the standard 45-days severance pay.[2]

3 Labor institutions in France and Spain

In this section, the institutional settings of the French and Spanish labor markets are briefly reviewed. We focus on employment protection legislation (EPL), unemployment benefits and wage bargaining. We argue that the main difference arises in the EPL gap between permanent and temporary workers, which is larger in Spain. Finally, we examine labor mobility, which we document to be lower in Spain.

3.1 Employment protection

As discussed earlier, France and Spain are among the countries where governments have, through their regulations, promoted more strongly fixed-term contracts to increase labor market flexibility with the aim of reducing unemployment. Table A1 in the Appendix presents the key features of regulations concerning dismissals in the two countries.

[2] Indeed, Garcia-Perez and Rebollo (2009) document that, in practice, most firms use this contract to pocket the subsidy, usually dismissing the employee under the standard procedure, as soon as the minimum job duration required by law is reached.

Permanent contracts are subject to notice periods and severance pay.[3] From the reported figures it may seem that firing permanent employees is much cheaper in France than in Spain, but this might be misleading, since there are additional important components of firing costs beside severance pay. For example, in France, as soon as a worker reaches a 2-year seniority the notice period doubles. Likewise, administrative approval is required for collective dismissals in Spain (roughly those involving 10% of an establishment's staff), which is much more easily granted if workers' representatives have agreed to the dismissal in advance (in exchange for higher severance pay).

Computing overall measures of firing costs is not an easy task. Let us consider the widely used OECD (2004) index of the strictness of employment protection legislation (EPL) for 2003, which ranges from 0 to 6, with higher scores indicating stricter regulation. This indicator gives a score of 2.5 for France and 2.6 for Spain regarding protection of regular employment, 3.6 for France and 3.5 for Spain regarding regulation of temporary employment, and 2.1 for France, and finally 3.1 for Spain in the regulation of collective dismissals. The overall EPL score is 3.0 for France and 3.1 for Spain (where the US has the lowest value, 0.7, and Portugal and Turkey the highest, 4.3). Hence, both countries are ranked in the middle-high range, with Spain appearing only slightly more regulated than France. However, there are good reasons to suspect that this EPL index, based on legal regulations and not on their implementation, does not capture Spanish EPL satisfactorily. As argued below, *de facto* EPL of temporary jobs is much weaker in Spain than in France, whereas the opposite holds for EPL of permanent jobs.

Moreover, economic theory on the effects of firing costs on employment tells us that what matters is not severance pay per se, which is a transfer from the firm to the worker and may therefore be compensated for in the wage bargain. (see Lazear, 1990). Rather, since the probability that workers will contest dismissals is very high, what matter are

[3] In France, this includes the regular permanent contract or *contrat à durée indeterminée* (CDI) and the new employment contract (*contrat nouvelles embauches*, CNE, which has different severance pay and other conditions) introduced in 2005 for small firms (see Cahuc and Carcillo, 2006). In Spain it includes both regular permanent contracts and the subsidized *contrato permanente de fomento del empleo* In principle, the latter has lower severance pay, but in fact most dismissals incur the ordinary one.

other costs that are not appropriated by firms and workers but are generated by third agents, such as labor courts and labor authorities, i.e., the so-called *red tape* costs. For example, severance pay offered by firms in exchange for a quick resolution of dismissals in France is typically higher than statutory severance or that agreed in collective bargains. In Spain, the situation can be even worse because the extra cost not only apply to collective dismissals but also to individual ones. In effect, since firms that go to court lose in 3 out of 4 cases on average, even if they think that dismissals are justified on economic grounds, they typically find it more profitable to claim disciplinary reasons. Proceeding in this way they do not need to satisfy the notice period and, upon immediately acknowledging the dismissal to be unfair, they avoid going to court by paying the standard 45-days severance pay upfront.[4] In applying our theoretical model to the two countries we will use estimated red-tape costs, which as discussed in Section 5.2, turn out to be 50% more expensive in Spain than in France.

Further, the use of fixed-term contracts is rather more limited in France than in Spain.[5] In France, they can only be used in nine specific cases: for replacing an employee who is absent or temporarily working part time, to transitorily replace an employee whose job is either going to be suppressed or filled by another permanent worker, and for temporary increases in the firm's activity, seasonal activities, and jobs in certain sectors (forestry, naval, entertainment, teaching, survey-making, professional sports, etc.). It is apparent, however, that the alleged reasons for hiring on a temporary basis are often misrepresented. By contrast, temporary contracts in Spain may be used for objective reasons (specific work, accumulation of tasks, replacement, etc.), for training, to hire disabled workers, and to cover the part of the working day left uncovered by an employee close to retirement. De facto, however, there are no restrictions: employers are hardly monitored by authorities to

[4]This option has been available to firms in Spain since Law 45/2002 was passed and it implies severance payments of 45 days wage per year of services with a maximum of 42 months' wages.

[5]We use the terms fixed-term and temporary interchangeably. We focus on the former, captured by the *contrat a duration determinée* (CDD) in France and the *contrato temporal* in Spain. There are several types of fixed-term contracts in Spain. And other non-permanent jobs exist in France, such as temporary jobs (*emploi interimaire* or *emploi temporaire*). Moreover, in both countries there are jobs intermediated by temporary work agencies and most apprenticeship contracts are also temporary. Empirically we shall consider all of these as fixed-term contracts.

ensure that they comply with the causes for hiring under temporary contracts. Moreover, while in both countries the maximum duration of fixed-term contracts is 24 months, uncertain-completion jobs (e.g. in construction) may lawfully last for an indeterminate period.

In sum, the previous evidence indicates that, in contrast with OECD rankings, EPL for permanent contracts is more stringent in Spain than in France, while the opposite is true for temporary contracts. Thus overall EPL may look similar but the gap in EPL between the two types of contracts is higher in Spain.[6]

3.2 Unemployment benefits

Unemployment insurance in France features a gross replacement ratio of 57.4% of the preceding year's wage.[7] In Spain, the replacement ratio decreases over time: it is 70% for the first 6 months and drops to 60% thereafter. Thus, at least at the beginning of unemployment spells, the Spanish system looks more generous than the French one. However, in comparing benefits, it is crucial to take into account personal characteristics and to consider replacement rates net of taxes. Thus, according to the OECD Benefits and Wages database (March 2006 update), the net replacement rate in 2004 for an average production worker who was married, whose partner did not work, and had no children was equal to 69% in both countries. Likewise, if the same worker was married with a working partner and had two children, the replacement rates again do not differ much: 84% in France and 87% in Spain.

In France, the length of benefits is the same as the worker's contribution period, with a maximum duration of 23 months (and higher for workers older than 50 years old). In Spain, benefit length increases in steps that imply durations going from 22% to one-third of the contribution period, which has to be of at least 12 months, with a maximum duration of 24 months. In computing a measure of unemployment benefits for our simulations we

[6] For more specific details on the level and structure of firing costs in France, see Cahuc and Postel-Vinay (2002) and Cahuc and Carcillo (2006), and Bentolila and Jimeno (2006) and Bentolila *et al.* (2008b) for Spain.

[7] Or, if it is higher, 40.4% of the wage plus a fixed amount (currently around 330 euros per month).

take into account statutory benefits and coverage, which is affected by duration rules.

In France, workers who exhaust unemployment insurance or are not eligible for it are entitled to so-called "minimum integration income" (*Revenu Minimum d'Insertion*, RMI), amounting to €454.63 (the minimum wage net of social contribution for full time workers being equal to €1042) and €681.9 for a couple (plus child benefits).[8] In Spain the assistance benefit is equal to 80% of the so-called "Multi-Purpose Public Income Indicator", which in 2008 amounted to €413.5 (around 23% of gross earnings in the private non-agricultural sector), with higher benefits for workers with family responsibilities. It is means-tested at the level of the benefit. In Spain additional welfare benefits are available in some regions (for example in Madrid they amount to €370) but coverage is typically low.

3.3 Wage bargaining

Collective wage bargaining is similar in the two countries. It may be argued that this is the result of Spain adopting French regulations in the early 1980s, when the post-dictatorship Spanish system of collective bargaining was established. In both countries, most workers are covered by collective bargaining, above 90% in France and above 80% in Spain. Bargaining takes place mostly at the industry level and there is geographical fragmentation (i.e. through industry-department agreements in France and industry-province agreements in Spain). Conditions set in above firm-level agreements are extended to all firms and workers in the relevant industry or geographical area; extension is discretionary in France and automatic in Spain.

In Spain, workers are represented by worker delegates in firms with less than 50 employees and by worker committees in firms with more than 50 employees, reflecting French practice. Unions obtain representation from firm-level elections, where voters need not be unionized. Thus, there is little incentive for workers to unionize, so that union density

[8] There is also another scheme equivalent to the RMI (open to those above 25 years old who never worked) for those who have worked before and are not eligible anymore: the *Allocation de Solidarité Specifique* (ASS), with an amount equivalent to the RMI.

is very low but largely irrelevant. Both countries have the highest gaps between the coverage of collective bargaining and union density (the latter is 10% in France and 15% in Spain).[9] One difference, though, is that whereas in Spain there are only two nationally representative unions (CCOO and UGT), in France there is a multiplicity of eight unions. Nonetheless, they are not equally powerful and, like in Spain, two unions are especially influential, particularly in the public sector (CGT and CDFT).

In sum, we believe that the two countries are not significantly different in their wage setting institutions and therefore we do not explore any potential differences in this dimension in the simulations below.

3.4 Mismatch, sectoral specialization and labor mobility

Besides EPL, another dimension in which the French and Spanish labor markets diverge is labor mobility. This difference does not become apparent in job mobility, which turns out to be rather similar: average job duration is equal to 7.6 years in France and 8.2 in Spain, and the fractions of workers who have changed job in the preceding 10 years are 49% and 50%, respectively.[10]

Yet, geographical mobility is much lower in Spain. A good starting point in documenting this difference is home leaving. The average age at which young people leave the parental home in France is 23 and 24 years old for women and men, respectively, against 28 and 29 years old, respectively, in Spain. A striking figure is that the fraction of people who have never moved after leaving the parental home is equal to 23% in Spain, but only 8% in France. Moreover, while 30% of the French population has moved across regions, only 11% of Spaniards have done so. Overall, the interregional migration rate for people aged 15-64 is 2.1% in France and only 0.2% in Spain, with a wider disparity for young people (15-24 years old), with a figure of 3.8% in France and 0.23% in Spain.[11]

[9] For more details regarding Spain see Bentolila and Jimeno (2006).

[10] This is in spite of the higher temporary employment rate in Spain, due to the higher stability of its permanent employees than in France.

[11] The home-leaving figure corresponds to 2007, from the Labor Force Survey, see Eurostat (2009), Figure 2.1. The subsequent figures are for 2005, from the analysis of the 2005 Eurobarometer by Vandenbrande *et al.* (2006), Figures 20, 23, 2 and 3, and Table 2, respectively. Lastly, the interregional

How does labor mobility affect the impact of the recession? First of all, the shock has hit Spanish regions quite differently. While national dependent employment has fallen by -7.3% between 2007:4 and 2009:3, the regional growth rates range from -1% to -13.4%. These different employment destruction patterns are closely related to the regional shares of employment in the construction industry, which has plummeted as a result of the credit crunch in the ongoing recession. Thus, while the nationwide reduction of employment in this sector is -34.6%, the regional rates range from -18.7% to -54.7%. The key role of construction in explaining the different impact of the recession across Spanish regions is clearly illustrated by the raw correlation coefficient between the changes in total and construction employment shares across regions, which is equal to 0.7.[12]

The strong dependence of the Spanish economy on the construction sector since the late nineties deserves a brief comment. It reached 11.9% of GDP and 13.3% of employment in 2007, against 6.3% and 6.9% in France (Eurostat). We argue that this type of sectoral specialization is closely related to the existence of a dual/segmented labor market. In effect, as a result of Spain's access to the Euro-area in the late 1990s with a higher inflation rate than France, real interest rates fell by 6 pp., against 1.5 pp. in France, leading to a strong increase in investment. These new investment projects could have taken place in either high value added industries (like., e.g., ICTs in Finland) or in low value added ones. Investors bet for the latter for at least two reasons. On the one hand, the rigid permanent contracts would have been inadequate to specialize in more innovative sectors, since higher labor flexibility is required to accommodate the higher degree of uncertainty typically associated with producing higher value added goods (Saint-Paul, 1997). On the other, there had been an increase in the relative endowment of unskilled labor in Spain. In effect, the high availability of jobs through very flexible contracts led both to a high dropout rate of youth from compulsory education (31%) and later on to a huge inflow of unskilled immigrants (implying a 10 pp. increase in the foreign population rate). Hence,

migration rate corresponds to 2003, from OECD (2005).

[12] These figures leave out the Balearic Islands, which have an abnormally high employment level in 2009:3 due to seasonal factors related to the turism industry.

as a result of this relative scarcity of highly skilled labor, investment in the construction sector surged.

Low geographical mobility is a source of mismatch and higher equilibrium unemployment via reallocation rather than conventional aggregate shocks (Layard *et al.*, 1991). This has become quite apparent in the aftermath of the recession in Spain, where unemployment rate dispersion has sharply increased. The range between the lowest and the highest regional unemployment rates, which was equal to 10.3 pp. in 2007:4, has risen to 15.6 pp. in 2009:4, whereas the standard deviation of those rates increased from 3 to 5 over that period.[13] In sharp contrast, that range only increased in France from 9.6 to 11.3 pp., while the standard deviation hardly changed, from 1.3 to 1.4.[14]

Geographical mobility depends on many factors, both economic and non-economic. Institutional determinants of regional divergence in incomes and unemployment rates surely play a role. For instance, Bentolila and Dolado (1991) found, for 1962-1986 in Spain (roughly a pre-temporary employment period), that if the national unemployment rate doubled (from 10% to 20%, not far from the current situation), the elasticity of inter-regional migration flows to regional wage and unemployment differentials halved. On the other hand, Rupert and Wasmer (2009), echoing earlier work by Oswald (1999), highlight the role of housing regulations in accounting for differences in unemployment between Europe and the US. The Spanish rental market works very poorly and is underdeveloped, since it represents only 12% of the housing market, against 40% in France. Therefore, it clearly hampers migration (Barceló, 2006). This is due to various institutional factors, in particular a legal structure that favors tenants vs. landowners and an income tax system which heavily subsidizes owner-occupied housing (Lopez-Garcia, 2004).

However, like industrial specialization, migration is also linked to labor institutions, and in particular to EPL. Thus differences in EPL may be a concomitant event to differences in labor mobility. On the one hand, there is evidence that the widespread use of

[13] This was even stronger for workers aged 16 to 24 years old. The lowest-highest unemployment rate difference increased from 19.4 to 24.7 and the standard deviation from 4.6 to 6.3.

[14] France: Labor Force Survey, BDM Macro-economic Database (www.bdm.insee.fr). Spain: Labor Force Survey (www.ine.es).

temporary contracts may reduce migration despite its potentially beneficial effect on job creation. For example, Antolín and Bover (1997), using individual data for Spain found that temporary employment reduces the likelihood of interregional migration. The insight is that a temporary job in a different region does not provide much job security, whereas migrating means giving up, to a large extent, the support of family networks, which are a key insurance mechanism in Southern Mediterranean countries (Bentolila and Ichino, 2008). In a similar vein, Becker *et al.* (2010) find, with a sample of 13 European countries over 1983-2004, that youth job insecurity discourages home-leaving, whereas parental job insecurity encourages it. Thus, the higher the difference between EPL for permanent and temporary contracts (roughly held by older and younger workers, respectively), the lower is the home-leaving rate. As discussed earlier, the fact that this gap is higher in Spain than in France would be consistent with the lower Spanish home-leaving rate .

4 Model

This section presents our search and matching model, which is inspired by previous work by Blanchard and Landier (2002) and Cahuc and Postel-Vinay (2002), who extend the seminal Mortensen-Pissarides (1994) model with endogenous job destruction to allow for the distinction between temporary and permanent jobs entailing different dismissal costs.

4.1 Model setup

The main features of the model are as follows. First, there is a continuum of infinitely-lived risk-neutral workers and firms, with a common discount rate $r > 0$. The measure of workers is normalized to 1.

Job matches have an idiosyncratic productivity distribution $F(\varepsilon)$, drawn over the support $[\underline{\varepsilon}, \overline{\varepsilon}]$.[15] The idiosyncratic productivity shocks follow a Poisson distribution with

[15] An alternative that we also pursued was to allow two types of productivity shocks, idiosyncratic and aggregrate, where the latter are governed by a Markov transition matrix among the different states of the economy; cf. L'Haridon and Malherbet (2006). However, given the much higher complexity of this extension when combined with two types of contracts, we failed to achieve convergence in its simulation.

incidence rate μ. In line with Pissarides (2000), it is assumed that new jobs start with productivity $\overline{\varepsilon}$.

There are two types of jobs: temporary and permanent jobs, both endowed with the same productivity distribution. Trying to mimic realistic labor market wage bargaining procedures, it is assumed that wages are only renegotiated in permanent jobs but not in temporary jobs. Unemployed workers have access to temporary jobs with probability p, exogenously set as EPL policy, and to initial permanent jobs with probability $(1-p)$. Temporary jobs are terminated with per unit of time probability λ, at which point firms can either convert them to permanent jobs or destroy them at no cost. A new value of productivity is drawn when the conversion takes place. Permanent jobs have red-tape firing costs f. Thus, under the previous assumptions, the gap between the severance pay for permanent and temporary contracts is simply given by f. Unemployment benefits are denoted by b. Notice that both magnitudes should be interpreted as monetary flows in terms of the average wage, $\overline{\omega}$, i.e., as $f\overline{\omega}$ and $b\overline{\omega}$,though to simplify notation they will simply be referred to as f and b in the sequel.

There is a Cobb-Douglas matching function $m(u,v) = m_0 u^{\alpha}\ v^{1-\alpha}$ à la Pissarides (2000), with matching rates $q(\theta)$ for vacancies and $\theta q(\theta)$ for the unemployed. Thus, labor market tightness is given by $\theta = v/u$, where v and u are vacancies and unemployment, respectively. The degree of mismatch is captured by the shifter m_0 such that a lower value of m_0 implies higher mismatch, that is, an outward shift in the Beveridge curve. Finally, there is flow a cost of keeping jobs vacant equal to $h > 0$ per unit of time.

In terms of notation, subindices are as follows: t for a temporary job, 0 for the beginning of a permanent job, and p for a continuing permanent job.

Asset values at steady state are denoted J and V for employers, and W and U for employees. They are as follows:

- V: Value to the firm of a vacant job,
- $J_t(\varepsilon)$: Value to the firm of a temporary job with productivity ε,

- $J_0(\varepsilon)$: Value to the firm of a new permanent job with productivity ε, not yet subject to firing costs,
- $J_p(\varepsilon)$: Value to the firm of a continuing permanent job with productivity ε, subject to firing cost f,
- U: Value to the worker of unemployment,
- $W_t(\varepsilon)$: Value to the worker of a temporary job with productivity parameter ε,
- $W_0(\varepsilon)$: Value to the worker of a new permanent with productivity ε subject to firing costs f (remember that a new permanent job can previously be a temporary job),
- $W_p(\varepsilon)$: Value to the worker of a continuing permanent job with productivity parameter ε, subject to firing costs f.

4.2 Bellman equations

The Bellman equations for the above asset values from the point of view of firms are the following:

$$rV = -h + q(\theta)\left[p\left(J_t(\overline{\varepsilon}) - V\right) + (1-p)\left(J_0(\overline{\varepsilon}) - V\right)\right] \tag{1}$$

$$rJ_t(\varepsilon) = \varepsilon - w_t + \mu \int_{\underline{\varepsilon}}^{\overline{\varepsilon}} [J_t(x) - J_t(\varepsilon)]\, \mathrm{d}F(x) + \lambda \int_{\underline{\varepsilon}}^{\overline{\varepsilon}} \max[J_0(x) - J_t(\varepsilon), V - J_t(\varepsilon)]\, \mathrm{d}F(x) \tag{2}$$

$$rJ_0(\varepsilon) = \varepsilon - w_0(\varepsilon) + \mu \int_{\underline{\varepsilon}}^{\overline{\varepsilon}} \max[J_p(x) - J_0(\varepsilon), V - J_0(\varepsilon) - f]\mathrm{d}F(x) \tag{3}$$

$$rJ_p(\varepsilon) = \varepsilon - w_p(\varepsilon) + \mu \int_{\underline{\varepsilon}}^{\overline{\varepsilon}} \max[J_p(x) - J_p(\varepsilon), V - J_p(\varepsilon) - f]\mathrm{d}F(x) \tag{4}$$

According to (1), keeping a vacant job implies a flow cost of h and returns a contact with probability $q(\theta)$ in each period. Once the contact takes place, the employer-employee pair sign a temporary contract with probability p or a new permanent contract with probability $1-p$, both created at the maximal productivity level, $\overline{\varepsilon}$. If a temporary contract is signed, equation (2) implies that the employer obtains a flow profit of $\varepsilon - w_t$, and after the productivity shock takes place at rate μ, this type of job –which yields an asset value to the employer of $J_t(\varepsilon)$– necessarily continues until the date at which it can be destroyed arrives. This assumption reflects the fact that employers are not allowed to layoff workers on temporary contracts before the end of the contract. Temporary contracts are terminated at rate λ.[16] When a temporary contract is terminated, the job can be either destroyed or converted in a permanent job. At the date of the termination of the temporary contract, a new value of the productivity shock is drawn because workers behave differently under permanent and temporary contracts.[17]

The asset value of a new permanent job, filled either by an unemployed worker or by a worker on a temporary contract, to the employer is $J_0(\varepsilon)$ which, according to (3), yields a flow profit of $\varepsilon - w_0(\varepsilon)$. Once a productivity shock occurs at rate μ, the permanent contract becomes either a continuing one, with an asset value to the firm of $J_p(\varepsilon)$, or the match is dissolved, which will cost the employer the firing cost f. If the employer-worker pair stay together, (4) indicates that the employer obtains a flow profit of $\varepsilon - w_p(\varepsilon)$, such that the only difference with (3) is that the worker now can use the firing cost as an additional threat in the wage bargain.

Turning now to workers, their corresponding Bellman equations are given by:

$$rU = b + \theta q(\theta)[\,p(W_t(\overline{\varepsilon}) - U) + (1-p)(W_0(\overline{\varepsilon}) - U)] \tag{5}$$

$$rW_t(\varepsilon) = w_t + \mu \int_{\underline{\varepsilon}}^{\overline{\varepsilon}} [W_t(x) - W_t(\varepsilon)]\,\mathrm{d}F(x) + \lambda \int_{\underline{\varepsilon}}^{\overline{\varepsilon}} \max[W_0(x) - W_t(\varepsilon), U - W_t(\varepsilon)]\,\mathrm{d}F(x) \tag{6}$$

$$rW_0(\varepsilon) = w_0(\varepsilon) + \mu \int_{\underline{\varepsilon}}^{\overline{\varepsilon}} \max[W_p(x) - W_0(\varepsilon), U - W_0(\varepsilon)]\mathrm{d}F(x) \tag{7}$$

$$rW_p(\varepsilon) = w_p(\varepsilon) + \mu \int_{\underline{\varepsilon}}^{\overline{\varepsilon}} \max[W_p(x) - W_p(\varepsilon), U - W_p(\varepsilon)]\mathrm{d}F(x) \tag{8}$$

Equation (5) points out that an unemployed worker enjoys a flow earning b and comes in contact with a vacancy at rate $\theta q(\theta)$, either of a temporary job or of a new permanent

[16] Assuming that the duration of temporary contracts is fixed rather than random leads to more complex formulations without changing the properties of the model.

[17] Ichino and Riphahn (2005) have shown that the number of days of absence per week increases significantly once employment protection is granted at the end of probation periods and Dolado and Stucchi (2008) find that the effort of temporary employees is lower than that of permanent employees.

job, with probabilities p and $1-p$, respectively. Expressions (6) to (8) represent the asset values to the worker of the different jobs, and their interpretation is similar to those in (2) to (4) with the flow income being the respective wages.

4.3 Surplus sharing

As is conventional in this type of model, the surplus is shared according to a Nash bargain in which workers have bargaining power $\beta \in [0,1]$. This gives rise to the surplus expressions:

$$S_t(\bar{\varepsilon}) = J_t(\bar{\varepsilon}) - V + W_t(\bar{\varepsilon}) - U \tag{9}$$

$$S_0(\varepsilon) = J_0(\varepsilon) - V + W_0(\varepsilon) - U \tag{10}$$

$$S_p(\varepsilon) = J_p(\varepsilon) - V + f + W_p(\varepsilon) - U \tag{11}$$

In steady state, the free-entry rule $V = 0$ implies:

$$h = q(\theta)\left[pJ_t(\bar{\varepsilon}) + (1-p)\left(J_0(\bar{\varepsilon})\right)\right] \tag{12}$$

Therefore, since $J_i(\bar{\varepsilon}) - V = (1-\beta)S_i(\bar{\varepsilon})$, $i = p, 0$, we get:

$$\frac{\theta h}{1-\beta} = \theta q(\theta)\left[pS_t(\bar{\varepsilon}) + (1-p)\, S_0(\bar{\varepsilon})\right] \tag{13}$$

Combining the different asset values to the employer and to the worker of a temporary job, a new permanent job and a continuing permanent job, implies that the three different surpluses in (9)-(11) can be rewritten as follows:

$$(r+\mu+\lambda)S_t(\varepsilon) = \varepsilon - b - \frac{\beta\theta h}{1-\beta} + \mu\int_{\underline{\varepsilon}}^{\bar{\varepsilon}} S_t(x)\mathrm{d}F(x) + \lambda\int_{\underline{\varepsilon}}^{\bar{\varepsilon}} \max[S_0(\varepsilon), 0]\mathrm{d}F(x) \tag{14}$$

$$(r+\mu)S_0(\varepsilon) = \varepsilon - b - \frac{\beta\theta h}{1-\beta} + \mu\int_{\underline{\varepsilon}}^{\bar{\varepsilon}} \max[S_p(x), 0]\mathrm{d}F(x) - \mu f \tag{15}$$

$$(r+\mu)S_p(\varepsilon) = \varepsilon - b - \frac{\beta\theta h}{1-\beta} + \mu\int_{\underline{\varepsilon}}^{\bar{\varepsilon}} \max[S_p(x), 0]\mathrm{d}F(x) + rf \tag{16}$$

From (15) and (16):

$$S_p(\varepsilon) = S_0(\varepsilon) + f. \tag{17}$$

Thus, according to (16), the surplus from a continuing permanent job is larger than that from a new permanent job, due to our previous assumption that the employer only has to pay the firing cost once the worker has been confirmed in the job and not when disagreement arises at the time of the first encounter with the worker.

4.4 Job creation and job destruction

The previous expressions for the surpluses give us the productivity thresholds for the destruction of permanent jobs (PJD) and the creation of permanent jobs (PJC):[18]

$$S_p(\varepsilon^d) = 0 = \varepsilon^d - b - \frac{\beta\theta h}{1-\beta} + \mu \int_{\varepsilon^d}^{\overline{\varepsilon}} S_p(x)\mathrm{d}F(x) + rf \tag{PJD}$$

$$S_0(\varepsilon^c) = 0 = \varepsilon^c - b - \frac{\beta\theta h}{1-\beta} - \mu f + \mu \int_{\varepsilon^d}^{\overline{\varepsilon}} S_p(x)\mathrm{d}F(x) \tag{PJC}$$

Hence, subtracting PJD from PJC yields:

$$\varepsilon^c = \varepsilon^d + (\mu + r)f, \tag{18}$$

which shows that temporary jobs are destroyed more frequently than continuing permanent jobs, because they are exempt from firing costs.

From the expressions for $S_p(\varepsilon)$, $S_0(\varepsilon)$, $S_p(\varepsilon^d)$, and $S_0(\varepsilon^c)$, we get the following relations:

$$S_0(\varepsilon) = \frac{\varepsilon - \varepsilon^c}{\mu + r} \quad \text{for} \quad \varepsilon \geq \varepsilon^c \tag{19}$$

$$S_p(\varepsilon) = \frac{\varepsilon - \varepsilon^d}{\mu + r} \quad \text{for} \quad \varepsilon \geq \varepsilon^d \tag{20}$$

where $S_p(\varepsilon)$ can be used to rewrite PJD such that the destruction rule of permanent jobs becomes:

$$\varepsilon^d = b + \frac{\beta\theta h}{1-\beta} - \frac{\mu}{\mu + r} \int_{\varepsilon^d}^{\overline{\varepsilon}} \left(x - \varepsilon^d\right) \mathrm{d}F(x) - rf \tag{21}$$

This equation shows that the threshold productivity ε^d is an increasing function of labor market tightness, θ, and a decreasing function of the firing cost, f. The intuition

[18] Notice that the job creation threshold does not exist for jobs filled by unemployed workers, since these jobs are created at the maximal productivity.

for the first relationship is that a tighter labor market, by improving the value of unemployment U, reduces the surplus, thus making the employer-worker pair more exacting on how productive the matching must be to compensate them for their outside options. As regards the second relationship, it is consistent with the goal of firing costs of reducing the propensity to destroy jobs, implying that less productive jobs remain operative.

Moreover, (14) implies that

$$(r+\lambda)\int_{\underline{\varepsilon}}^{\overline{\varepsilon}} S_t(x)\mathrm{d}F(x) = \int_{\underline{\varepsilon}}^{\overline{\varepsilon}} x\mathrm{d}F(x) - b - \frac{\beta\theta h}{1-\beta} + \lambda\int_{\varepsilon^c}^{\overline{\varepsilon}} \frac{\varepsilon-\varepsilon^c}{\mu+r}\mathrm{d}F(x)$$

and then,

$$S_t(\varepsilon) = \frac{1}{(r+\mu+\lambda)}\left[\varepsilon + \frac{\mu}{r+\lambda}\int_{\underline{\varepsilon}}^{\overline{\varepsilon}} x\mathrm{d}F(x)\right] + \frac{1}{r+\lambda}\left[\lambda\int_{\varepsilon^c}^{\overline{\varepsilon}} \frac{x-\varepsilon^c}{\mu+r}\mathrm{d}F(x) - b - \frac{\beta\theta h}{1-\beta}\right] \tag{22}$$

Evaluation of (22) at $\overline{\varepsilon}$ yields $S_t(\overline{\varepsilon})$ which together with (19) evaluated at $\overline{\varepsilon}$, $S_0(\overline{\varepsilon})$, can be used to rewrite the job creation equation JC out of the free entry rule as follows:

$$\frac{h}{1-\beta} = q(\theta)\left[\begin{array}{c} \frac{p}{(r+\mu+\lambda)}[\overline{\varepsilon} + \frac{\mu}{r+\lambda}\int_{\underline{\varepsilon}}^{\overline{\varepsilon}} x\mathrm{d}F(x)] + \frac{p}{r+\lambda}[\lambda\int_{\varepsilon^c}^{\overline{\varepsilon}} \frac{(x-\varepsilon^c)}{\mu+r}\mathrm{d}F(x) - b - \frac{\beta\theta h}{1-\beta}] \\ +(1-p)\frac{\overline{\varepsilon}-\varepsilon^c}{\mu+r} \end{array}\right] \tag{JC}$$

By replacing ε^c by ε^d in equation JC using equation (18), it is easy to show that, along the JC locus, labor tightness θ is a decreasing function of the reservation productivity ε^d. In other words, the lower the destruction threshold ε^d, the longer jobs last on average, which leads to a higher creation of vacancies. Conversely, for a given value of ε^d, a higher firing cost f reduces the expected present value of jobs and therefore hinders job creation.

In sum, the three unknowns θ, ε^c, and ε^d are defined by JC and by equations (18) and (21). A graphical representation of the equilibrium values is depicted in Figure 2, where the crossing of the JC (having replaced ε^c by ε^d) and PJD loci in the (θ, ε^d) space determines the equilibrium values of these two variables, whereas (18) determines the equilibrium value of ε^c. In Figure 3 we consider the effect of an increase in the firing costs gap between permanent and temporary workers. This is captured by a rise in f, which shifts upwards the PJC locus[19] and downwards the PJD and JC schedules. It

[19] From equations (18) and (21) we get $\left.\frac{\mathrm{d}\varepsilon^c}{\mathrm{d}f}\right|_{\theta=\mathrm{cst}} = \frac{\mu F(\varepsilon^d)}{1-\frac{\mu}{\mu+r}[1-F(\varepsilon^d)]} > 0$.

can be checked that the PJC schedule shifts upwards. Firms unambiguously become less exacting in firing permanent workers (lower ε^d) and more exacting in transforming temporary contracts into permanent ones (higher ε^c). In principle, although the effect on θ, and thus on unemployment, is ambiguous, the lower the conversion rate is (induced by higher f) the more likely it is that unemployment will rise due to excessive turnover of temporary workers, as Blanchard and Landier (2002), and Cahuc and Postel-Vinay (2002) have pointed out before.

Figure 4, in turn, shows the effect of a reduction in p, that, as mentioned earlier, we consider in part as an approximation to the burst of the real estate bubble in Spain, since this sector was one of the driving engines behind the high demand of temporary work in this economy. Now, the PJC and PJD loci remain unaffected whereas the JC schedule shifts downwards, since job creation is hindered by the recession. As a result, the equilibrium value of θ unambiguously decreases and the unemployment rate goes up. Lastly, using the same argument as in a decline of p, it is straightforward to check that either a rise of λ (i.e., a higher frequency in the termination of temporary jobs) or a reduction of m_0 (i.e., an increase in mismatch) lead to lower θ and higher unemployment.

4.5 Unemployment flows

Let us denote by N_t the number of workers with a temporary contract, N_p those with a permanent contract, and u the number of unemployed workers. Then we have:

$$\begin{aligned} \dot{N}_t &= pu\theta q(\theta) - \lambda N_t \\ \dot{N}_p &= (1-p)u\theta q(\theta) + \lambda N_t[1 - F(\varepsilon^c)] - \mu N_p F(\varepsilon^d) \end{aligned}$$

$$\dot{u} = \lambda F(\varepsilon^c) N_t + \mu F(\varepsilon^d) N_p - u\theta q(\theta)$$

In steady state, the number of workers in the different type of jobs and the unemployment rate, u, becomes:

$$N_t^* = \frac{1}{\lambda} pu\theta q(\theta) \tag{23}$$

$$N_p^* = \theta u q(\theta) \frac{1 - pF(\varepsilon^c)}{\mu F(\varepsilon^d)} \tag{24}$$

$$u^* = 1 - N_p^* - N_t^* \tag{25}$$

4.6 Wages

As mentioned earlier, wages are set according to Nash bargaining in which workers have bargaining power $\beta \in [0,1]$. While they can be renegotiated on permanent jobs, we assume that they are not renegotiated on temporary jobs. Nash bargaining yields:

$$(1-\beta)[W_t(\bar{\varepsilon}) - U] = \beta\,[J_t(\bar{\varepsilon}) - V] \tag{26}$$

$$(1-\beta)[W_0(\varepsilon) - U] = \beta[(J_0(\varepsilon) - V] \tag{27}$$

$$(1-\beta)[W_p(\varepsilon) - U] = \beta[(J_p(\varepsilon) + f - V] \tag{28}$$

By substituting into these relations the expressions of each asset value under the free-entry condition $V = 0$, we get the following wages:

$$w_t = \beta(\bar{\varepsilon} + h\theta) + (1-\beta)b \tag{29}$$

$$w_0(\varepsilon) = \beta(\varepsilon + h\theta - \mu f) + (1-\beta)b \tag{30}$$

$$w_p(\varepsilon) = \beta\,(\varepsilon + h\theta + rf) + (1-\beta)b$$

where $w_0(\varepsilon) < w_p(\varepsilon)$ and $w_0(\varepsilon) < w_t$. Notice that $w_p(\varepsilon) = w_t + \beta[rf - (\bar{\varepsilon} - \varepsilon)]$, the wage of permanent workers is not necessarily larger than the wage of temporary workers because the latter always start at the highest productivity level. Nonetheless, the larger is f the more likely it is that $w_p(\varepsilon) > w_t$.

Let us denote by N_0 the number of temporary jobs that have just been created with productivity $\bar{\varepsilon}$ and that have not yet been hit by a shock since their creation, and by N_{0t} the number of permanent jobs that have not been hit by a shock since they were transformed from temporary jobs:

$$\begin{aligned} \dot{N}_0 &= (1-p)u\theta q(\theta) - \mu N_0 \\ \dot{N}_{0t} &= \lambda N_t p[1 - F(\varepsilon^c)] - \mu N_{0t} \end{aligned}$$

such that their steady state values become:

$$
\begin{aligned}
N_0 &= \frac{(1-p)u\theta q(\theta)}{\mu} \\
N_{0t} &= \frac{pu\theta q(\theta)[1-F(\varepsilon^c)]}{\mu}
\end{aligned}
$$

Using the previous employment sizes, we can next calculate the average wage in steady state, which is given by:

$$
\overline{\omega} = \frac{N_t w_t + \frac{N_{0t}}{1-F(\varepsilon^c)} \int_{\varepsilon^c}^{\overline{\varepsilon}} w_0(x) \mathrm{d}F(x) + N_0 w_0(\overline{\varepsilon}) + \frac{(N_p - N_{0t} - N_0)}{1-F(\varepsilon^d)} \int_{\varepsilon^d}^{\overline{\varepsilon}} w_p(x) \mathrm{d}F(x)}{1-u} \tag{31}
$$

For example, assuming that $F(.)$ is the c.d.f. of a uniform distribution $U[\underline{\varepsilon}, \overline{\varepsilon}]$, $\overline{w}$ becomes:

$$
\overline{\omega} = \frac{\beta h\theta(1-u) + \beta\,\overline{\varepsilon}\,(N_t + N_0) + \beta\frac{\overline{\varepsilon}+\varepsilon^c}{2} N_{tp} + \beta\frac{\overline{\varepsilon}+\varepsilon^d}{2}(N_p - N_0 - N_{tp})}{(1-u)\,(1-b(1-\beta)) + f(\mu+r)(N_0 + N_{tp}) - frN_p} \tag{32}
$$

5 Accounting for the impact of the crisis

In this section, we first show how to calibrate a number of key parameters in the model and then discuss the results of a simulation exercise whose goal is to ascertain the extent to which the difference in EPL regulation between Spain and France can account for the strikingly different evolution of their respective unemployment rates during the crisis.

5.1 Calibration of the model

The length of a model period is chosen to be one quarter. Some of the values of the model's parameters can be found directly from data, but others need to be endogenously calibrated to fit a set of labor market variables. The actual reference period is the latter part of the boom, preceding the recession, namely 2005:1-2007:4, since the unemployment rates in both countries were rather similar at that stage and our goal is precisely to let the model explain the unemployment rate in the bad state (after the crisis) relative to the good state (before the crisis). Parameter values are presented in Table 2.

The interest rate r is set at 1% per quarter. As in most of the literature (see, e.g., Petrongolo and Pissarides, 2001), we set values for the elasticity of the matching function with respect to unemployment, α, and the bargaining power, β, equal to 0.5.

For the unemployment benefit indicator b, we use statutory replacement rates corrected for benefit coverage, setting it to 55% for France and 58% for Spain. Indicators f and p are chosen to represent each country's EPL. As regards f, its value is chosen to fit red-tape firing costs. Kramarz and Michaud (2008) calculate the average firing cost for permanent workers in France to be around one year's wages, with red-tape costs accounting for one third of this amount (i.e. 1.33 quarters). For Spain, we compute it as the difference between statutory severance (20 days of wages per year of service) for dismissals based on economic reasons and actually paid severance (45 days in either individual or collective dismissals), which is induced by labor courts and authorities. Making use of observed employment tenures yields a value around 2 quarters. Parameter p represents the proportion of newly created contracts that are temporary, which was 71% in France and 91% in Spain. λ captures the probability that a temporary contract is either transformed into a permanent one or terminated, which was 13.5% in France and 21.3% in Spain. Note that the higher value of λ in Spain reflects the above-mentioned "capitalization" effect stressed by Wasmer (1999) since the average growth rate of GDP during the decade preceeding the crisis was much higher in Spain than in France.

To simplify computations, the idiosyncratic productivity shock is assumed to be uniformly distributed. Since the upper bound of the support can be chosen arbitrarily, because all monetary variables in the model are relative to $\bar{\varepsilon}$, we set $\bar{\varepsilon} = 1$. However, the standard deviation of the idiosyncratic productivity needs to be calibrated. Given a uniform distribution, this is equivalent to calibrating the lower bound of the support of the shock, $\underline{\varepsilon}$. More specifically, to uncover the values of the parameters $\underline{\varepsilon}$, h, m_0, and μ, for which no direct information is available, we use the following four equations defining key labor market variables related to temporary and permanent employment features and the overall unemployment rate in each economy, which are computed using the French and Spanish Labor Force Surveys. The first equation defines the rate of transformation of temporary contracts into permanent ones, which reads as:

$$\lambda\frac{N_{0t}+(N_t-N_{0t})\left[1-F(\varepsilon^c)\right]}{N_t}$$

or, in steady state:

$$\lambda\left[1-F(\varepsilon^c)\right] \tag{33}$$

Secondly, we use the destruction rate of permanent jobs, which is defined by:

$$\mu F(\varepsilon^d) \tag{34}$$

Thirdly, we use the share of temporary jobs in the total stock of jobs (in steady state), given by:

$$\frac{N_t^*}{N_t^*+N_p^*}=\frac{p\mu F(\varepsilon^d)}{p\mu F(\varepsilon^d)+\lambda\left[1-F(\varepsilon^c)\right]} \tag{35}$$

Lastly, we use the unemployment rate in (25) which can be rewritten as:

$$u^*=\frac{\lambda\mu F(\varepsilon^d)}{\lambda\mu F(\varepsilon^d)+\theta q(\theta)[\lambda(1-F(\varepsilon^c))+p\mu F(\varepsilon^d)]} \tag{36}$$

Once the model has been calibrated to reproduce the stylized facts during the boom, we obtain simulations for the recession allowing for adverse changes in the productivity distribution and possibly in mismatch. These simulations are obtained for two specifications of the average wage $\overline{\omega}$ applied to compute the firing cost and the unemployment benefit during the recession: (i) one where we consider that $\overline{\omega}$ corresponds to the average wage during the bad state, and (ii) another where it takes the value of $\overline{\omega}$ in the good state, in order to mimic the realistic feature that both unemployment benefits and severance pay are linked to workers' tenure and experience, respectively. For notational convenience, these two specifications will be labeled in the sequel as the "endogenous wage" and endogenous wage with "fixed f and b" models respectively.

5.2 Simulation results

In this section we summarize the results of several simulation exercises. We present targets (actual data) and outcomes (simulated data) for both countries in the expansionary and recessionary periods, using the two values of $\overline{\omega}$ just described. For the sake of brevity, however, we will mainly focus on the results of the "fixed f and b" model, which we see as a more realistic setup, to the extent that wages are downward rigid in France and in Spain. Table 3 presents the data (target values) for the four labor market variables in (33) to (36) and the outcomes of the simulations. For the reference expansionary period (based on data for 2005-2007) we are able to match both the French and Spanish magnitudes fairly well, especially the unemployment and temporary employment rates, which are reproduced almost perfectly.

The next step is to match the data during the recession. Since the slump is still in progress, target values are aimed at reproducing data observed in the latest available four-quarter period at the time of writing this paper, namely 2008:3-2009:2. We follow two approaches in running these simulations. First, we consider a *baseline* simulation where the only degree of freedom in matching targets during the slump is a parameter controling the severity of the productivity shock through a shift in its distribution, whereas all other parameters in the model remain the same as in the preceding expansion. Specifically, we assume that the shock distribution is shifted through a multiplicative factor, namely ε in the bad state is assumed to be uniformly distributed with support $\gamma[\underline{\varepsilon}, \overline{\varepsilon}]$, such that γ is chosen so as to match the required moments in the recession. Secondly, we compute an *alternative* simulation where, besides the severity of the shock, we allow for another model parameter to change, namely, m_0. The insight for this choice is to allow for reallocation shocks to play a role in capturing the effects of the collapse in the construction sector on mismatch. This second simulation will enable us to check whether allowing for higher mismatch helps improve the overall match of the targets during the crisis yielded by the baseline simulation.

5.2.1 Baseline simulations

The results of the baseline simulations are presented in Table 3. Our estimates for γ and $\underline{\varepsilon}$ in the "fixed f and b" model are γ=0.880 and $\underline{\varepsilon}$=0.5 for France, whereas the Spanish values turn out to be γ=0.76 and $\underline{\varepsilon}$=0.5. This implies that the severity of the negative shock is larger in Spain since the mean of its distribution falls by 24% against 12% in France. According to the simulated model, unemployment goes up by 8.1 percentage points in Spain and by 1.4 pp. in France, yielding a very good match with the targets (7.9 pp. and 1.3 pp., respectively). Likewise, the remaining three targets in the recession are matched remarkably well for France. However, this is not the case for Spain, where the model badly fails to capture the fall in the rate of temporary work during the recession. As can be observed, the simulation gives rise to a sharp rise in this rate, from 33% in the boom to 45% in the bust, in sharp contrast to the opposite move observed in the data (i.e. from 33% to 27%). In view of this failure of the *baseline* simulation, we proceed to allow for additional changes in other parameters of the model, besides the severity of the shock.

5.2.2 Alternative simulations: Allowing for other parameter changes

The alternative simulation implies that, relative to the baseline simulation, we allow an increase in the degree of mismatch, captured by a reduction of m_0 from 0.96 to 0.68. Notice that the outward shift in the Beveridge curve reflects reallocation distortions, rather than aggregate shocks. In line with the discussion in Section 3.4, higher mismatch leads to a rise in unemployment through lower labor mobility driven both by the higher risk involved by the increasing destruction of temporary jobs and the rigid regulations affecting the Spanish rental market. In other words, workers who have lost their jobs in regions with high unemployment, because of the collapse of the construction industry, find it very costly to move to other regions where unemployment is lower.

The results reported in the last row in Table 3 for this alternative scenario show a substantial improvement in matching the target on temporary work (27% in the data vs. 27.8% in the simulation), while the other three targets remain satisfactorily reproduced.

5.2.3 Counterfactual simulations: Spain with French EPL regulations

Once we have managed to get a calibration that behaves well in both the good and bad states, we can use this model to run counterfactual simulations aimed at gauging the share of the increase in unemployment induced by the recession in Spain that can be attributed to differences in its EPL vis-à-vis France. In other words, we carry out this counterfactual simulation by computing what would have been the increase in unemployment during the slump had Spain adopted French EPL just before the recession started.[20]

We interpret the adoption of French EPL in two ways, namely, in a broad and in a narrow sense. First, it is interpreted as involving not only the direct effect of adopting a lower value f on worker turnover but also the related indirect effects of a reduction in f on industrial specialization. Thus, under this broad interpretation, besides using the French value of f, we also impute to Spain the French share of hires on temporary jobs, p, and the destruction rate of temporary jobs, λ. The insight for bundling these three parameters together is that, though p and λ are assumed to be parameters of the model and therefore independent of the value of f, in practice it is very likely that lowering f (from 2.0 to 1.33) would lead to: (i) a smaller share of temporary contracts in hiring (i.e., a reduction in p from 0.91 to 0.71), and (ii) a fall in the duration of temporary contracts, since they could be more easily converted into permanent ones (i.e., a reduction in λ from 0.24 to 0.135). Secondly, the narrow interpretation is based on exclusively imputing to Spain the lower value of f in France.

The results of these simulations are presented in Table 4. To compute the counterfactual rise in Spanish unemployment, we follow a difference-in-differences approach. For instance, regarding the "fixed f and b" version of the model under the broad interpretation of EPL, the first row in panel (a) of Table 4 shows the result of subtracting from the overall change in unemployment, 8.07 pp., the change predicted had Spain had the French parameters, namely, 5.07 pp. The implication is that the recession would have raised the unemployment rate in Spain by 3 pp. less (i.e. about 40% of the actual increase) had Spain adopted French labor market characteristics rather than its own. The endogenous wage model provides a similar outcome of 3.1 pp. Interestingly, these counterfactual outcomes are not too different from what we obtained by simulating the baseline version of

[20]Notice that this assumption about the timing of the adoption of French EPL in Spain implies that we do not need to re-calibrate the model under the good state.

the model where only an adverse shift of the distribution of the shock was allowed. Although the results of this simulation are not reported in Table 4, because of its failure in matching the decline in the rate of temporary work during the recession, we obtained that unemployment would have risen by about 4 pp. less under French EPL. Thus, irrespective of the precise mix of a negative aggregate shock and a rise in mismatch in originating the surge of the Spanish unemployment, the effect of the bundled EPL variables during the recession turns out not to be too different.

Next, panel (b) in the table presents the results of the simulation under the narrow interpretation of French EPL adoption. The result of the counterfactual increase in Spanish unemployment, is quite smaller than before: 0.8 pp. less than with Spanish EPL. Nonetheless, as stressed above, we believe that there should be a close link among changes in f, p and λ. Endogeneizing p and λ as a function of f is bound to be hard in this type of equilibrium search and matching models but remains as a relevant item in our research agenda.

Finally, panel (c) reports the results obtained in the converse simulation exercise addressing this time the question: By how much would French unemployment have risen during the recession had France adopted Spanish EPL. In line with our previous discussion, we use the broad interpretation of Spanish EPL in term of the bundle (f, p, λ) of parameters. The result is that, instead of the observed rise of 1.5 pp. in the French unemployment rate, it would have risen by 2.9 pp., that is 1.4 pp. more than with their own regulations when the average wage $\overline{\omega}$ applied to f and b remains as in the good state, and by only 0.5 pp. under endogenous wages.

5.2.4 Transitional dynamics

Lastly, in order to complement the results of the above-mentioned simulations, which are restricted to steady states, Figure 5 depicts, two transition paths of the Spanish unemployment rate in the recession for the "fixed f and b" model. The solid line corresponds to the alternative simulation with Spanish parameters whereas the dashed line captures the case where the values of f, p, and λ are replaced by the French ones.[21] In both paths there is large overshooting in the short-run after the adverse shock hits the economy and later on the unemployment goes down to a new steady state with the properties discussed above: i.e., about 3 pp. larger when Spain keeps its own EPL rather than having adopted then French one.

6 Conclusions

In this paper we explore how much of the significantly larger increase in unemployment in Spain vis-à-vis France during the ongoing recession can be accounted for the difference in EPL between the two countries. We have argued that the larger gap between the dismissal costs of workers with permanent and temporary contracts in Spain as compared to France has led to: different labor mobility and industrial specialization, huge flows of temporary workers into and out of unemployment and, as a result, large job losses during the financial crisis.

To undertake this task , inspired by previous work by Blanchard and Landier (2002) and Cahuc and Postel-Vinay (2002), we have used a search and matching model that extends Mortensen-Pissarides (1994) to allow for the distinction between temporary and permanent jobs entailing different dismissal costs. After calibrating the parameters with data for the two economies, we simulate the model to replicate a few key labor market magnitudes for the expansion (2005-2007) and recession periods (2008:3-2009:2).

Subsequently we carry out several counterfactual exercises involving the key parameters capturing employment protection and industry composition in the model, which we interpret to be closely related. Setting the French-economy levels of several subsets of these parameters to the Spanish economy yields a robust result, namely that the current recession would have raised the unemployment rate in Spain by about 40% less than the

[21] The dynamics are easy to compute because the core of the model is forward looking. As soon as the economy is hit by an unfavorable shift in the distribution of shocks, the productivity thresholds jump to their new stady-state values. We then essentially look at the adjustment of the stocks given the new flows, noting that some permanent workers would be laid off even without having been hit by an "idiosyncratic" shock because of the shift in the thresholds.

observed rise (8 pp.) had Spain adopted French EPL institutions rather than kept its own.

Recently there have been several policy initiatives in Europe defending the idea of eliminating the firing cost gap through the introduction of a single labor contract. Among these proposals are those of Blanchard and Tirole (2003) and Cahuc and Kramarz (2004) for France, Boeri and Garibaldi (2008) and Ichino (2009) for Italy, and a manifesto signed by 100 academic economists, see Andrés *et al.* (2008), for Spain. While not identical in their details, all these proposals highlight the negative effects induced by the permanent-temporary contract divide. As a result, they all advocate the elimination of temporary contracts and the introduction of a single labor contract with severance pay that is increasing with seniority in the job.[22] The results in this paper, by quantifying a rather sizeable impact of the firing cost gap and its related effects upon sectoral composition on the rise in unemployment during the crisis, provide some support for this proposal.

[22] For a specific proposal of a single contract for Spain and its consequences in terms of expected protection and job stability, see Garcia-Perez (2009).

Appendix

Table A1. Employment protection legislation in France and Spain

	Permanent contracts	Fixed-term contracts
France		
* Notice period	1 month if 6<seniority (mos.)< 24 2 months if seniority (mos.)> 24	
* Severance pay		
1. Economic reasons	6 days of wages pyos. (20% of wage) +0.08 days' wages pyos.>10 yrs (1/15 of monthly wage)	3 days of wages pyos.
2. Personal reasons (before July 2008)	Minimum seniority: 1 year 3 days of wages pyos. (10% of wage) +0.04 days' wages pyos.>10 yrs	
Observations	Personalized plan for up to 12 months	Max. duration: 24 months Restricted to 9 cases (see text)
Spain		
* Notice period	1 month	
* Severance pay		
1. Economic reasons	20 days of wages pyos. Max. seniority cov.: 12 months	8 days of wages pyos. (0 days in some cases, see text)
Observations	Collective dismissal requires administrative approval	Max. duration: 24 months Unrestricted
2. Unfair dismissal	45 days of wages pyos. Max. seniority cov.: 42 months	

Note: "pyos." means per year of service.

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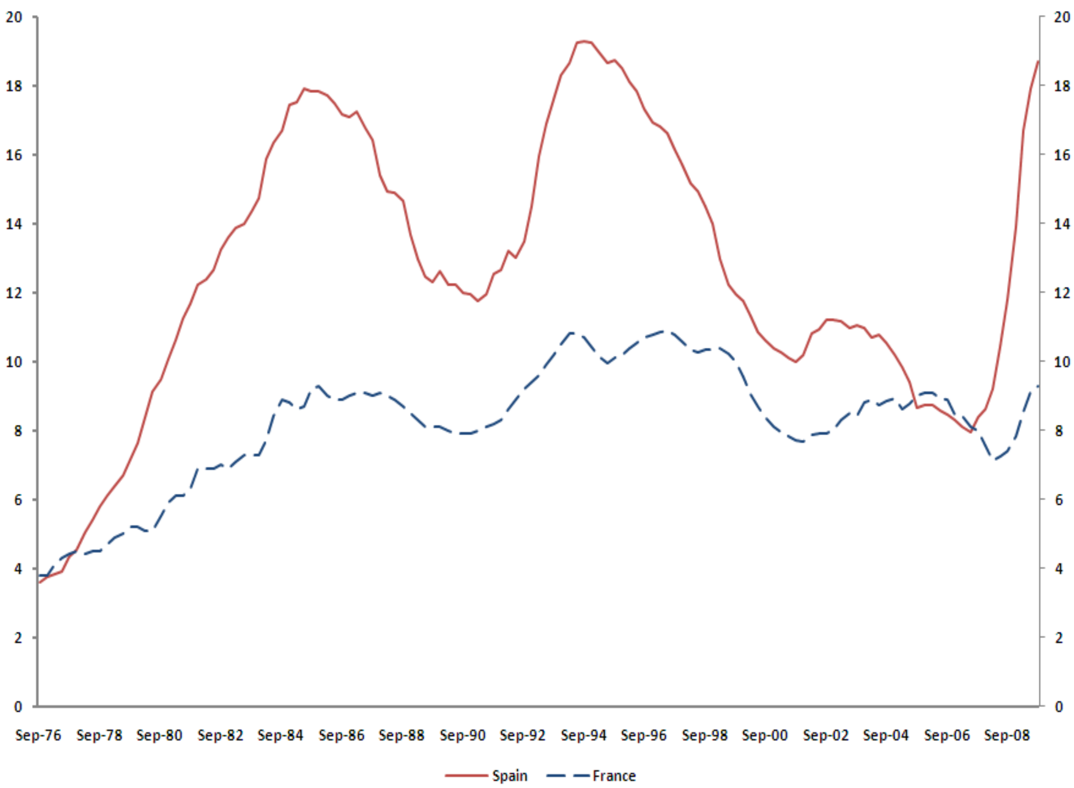

Figure 1: Unemployment rate in France and Spain, 1976-2008

Table 1: Labor market evolutions in France and Spain

Levels (%)			1998:1	2007:4	2009:2
1.	Unemployment	France	10.3	7.4	9.2
		Spain	15.2	8.6	18.0
2.	Fixed-term employment[1]	France	13.8	14.3	12.8
		Spain	33.3	30.9	25.4
3.	Hours of work[2]	France	40.7	37.7	37.7
		Spain	38.8	39.0	39.7

Annual growth rates (%)			1998:1-2007:4	2008:1-2009:2
4.	Gross Domestic Product	France	2.3	-2.2
		Spain	3.7	-2.7
5.	Labor force	France	0.8	1.0
		Spain	3.3	1.8
6.	Employment	France	1.1	-0.4
		Spain	4.2	-5.3
7.	Private non-agricultural employees:			
	(a) Total	France	1.5	-1.8
		Spain	5.6	-6.3
	(b) Construction	France	2.4	-0.7
		Spain	8.1	-23.3
	(c) Manufacturing	France	-0.7	-3.4
		Spain	2.0	-10.8
	(d) Market services	France	2.2	-1.4
		Spain	6.8	-0.9
8.	Real hourly earnings[3]	France	1.3	0.5
		Spain	0.3	1.4
9.	Hiring on temporary contracts	France	71.3	n.a.
		Spain	84.7	89.1

Notes: [1] As a share of employees. [2] Full-time employees. The last period is 2008:4. [3] Deflated by GDP Deflator, seasonally adjusted.
Sources: (1),(4)-(6), OECD Economic Outlook Database (www.oecd.org); (2),(3) Eurostat Statistics Database (epp.eurostat.ec.europa.eu); (7), INSEE BDM Macroeconomic Database (www.bdm.insee.fr) for France and INE, Encuesta de Población Activa (www.ine.es) for Spain; (8) OECD Main Economic Indicators Database (www.oecd.org), (9) Dares DMMO-EMMO (www.dmmo.travail.gouv.fr) for France and Ministerio de Trabajo e Inmigración, Boletín de Estadísticas Laborales (www.mtin.es).

Table 2: Calibrated and estimated parameters[1]

		France	Spain
Standard parameters:			
Interest rate	r	0.010	0.010
Matching function elasticity	α	0.500	0.500
Worker bargaining power	β	0.500	0.500
Institutional parameters:			
Unemployment benefit replacemente rate	b	0.550	0.580
Severance pay for permanent employees	f	1.330	2.000
Dual labor market flow rates:			
Probability of hiring into a temporary job	p	0.710	0.910
Probability of temporary contract ending	λ	0.135	0.213
Parameters estimated by indirect inference:			
Cost of keeping jobs vacant	h	0.600	0.600
Matching efficiency level	m_0	0.350	0.960
Incidence rate of productivity shocks	μ	0.020	0.070
Lower bound of productivity shock	$\underline{\varepsilon}$	0.500	0.500
Shocks multiplicative shift factor in recession	γ	0.880	0.760

[1] Reference period: 2005:1-2007:4.

Table 3: Simulation results

	Unemployment rate[1]	Perm. jobs destruction rate	Temporary employment rate	Transition temp. to permanent
France - Expansion				
Data	0.085	0.015	0.126	0.047
Model	0.080	0.013	0.125	0.037
France - Recession				
Data	0.098	0.013	0.125	0.037
Model	0.094	0.013	0.126	0.037
Spain - Expansion				
Data	0.103	0.008	0.333	0.100
Model	0.097	0.034	0.327	0.060
Spain - Recession				
Data	0.177	0.016	0.270	0.075
Baseline simulation	0.178	0.055	0.454	0.045
Alternative simulation	0.178	0.029	0.278	0.052

[1] As a share of employees plus unemployed (i.e. self-employed are excluded).

Table 4: Differential increase in unemployment in Spain induced by the recession explained by differences with France in the alternative simulation (percentage points)

	Δu_{SP}	$\Delta u_{SP}(FR)$	$\Delta u_{SP} - \Delta u_{SP}(FR)$
A. Spain with French EPL: f, p, and λ^*			
* Fixed f and b model	8.07	5.07	3.00
* Endogenous wage model	7.92	4.86	3.06
B. Spain with French EPL: f^*			
* Fixed f and b model	7.90	7.18	0.72
* Endogenous wage model	7.96	7.48	0.48
	Δu_{FR}	$\Delta u_{FR}(SP)$	$\Delta u_{FR} - \Delta u_{FR}(SP)$
C. France with Spanish EPL: f, p, and λ^*			
* Fixed f and b model	1.40	2.83	-1.43
* Endogenous wage model	1.42	1.98	-0.52

Note: Δu_{SP} denotes the change in unemployment explained by the model simulated for the Spanish economy and $\Delta u_{SP}(FR)$ the change in unemployment explained by the model simulated for the Spanish economy with the indicated set of parameter values corresponding to the simulated French economy. The mirror definitions apply to Δu_{FR} and $\Delta u_{FR}(SP)$. (*) Based on alternative simulations. (**) Based on baseline simulations.

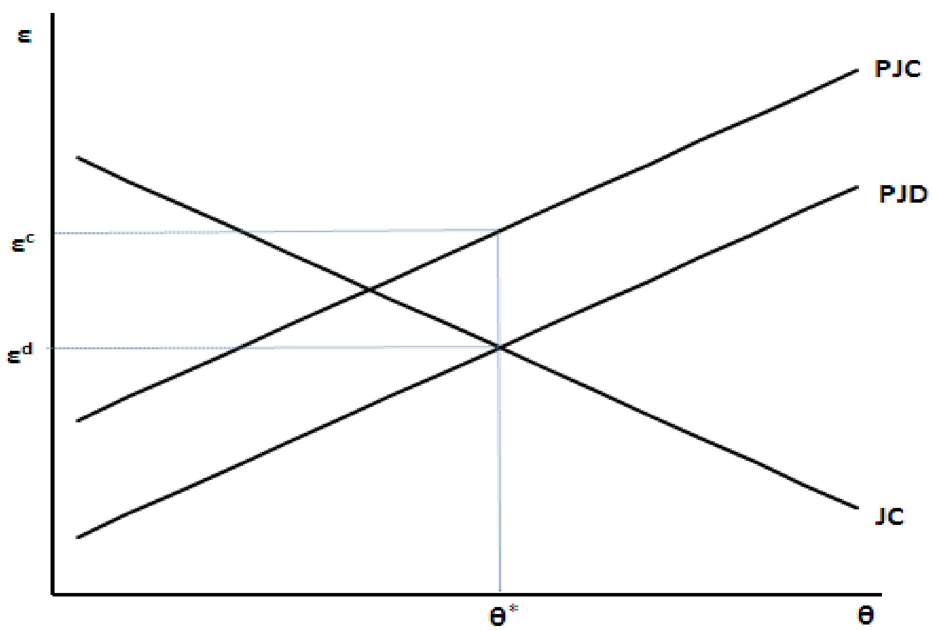

Figure 2: Labor market equilibrium

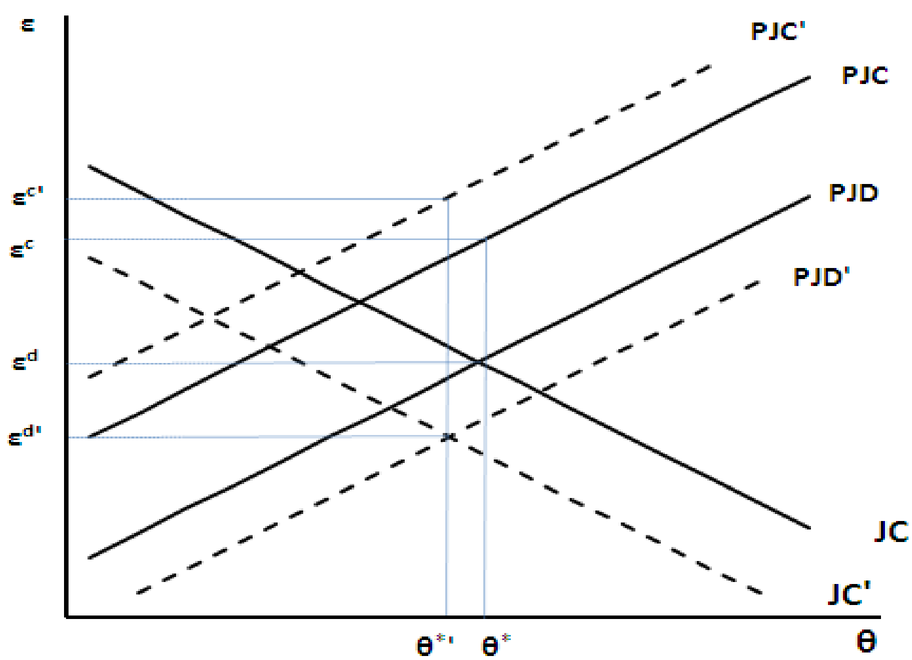

Figure 3: Effects of an increase in the firing cost (f)

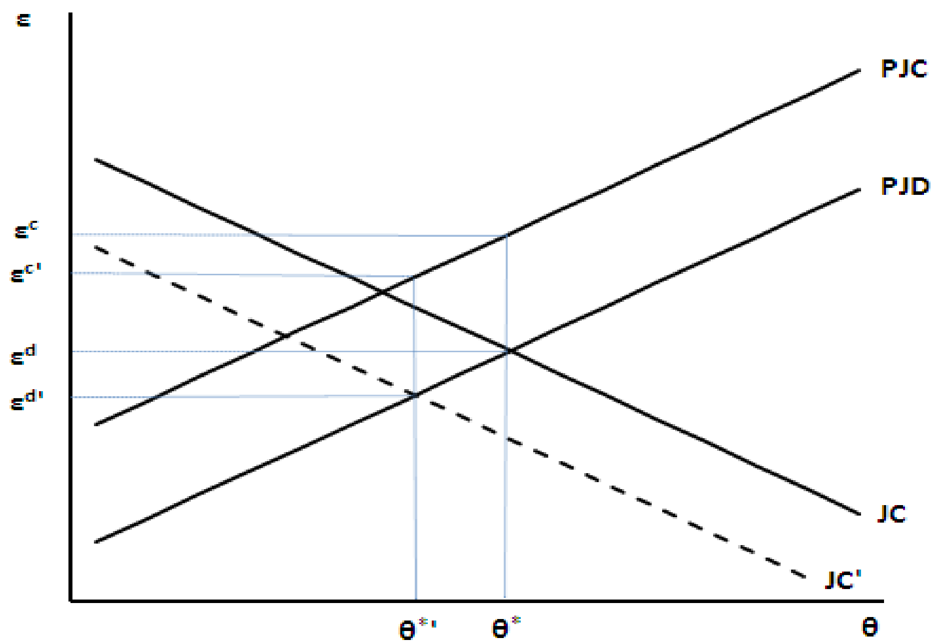

Figure 4: Effects of a reduction in the proportion hires on temporary contracts (p)

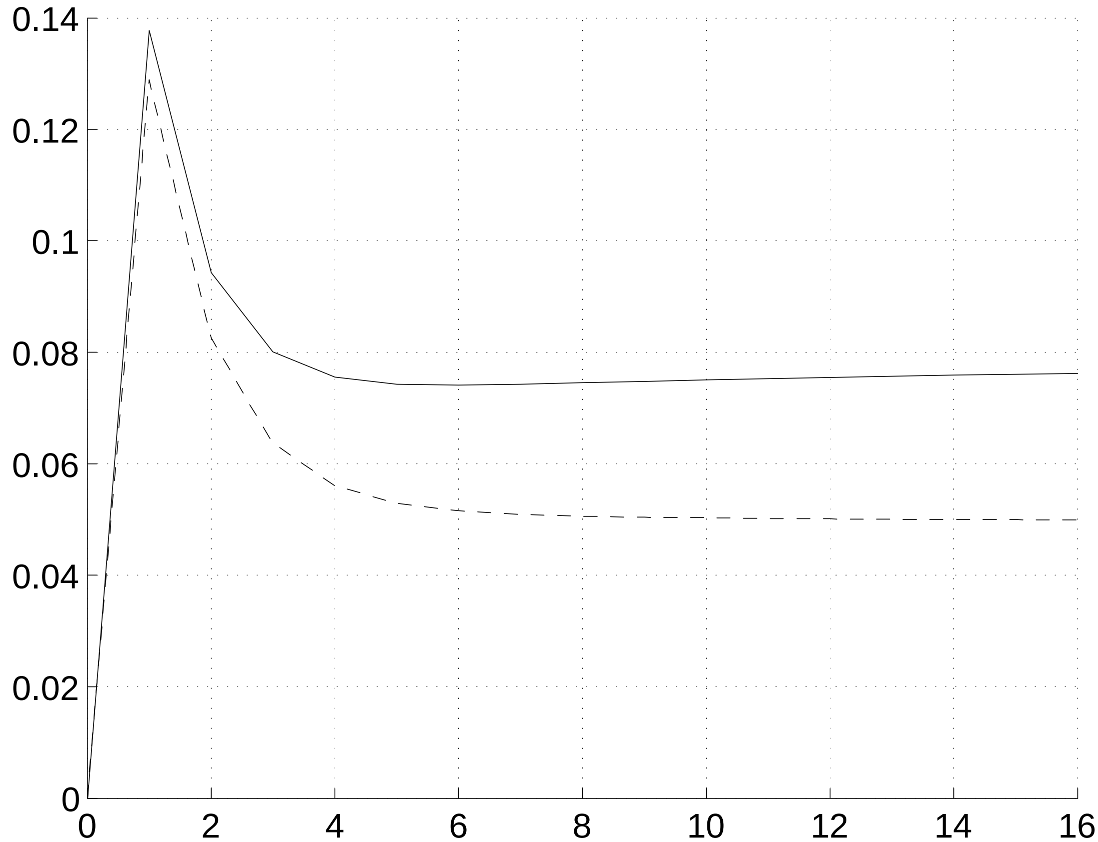

Figure 5: Simulated increase in the unemployment rate in Spain due to the recession in the "fixed f and b" model with the baseline parameters (continuous line) and with French f, p, and λ (dashed line)