IZA

DISCUSSION PAPER SERIES

IZA DP No. 3293

Flexibility at the Margin and Labor Market Volatility in OECD Countries

Hector Sala
José I. Silva
Manuel E. Toledo

January 2008

Forschungsinstitut
zur Zukunft der Arbeit
Institute for the Study
of Labor

Flexibility at the Margin and Labor Market Volatility in OECD Countries

Hector Sala
Universitat Autònoma de Barcelona and IZA

José I. Silva
Universitat Jaume I de Castelló

Manuel E. Toledo
Universidad Carlos III de Madrid

Discussion Paper No. 3293
January 2008

IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

IZA Discussion Paper No. 3293
January 2008

ABSTRACT

Flexibility at the Margin and Labor Market Volatility in OECD Countries*

We study whether segmented labor markets with flexibility at the margin (e.g., just affecting fixed-term employees) can achieve similar volatility than fully deregulated labor markets. Flexibility at the margin produces a gap in separation costs among matched workers that cause fixed-term employment to be the main workforce adjustment device, which in turn increases de labor market volatility. This increased volatility is partially reverted when limitations in the duration and number of renewals of fixed-term contracts are introduced. Under this scenario, firms respond by reducing the intensity of job destruction since it becomes more difficult to avoid firing costs in permanents contracts. We present a matching model with temporary and permanent jobs where (i) the gap in firing costs and (ii) restrictions in the use of fixed-term contracts helps explain the similar volatility observed in many regulated OECD labor markets with flexibility at the margin vis-à-vis the fully deregulated ones.

JEL Classification: J23, J41, J63

Keywords: flexibility at the margin, volatility, separation costs, matching model

Corresponding author:

Hector Sala
Departament d'Economia Aplicada
Universitat Autònoma de Barcelona
08193 Bellaterra
Spain
E-mail: hector.sala@uab.es

* We would like to thank the participants of the 2008 International Conference on Labor Market Outcomes: A Transatlantic Perspective, held in Paris, and the participants of the 2007 Symposium on Economic Analysis, held in Granada, for valuable insights. We are also grateful to Julián Messina for insightful comments on earlier versions of this paper. Hector Sala is grateful to the Spanish Ministry of Education and Science for financial support through grant SEJ2006-14849/ECON.

1 Introduction

This paper is concerned with the firms' workforce adjustment mechanisms in response to productivity shocks. We ask whether flexibility at the margin is a sufficient device, in regulated markets, to achieve the quick adjustments and large volatilities that characterize flexible labor markets such as the Anglo-Saxon ones. This is an important matter because it may help explain why some of these regulated labor markets, such as the Spanish one, display a similar volatility than the Anglo-Saxon ones. The analysis of labor markets with different degrees of flexibility at the margin may yield important lessons for economies currently involved in labor market institutional reforms.

The influence of institutions on the performance of the labor market is receiving utmost attention in recent years. Within this context, the study of the impact of firing taxes on business cycle fluctuations is in its initial steps, and only recently a number of studies have started to deal with this issue. Veracierto (2007), for example, develops a Real Business Cycle model with establishment level dynamics and shows that firing costs are important in reducing business cycle fluctuations. They preclude employment adjustments and lower the response of the economy to aggregate productivity changes. Thomas (2006) reaches the same conclusion using a matching model and considering economies with different firing costs. Zanetti (2007), also within the matching framework with nominal rigidities in the goods market., studies the impact of unemployment benefits and firing taxes on business cycle fluctuations. The latter are found to reduce the volatility of output, unemployment, employment, and the job creation and job destruction flows.

To motivate their papers, Veracierto (2007) and Thomas (2006) resort to empirical evidence, for years 1970-1990 and 15 OECD countries, which shows a negative relationship of both output and employment volatility with respect to an OECD Employment Protection Legislation index (EPL). This relationship is reproduced in Figure 1a,[1] below, but in terms of the unemployment volatility and the OECD index of EPL on permanent contracts (for the late 1980s). Overall it yields the same picture, and a negative correlation coefficient that amounts to -0.28.

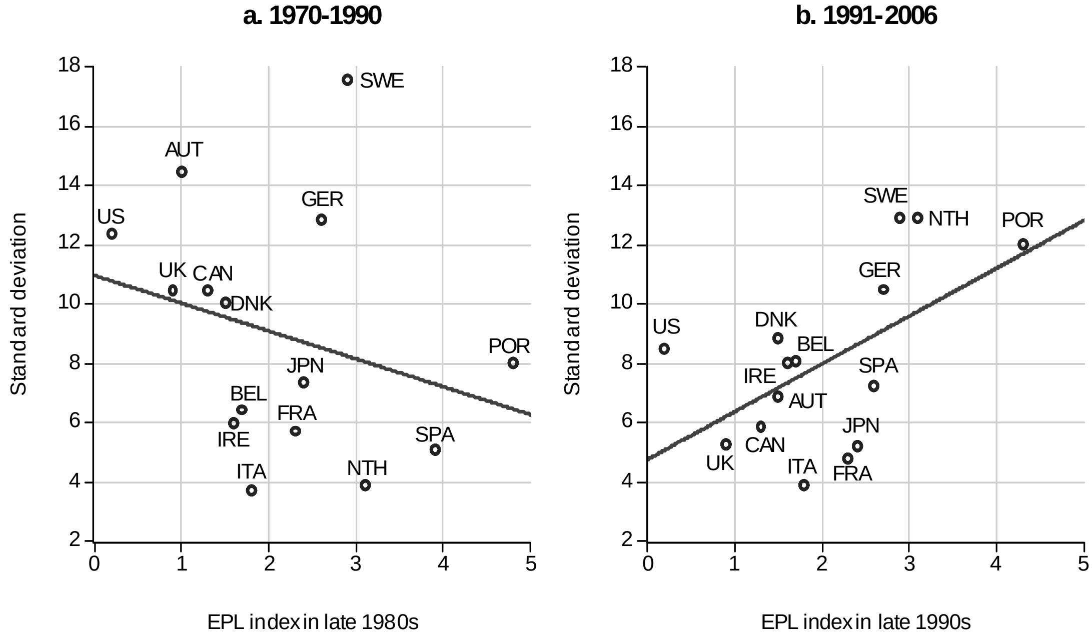
Since the 1990s, however, two phenomena affected the relationship between the unemployment volatilities and the EPL legislation. The first one is the fall in the business cycle volatility in the US and generally in the Anglo-Saxon countries, which has come to be known as the "Great Moderation". The second one is the growing use of temporary contracts, as a consequence of several waves of labor market reforms introduced in many OECD countries. These reforms have affected the relative strictness of EPL on fixed-term and permanent contracts (see Table 2.A2.6, in OECD, 2004). Firms have had to adapt their hiring and firing policies and, today, produce different responses to business cycle

[1] See notes of Table 1, below, for definitions and sources of these variables.

shocks.

The extent to which firms rely on the use of fixed-term contracts to adjust their workforce has become an important matter of interest. In parallel with the growing use of temporary work, the negative correlation of the labor market volatility with the strictness of EPL has reversed, and we face a new scenario with a positive relationship between unemployment volatility and EPL. This relationship, depicted in Figure 1b, yields a correlation coefficient of 0.55, which is significant at a 3% critical value.[2] Observe that in the Anglo-Saxon countries there is a fall in volatility (see US, UK, Australia or Canada), in contrast with the stability or increase witnessed in the other economies.

Figure 1. Unemployment volatility vs. EPL



How have firms reacted to the changing institutional setting? Have they adapted their workforce management strategy? Our hypothesis is that, following the possibility of hiring on a fixed-term basis, firms are using flexibility at the margin as the main workforce adjustment device. According to this, job creation and job destruction would be mainly concentrated on the segment of temporary employment, and this would help to explain the high labour market volatilities achieved by countries with strict EPL on permanent contracts and a high (or growing) share of fixed-term employment.

This hypothesis is somewhat endorsed by the OECD (2004), where it is shown that countries having undertaken EPL reforms (and thus eased the relative strictness of EPL

[2] Quarterly data on the standardized unemployment rate for Finland is only available since 1988. For comparability with respect to Figure 1a, Finland is not included in Figure 1b (its inclusion, in any case, does not change the correlation coefficient; it only increases its significance).

for fixed-term contracts relative to the one on permanent contracts) have had a more intensive use of temporary work. Along these lines, Table 1 offers crucial information to allow the differentiation of two labor market types that characterize many OECD economies. First, the well-known Anglo-Saxon type, which is characterized by a small degree of EPL in regular contracts, and no limitations on the renewal and duration of temporary contracts -which we denote by [NL]-. As a consequence of the high flexibility in the regular segment of the market, there is a small use of temporary contracts like in Australia (5.8%), Ireland (6.8%), UK (6.3%) and US (4.5%).

Table 1. Contract legislation and unemployment volatility in OECD countries

	Contract legislation				Volatility
	Restrictions on TCs [A]	EPL on PCs [B]	Share [C]	Conversion rate [D]	s.d. (u) [E]
Australia	[NL]	1.5	5.8	n.a.	6.9
Belgium	[L]	1.7	7.3	42.7	8.1
Canada	[NL]	1.3	12.3	n.a	5.9
Denmark	[L]	1.5	10.4	45.4	8.9
Finland	[L]	2.3	17.3	38.5	10.9
France	[L]	2.3	12.7	20.8	4.8
Germany	[L]	2.7	11.8	40.6	10.5
Ireland	[NL]	1.6	6.8	47.0	8.0
Italy	[L]	1.8	8.9	41.3	3.9
Japan	[NL]	2.4	11.6	n.a	5.2
Netherlands	[L]	3.1	12.5	49.1	12.9
Portugal	[L]	4.3	16.1	39.0	12.0
Spain	[L]	2.6	32.9	23.1	7.2
Sweden	[L]	2.9	14.6	n.a	12.9
UK	[NL]	0.9	6.3	56.1	5.3
US	[NL]	0.2	4.5	n.a	8.5
Average [L] countries		*2.4*	*14.4*	*37.8*	*9.2*
Average [NL] countries		*1.3*	*7.9*	*51.6*	*6.6*

[A] Refers to limited renewals and a maximum duration of temporary contracts (TCs): OECD, (2004); [NL] stands for No Limitations, [L] for Limitations;
[B] EPL index on permanent contracts (PCs) in the late 1990s: OECD (2004);
[C] Share of TCs in 1991-2006: Eurostat (2007); except Australia (1997), Canada and Japan (1997-2004), and US (1995-2001): OECD (2006);
[D] Conversion rate from TCs to PCs in 1996-1997: OECD (2002).
[E] Standard deviation of the cyclical component of standardized unemployment in 1991:1 - 2006:4: OECD Main Economic Indicators (2007).

Second, the flexibility-at-the-margin type, which combine a high degree of employment protection in the regular segment with a limited flexibility in the use of temporary contracts -which we denote by [L] in Table 1-. Economies such as Portugal, Sweden and Spain are among the ones with the highest values of the EPL index (4.3, 2.9 and 2.6, respectively) and display the highest temporary shares (16.1%, 14.6% and 32.9%).

It is well known that fixed-term employment contracts have been introduced in a number of European countries as a way to provide flexibility to economies with high employment protection levels. Nevertheless, the implementation of temporary contracts have typically included restrictions such as limited renewals or maximum durations.[3] For example, the Spanish 1984 labour market reform crucially broadened the scope of fixed-term contracts while, at the same time, restricted to 3 the maximum number of successive contracts with a top accumulated duration of 2 years (OECD, 2004). In Portugal, temporary contracts can also be renewed 3 times, but with a longer maximum duration of 30 months. These limitations provide a great source of labor turnover and, thus, of labor market volatility. For example, unemployment volatilities in Portugal and Sweden are 12.0% and 12.9%, well above those of UK and US 5.3% and 8.5%). In turn, the unemployment volatility in Spain (7.2%) falls between these two deregulated countries. In other words, the flexibility at the margin may be important in the achievement of the quick adjustments and high volatilities that characterize the Anglo-Saxon labor markets.

To further check to what extent this is a promising hypothesis, Table 1 also provides the averages by countries with and without restrictions on temporary contracts. Observe that the first group has a substantially higher index of EPL (2.4 versus 1.3) and a higher share of temporary contracts (14.4% versus 7.9%), while it achieves a larger unemployment volatility (9.2 versus 6.6). Thus, despite the Anglo-Saxon labor markets have a less stringent legislation, unemployment in segmented/dual labor markets with restrictive EPL and high firing costs in the regular side is, on average, 33% more volatile.

One remarkable common feature of Veracierto (2007), Thomas (2006), and Zanetti (2007) is that none of them distinguish permanent from temporary work. In these studies, therefore, there is no space for considering the influence of flexibility at the margin in business cycle fluctuations. This consideration, important in the assessment of the firing costs' impact on these fluctuations, is among the contributions of this paper.

To evaluate the business cycle implications associated with the presence of temporary employment we extend the equilibrium matching model of Mortensen and Pissarides (1994) by introducing the possibility that firms hire workers on a fixed-term basis. We, thus, differentiate between permanent and temporary employees, where the latter have fixed-term contracts and virtually zero firing costs. Fixed-term contracts have a limited duration by definition and many countries have introduced legal restrictions on their use

[3] For a comprehensie overview of such restrictions see OECD (2004).

in the form of a maximum number of renewals. When this maximum is reached, firms are bounded to convert them into permanent contracts, with higher firing costs, and change the status of the worker. To avoid this restriction, however, firms have the alternative to finish that temporary relationship and hire a new temporary worker. Our theoretical model features these restrictions. Since many OECD countries show a high degree of employment protection in regular jobs and limited flexibility in the use of temporary ones (see Table 1) we find this model particularly suitable to study the incidence of flexibility at the margin on labor market volatility.

Our formal analysis draws on a widely accepted distinction between entrants (or outsiders) and insiders (see Lindbeck and Snower, 1989), which is not new either in the matching literature (see for example Wasmer, 1999; Blanchard and Landier, 2002; Kugler *et al.*, 2002; Cahuc and Postel-Vinay, 2002; Osuna, 2005). However, in contrast with the long-run perspective generally taken by previous studies, this paper differs in scope and focuses exclusively on business cycle fluctuations. Our paper also differs from Boeri and Garibaldi (2007), who focus on the transitional dynamics of EPL reforms providing flexibility 'at the margin'.

In particular, this paper contributes to the understanding of the sources of unemployment volatility by assessing the role played by (i) the gap between the separation costs of the fixed-term and permanent employees; and (ii) restrictions in the use of temporary contracts. We claim that these are two important driving forces behind the volatility achieved by segmented labor markets.[4] The simulated results provide new insights on the effects of different EPL schemes on the cyclical behavior of job finding and job destruction probabilities and unemployment. We consider these effects in three scenarios, one of full regulation (strict EPL), one of no regulation (loose EPL), and a third one with regulation in the regular segment (permanent contracts) and flexibility at the margin. The main results stem from considering a situation with flexibility at the margin in which, we show, the gaps in separation costs between temporary and permanent jobs and the restricted use of fixed-term contracts increase the labor market volatility with respect to a situation of strict EPL with no gap in firing costs. It should be noted that, within each scenario, we find the standard result that a rise in firing costs reduces the volatility of the labor market (Thomas, 2006, Veracierto, 2007 and Zanetti, 2007).

The main intuition behind the higher volatility observed in the scenario with flexibility at the margin with respect to a fully regulated labor market is simple. To avoid transitions to a permanent status, which entails future costs in case of adjustments, firms' workforce adjustments take place more intensively and with higher frequency in temporary jobs. In particular, rather than converting fixed-term contracts into permanent, firms

[4]Azariadis and Pissarides (2007) have recently argued that unemployment volatility is magnified by international capital mobility. Our claim is that it is also increased by the legislative setup.

will tend to fire 'old' temporary workers and hire new ones not yet affected by the legal conversion restriction. This situation generates large volatilities in the job finding and job destruction probabilities associated with temporary contracts, as well as in unemployment. However, in the presence of limitations in the duration and number of renewals of fixed-term contracts, these lager volatilities are somewhat reduced. Adjustments on temporary workers become constricted, it is thus more difficult to avoid the firing costs on permanent contracts, and firms respond by reducing the intensity of job destruction. Summing up, a higher conversion probability of fixed-term contracts into permanent ones reduces the volatility of the labor market.

When flexibility at the margin is suppressed, most of the volatility in our model vanishes and gives rise to a scenario similar to the one before the explosion of fixed-term employment in many OECD countries. This situation corresponds to the one in the aftermath of the labor market reforms that took place since the 1990s in many of these economies. In short, we show that the scenario of flexibility at the margin provides an intermediate situation, in terms of volatility, with respect to the fully regulated and fully deregulated labor markets. This paper, therefore, provides an evaluation of some of the pros and cons of this type of reforms and gives some policy insights for those countries currently seeking to foster the flexibility of their labor markets.

A final important result is the countercyclical behavior we find between job destruction and the business cycle both in fully deregulated and flexibility-at-the-margin labor market types. This result clarifies a similar empirical finding for Spain in Messina and Valanti (2007) and helps to explain why the job turnover rate of some regulated labor markets displays a countercyclical behavior in contrast to the acyclical or even procyclical movements suggested by some studies (Garibaldi, 1998).

The remaining of the paper is structured as follows. Section 2 presents the model, which is calibrated in Section 3 and simulated in Section 4. Section 5 concludes.

2 The model

The economy is integrated by a continuum of risk-neutral, infinitely-lived workers and firms, which discount future payoffs at a common rate β. We further assume that capital markets are perfect.

Workers can either be employed or unemployed. Those who are employed can be so either on a temporary basis (T), or on a permanent one (P). When finding a job, unemployed workers become temporary and only from there may be upgraded to permanent with probability ι. The productivity of the match is a function of aggregate productivity A_t, and a term z_t idiosyncratic to the match. There is a firm-specific productivity term independent and identically distributed across firms and time, with a cumulative distribution function $G(z)$ and support $[0, \bar{z}]$.

There is a time-consuming and costly process of matching workers and job vacancies, captured by a constant-returns-to-scale matching function $m(u_t, v_t)$, where u_t denotes the unemployment rate and v_t is the vacancy rate. Unemployed workers meet jobs with probability $f(\theta_t)$ whereas vacancies meet workers with probability $q(\theta_t)$. From the properties of the matching function, these probabilities only depend on the vacancy-unemployment ratio θ_t, where the higher the number of vacancies with respect to the number of unemployed workers, the easier to find a job and the more difficult to fill up vacancies.

Firms have a constant-returns-to-scale production technology with labor as an only input. A posted job can either be filled or vacant. The firm has to open a job vacancy entailing cost c per period before a position can be filled. When the vacancy is filled the firm incurs in training costs ξ. Each productive match yields an instantaneous profit equal to the difference between labor productivity and the wage, which is $A_t z_t - w_t^T(z_t)$ for a temporary position and $A_t z_t - w_t^P(z_t)$ for a permanent one.

When a match with a temporary job is terminated, the firm pays a firing tax γ^T, which is assumed to be fully wasted and lower or equal than the firing tax for a permanent position, γ^P. Due to legal restrictions, after renewing a number of times a fixed-term contract, firms are bounded to convert it into permanent. We abstract from the actual restrictions on the duration of temporary jobs and the number of renewals and, for simplicity, represent them by an exogenous conversion probability ι. For instance, the tighter those restrictions are (i.e., shorter permitted maximum duration and/or fewer possible renewals), the higher ι is. To avoid these restrictions, however, firms have the alternative to finish that temporary relationship and hire a new worker. If a match is broken, either from a temporary or a permanent status, the firm opens a new vacancy.

Accordingly, the value of vacancies (V_t) and filled positions, $J_t^T(z_t)$ and $J_t^P(z_t)$, are represented by the following Bellman equations:

$$V_t = -c + \beta E_t \left[q(\theta_t) \int_{\widetilde{z}_{t+1}^I}^{\bar{z}} (J_{t+1}^T(z) - \xi) dG(z) + (1 - q(\theta_t)(1 - G(\widetilde{z}_{t+1}^I)) V_{t+1} \right], \quad (1)$$

$$\begin{aligned} J_t^T(z_t) = {} & A_t z_t - w_t^T(z_t) + (1-\phi)\beta E_t \left[\iota \left(\int_{\widetilde{z}_{t+1}^C}^{\bar{z}} J_{t+1}^P(z) dG(z) + G(\widetilde{z}_{t+1}^C) \left(V_{t+1} - \gamma^T \right) \right) \right. \\ & \left. + (1-\iota) \left(\int_{\widetilde{z}_{t+1}^T}^{\bar{z}} J_{t+1}^T(z) dG(z) + G(\widetilde{z}_{t+1}^T) \left(V_{t+1} - \gamma^T \right) \right) \right], \quad (2) \end{aligned}$$

$$J_t^P(z_t) = A_t z_t - w_t^P(z_t) + (1-\phi)\beta E_t \left[\int_{\widetilde{z}_{t+1}^P}^{\bar{z}} J_{t+1}^P(z) dG(z) + G(\widetilde{z}_{t+1}^P) \left(V_{t+1} - \gamma^P \right) \right], \quad (3)$$

where $\widetilde{z}^j$, $j = I, T, C, P$, are productivity thresholds defined such that nonprofitable matches (i.e., with negative surplus) are severed.[5] Thus, the conditions defining these thresholds for temporary and permanent job destruction (also called reservation productivities) are:

$$
\begin{aligned}
J_t^T(\widetilde{z}_t^I) - V_t &= 0, && (4)\\
J_t^T(\widetilde{z}_t^T) - V_t + \gamma^T &= 0, && (5)\\
J_t^P(\widetilde{z}_t^C) - V_t + \gamma^T &= 0, && (6)\\
J_t^P(\widetilde{z}_t^P) - V_t + \gamma^P &= 0. && (7)
\end{aligned}
$$

Condition (4) refers to those unemployed workers who have met a vacant job. Note that in this case the firm does not have to pay γ^T in the absence of agreement. Expressions (5) and (7) define the reservation productivity for current temporary and permanent workers, respectively, whereas (6) refers to those temporary workers on the verge of becoming permanent. That is, those who were drawn with probability ι. Recall that firms have the option to avoid temporary-to-permanent conversion by laying off workers before they must be offered a permanent contract due to legal restrictions. Hence, we need to consider the case where a firm does not want to offer a permanent contract to a temporary worker that has been randomly chosen to become permanent. Notice that in this case the firm is only liable to γ^T if it chooses to break up the match.

Let ϕ be an exogenous separation probability. It follows that the temporary and permanent matches separate with probabilities $s_t^T = \phi + (1-\phi)\left[(1-\iota)G(\widetilde{z}_t^T) + \iota G(\widetilde{z}_t^C)\right]$ and $s_t^P = \phi + (1-\phi)G(\widetilde{z}_t^P)$, respectively. Moreover, job creation takes place with probability $q(\theta_t)(1 - G(\widetilde{z}_t^I))$ when a firm and a worker meet and agree on an employment contract. Similarly, unemployed workers find a job with probability $f(\theta_t)(1 - G(\widetilde{z}_t^I))$.

At the workers' side the values of the different statuses - unemployed, U_t; temporary employee, $W_t^T(z_t)$; and permanent employee, $W_t^P(z_t)$ - are given by the following expressions:

$$
\begin{aligned}
U_t &= b + \beta E_t\left[f(\theta_t)\int_{\widetilde{z}_{t+1}^I}^{\bar{z}} W_{t+1}^T(z)dG(z) + (1 - f(\theta_t)(1 - G(\widetilde{z}_{t+1}^I))U_{t+1}\right], && (8)\\
W_t^T(z_t) &= w_t^T(z_t) + \beta E_t\Bigg[\iota\left((1-\phi)\int_{\widetilde{z}_{t+1}^C}^{\bar{z}} W_{t+1}^P(z)dG(z) + \left(\phi + (1-\phi)G(\widetilde{z}_t^C)\right)U_{t+1}\right)\\
&\quad + (1-\iota)\left((1-\phi)\int_{\widetilde{z}_{t+1}^T}^{\bar{z}} W_{t+1}^T(z)dG(z) + \left(\phi + (1-\phi)G(\widetilde{z}_t^T)\right)U_{t+1}\right)\Bigg] && (9)\\
W_t^P(z_t) &= w_t^P(z_t) + \beta E_t\left[(1-\phi)\int_{\widetilde{z}_{t+1}^P}^{\bar{z}} W_{t+1}^P(z)dG(z) + s_t^P U_{t+1}\right]. && (10)
\end{aligned}
$$

[5] Since the value of a match is increasing in z_t, we can prove that there exists a threshold $\widetilde{z}_t \in [0, \bar{z}]$ below which matches are no longer profitable.

According to these equations, any unemployed worker gets a constant current value $b = h + \psi$ from leisure, h, and unemployment benefits, ψ. This worker becomes employed in a temporary job if a match takes place, and remains unemployed if not. Employed workers earn an endogenous wage $w_t^T(z_t)$ if temporary and $w_t^P(z_t)$ if permanent. If a match is broken either from a temporary or a permanent status, the worker becomes unemployed.

We also assume that there is free entry for firms. Hence firms open vacancies until the expected value of doing so becomes zero. Therefore, in equilibrium:

$$V_t = 0. \tag{11}$$

Furthermore, because neither workers nor employers can instantaneously find an alternative match partner in the labor market, and because hiring and firing decisions are costly, a match surplus exists. To divide this surplus we assume wages to be the result of bilateral Nash bargaining between workers and firms. They are revised every period upon the occurrence of new shocks, and the Nash solution is the wage that maximizes the weighted product of the workers' and the firms' net return from the job match. The first-order conditions for the temporary and permanent employees yield the following two equations:

$$(1-\eta)(W_t^T(z_t) - U_t) = \eta(J_t^T(z_t) - V_t + \gamma^T), \tag{12}$$

$$(1-\eta)(W_t^P(z_t) - U_t) = \eta(J_t^P(z_t) - V_t + \gamma^P), \tag{13}$$

where $\eta \in (0,1)$ denotes the workers' bargaining power relative to firms. Note that the Nash conditions present terms depending on γ^T and γ^P. Because separation costs are operational they are explicitly considered in the wage negotiation. This implies that the firms' threat point when negotiating with a worker is no longer the value of a vacancy V_t but $(V_t - \gamma^T)$ or $(V_t - \gamma^P)$ depending on the type of worker.

To fully characterize the dynamics of the model economy, we need to define the law of motion for the unemployment rate u_t, and the mass of temporary and permanent workers, n_t^T and n_t^P, respectively. These evolve according to the following difference equations:

$$u_t = u_{t-1} + s_t^T n_{t-1}^T + s_t^P n_{t-1}^P - f(\theta_{t-1})(1 - G(\widetilde{z}_t^I))u_{t-1}, \tag{14}$$

$$n_t^T = n_{t-1}^T + f(\theta_{t-1})(1 - G(\widetilde{z}_t^I))u_{t-1} - s_t^T n_{t-1}^T - (1-\phi)\iota(1 - G(\widetilde{z}_t^C))n_{t-1}^T, \tag{15}$$

$$n_t^P = n_{t-1}^P + (1-\phi)\iota(1 - G(\widetilde{z}_t^C))n_{t-1}^T - s_t^P n_{t-1}^P. \tag{16}$$

Finally, we define job destruction rate (jd_t) equals to the average separation rate,

$$jd_t = s_t = \frac{s_t^T n_{t-1}^T + s_t^P n_{t-1}^P}{(1 - u_{t-1})}. \tag{17}$$

3 Calibration

We calibrate the model at quarterly frequency in order to match some empirical facts and steady-state values for the US economy between 1953 and 2003. Following Blanchard and Diamond (1990) we set an average unemployment rate of 11% as well as its observed standard deviation of 12.3%. This figure is consistent with the fraction of unmatched workers in the US when we consider not only the officially unemployed but also those not in the labor force who are looking for a job. Following Shimer (2005) we target: (i) a steady-state job separation probability s equal to 0.10 per quarter; and (ii) an elasticity of the matching function with respect to unemployment of 0.72. We also target the observed negative correlation between unemployment and labour market tightness of -0.98. Our final target is an elasticity of unemployment duration with respect to unemployment benefits around 1.0. As in Costain and Reiter (2007), we do not want unemployment duration or the unemployment rate to be excessively responsive to benefits. We choose this value based on the empirical evidence found by Meyer (1990), who uses individual data from the Continuous Wage and Benefit History (CWBH) database.

We set the discount factor $\beta = 0.99$, which implies a reasonable quarterly interest rate of nearly 1 percent in the steady state. The steady-state aggregate labor productivity A^* is normalized to one. The logarithm of this variable follows an AR(1) process such that $\log A_t = \rho \log A_{t-1} + \epsilon_t$. The values of the autoregressive parameter and the standard deviation of the white noise process, $\rho = 0.99$ and $\sigma_A = 0.013$, have been calibrated to match the cyclical volatility (1.3 percent) and persistence (0.760) of the US labor productivity $A_t \bar{z}_t$ between 1953 and 2003.[6] Following Silva and Toledo (2007), we set training costs to be equal to the actual productivity gap of 20% between new hired workers and incumbent employees, $\xi = 0.20$.

Regarding the exogenous separation probability ϕ, we follow den Haan *et al.* (2000) by interpreting exogenous separations as worker-initiated separations. Hence, since only endogenous separations are associated with the layoff rate, firms do not incur in firing costs when separations are exogenous. This is consistent with our model since endogenous separations are a firm's decision. According to the evidence from the Job Opening Labor

[6] Where $\bar{z}_t$ is the the average idiosyncratic productivity. As in Shimer (2005), the average labor productivity is the seasonally adjusted real average output per person in the non-farm business sector, constructed by the Bureau of Labor Statistics (BLS) from the National Income and Product Accounts and the Current Employment Statistics. It is reported in logs as deviations from an HP trend with smoothing parameter 1600.

Turnover Survey (JOLTS) shown by Davis, Faberman, and Haltiwanger (2006), and from the Census' Survey of Income and Program Participation (SIPP), shown by Nagypal (2004), layoffs represent on average about 35% of total separations. Thus, the value for ϕ is 0.065, which is close to the one used by den Haan *et al.* (2000). Given the total separation rate $s^* = \phi + (1-\phi)G(z^*)$, we solve for $G(z^*) = 0.0374$. To match the average unemployment rate we set the job finding probability $f(\theta^*)(1 - G(z^*))$ to 0.807. Thus, the job meeting rate $f(\theta^*)$ is 0.838.

Table 3. Calibrated parameters for the baseline economy

Parameters		Value	Source
Ave. aggregate labor productivity	A^*	1	Normalized
Discount rate	β	0.99	[A]
Mean for the distribution of z	μ	−0.19	[D]
Standard deviation for the distribution of z	σ	0.23	[D]
Exogenous separations	ϕ	0.065	[D]
Persistence parameter of A	ρ	0.99	[B]
Standard deviation of A	σ_A	0.013	[B]
Discount rate	β	0.99	[A]
Workers' bargaining power	η	0.4128	[C]
Parameter of the matching function	φ	1.8635	[A]
Hiring costs	c	0.0321	[C]
Training costs	ξ	0.20	[A]
Firing costs for temporary contracts	γ^T	0	[A]
Firing costs for permanent contracts	γ^P	0	[A]
Employment conversion rate	ι	0	[A]
Unemployment benefits	ψ	0.20	[A]
Leisure parameter	h	0.525	[C]

Notes: [A] Other studies, data or own assumptions as explained in main text.
[B] Set to match the cyclical behavior of labor productivity.
[C] Obtained from theoretical model and to match the elasticity of unemployment duration with respect to unemployment benefits.
[D] Set to match the volatility of s_t and the correlation between v_t and u_t.

As in den Haan *et al.* (2000), we assume the matching function to be

$$m(u_t, v_t) = \frac{u_t v_t}{(u_t^{\varphi} + v_t^{\varphi})^{1/\varphi}}.$$

We select the matching technology parameter φ in order to match our target elasticity of the matching function with respect to unemployment. Since the matching elasticity depends on θ as well, we need to solve the following system of equations for φ and θ

$$
\begin{aligned}
0.838 &= \frac{\theta^*}{(1+\theta^{*\varphi})^{\frac{1}{\varphi}}} \\
0.72. &= \frac{\theta^{*\varphi}}{(1+\theta^{*\varphi})}
\end{aligned}
$$

The first two equations arise from the properties of the matching function while the last equation is the elasticity of the matching function with respect to unemployment in the steady state. The solution of this system yields $\varphi = 1.8635$ and $\theta = 1.660$.

Considering the value of being unemployed, $b = h + \psi$, we set the unemployment benefits at $\psi = 0.20$. This is consistent with the US ratio of benefits to average wages, which is placed at 20% at most by the OECD (1996). Vacancy costs c, workers' bargaining power η, and the leisure parameter h are set to ensure simultaneously that: (i) job creation is equal to job destruction in the steady state; and, (ii) the elasticity of unemployment duration with respect to unemployment benefits is 1.0. In this way we obtain the leisure parameter $h = 0.525$, $c = 0.0321$ and $\eta = 0.4128$.

Finally, the idiosyncratic productivity shocks are i.i.d. log-normally distributed with mean $\mu = -0.19$ and standard deviation $\sigma = 0.23$. These two parameters are chosen to match the target volatility of unemployment and its observed negative correlation with respect to labor market tightness, -0.98. Table 3 summarizes the parameter values for our baseline economy.

For the remaining parameters associated to restrictions in the labor market, γ^P, γ^T, and ι, we consider several cases. Our baseline parametrization describes the US labor market, where there are hardly any legal restrictions of the type studied in our analysis. Thus, we set $\gamma^P = \gamma^T = 0$. This implies the existence of just one type of job since temporary and permanent contracts become perfect substitutes. Hence ι becomes irrelevant.[7]

In next section we simulate different legislative scenarios, which we compare against this benchmark case. The objective of this exercise is to assess the effects of changes in the EPL on the labor market volatility. The first of these scenarios represents a situation with *employment protection and no temporary contracts.* This case considers that firms provide a single type of job. It attempts to mimic the situation of several OECD labor markets before the introduction of the temporary contracts and the development of fixed-term employment (a paradigmatic case would be Spain before its 1984 labor market reform). In terms of the model, this has two implications. First, firms are no longer able to make use of fixed-term contracts. As a consequence, we set $\gamma^T = \gamma^P = \gamma$, ruling out the distinction between temporary and permanent firing costs. The second implication is that

[7]When $\gamma^P = \gamma^T$, ι can take any value in [0,1]. We set it to zero. Similarly, since $\gamma^P = \gamma^T = 0$, there is only one job destruction condition. Thus, $s_t = s_t^T = s_t^P = s_t$ for all t.

the conversion probability from temporary to permanent contracts becomes irrelevant.

Another scenario presents a situation with *employment protection and temporary contracts*, which may be subject to restrictions in terms of duration and renewal limitations. This mimics the situation of most OECD countries in the aftermath of the partial labor market reforms implemented to introduce flexibility at the margin (again, the paradigmatic case is Spain after the 1984 labor market reform). Within this scenario, we distinguish between two cases:

1. We set $\gamma^T = 0$ and consider different values for $\gamma^P > 0$. Moreover, we fix $\iota = 0.10$. This value is close to the average quarterly conversion rate observed in the OECD countries. In this context, we evaluate the effects of changes in the permanent-worker firing cost on the volatility of labor market outcomes.

2. We set $\gamma^T = 0$ and $\gamma^P = 0.75$, so that there is a gap of 75% in firing costs. As opposed to the previous case, this exercise keeps the gap in separation costs constant. However, here we consider a number of values for the conversion probability ι from 0 to 1. Thus, for a given gap in separation costs, we evaluate the response of the labor market to different degrees of restrictions on the duration and renewal of temporary contracts.

4 Simulation results

In this Section we first describe the effects of changes in EPL on the model's steady-state. Then, we simulate each of the above legislative scenarios to determine the effects of firing costs and the duration and renewal limitations of temporary contracts on business cycle dynamics.

4.1 Steady state results

As noted, these scenarios stem from the values assigned to the legislative parameters: the firing tax parameters, γ^P and γ^T, and ι, which captures the existence of renewal restrictions in temporary contracts. When modifying these key parameters, we hold all the other ones constant and compute the new equilibrium values of the endogenous variables in the steady state. Table 4 shows the results from the conducted simulations by distinguishing three analytical panels.

The first noteworthy result if that higher values of both γ and ι reduce the relative number of vacancies relative to unemployed (θ) and this, in turn, diminishes the workers' hiring probability $f(\theta)$. Intuitively, this is the outcome of the firms' internalization of higher expected firing costs, whose response hinders job creation. Note that this result is especially significant in the scenario without flexibility at the margin (panel 1), because firing costs become immediately operational once the match takes place. For example, in the absence of temporary contracts (panel 1), when the firing tax is increased from 0% to 75% of labor productivity, $f(\theta)$ falls by 77% (from 80.7 to 18.7). With flexibility at the margin (panel 2), this probability is reduced only by 7.7% (from 80.7 to 74.5).

Table 4. Simulated steady states under different scenarios of employment protection (%)

	u	$f(\theta)$	s	s^T	s^P	$\frac{n^T}{(1-u)}$
Panel 1: $\gamma^T = \gamma^P = \gamma, \iota = 0$						
$\gamma = 0.00$ (Baseline case)	11.03	80.70	10.00	10.00	10.00	100
$\gamma = 0.75$	25.82	18.67	6.50	6.50	6.50	100
$\gamma = 1.00$	33.27	13.04	6.50	6.50	6.50	100
Panel 2: $\gamma^T = 0.00, \iota = 0.10$						
$\gamma^P = 0.75$	15.88	74.46	14.06	17.30	6.50	70.00
$\gamma^P = 1.00$	19.01	72.00	16.90	19.09	6.50	82.59
$\gamma^P = 2.00$	23.33	68.69	20.91	20.93	6.50	99.99
Panel 3: $\gamma^T = 0.00, \gamma^P = 0.75$						
$\iota = 0.10$	15.88	74.46	14.06	17.30	6.50	70.00
$\iota = 0.50$	15.82	70.94	13.13	35.14	6.50	23.76
$\iota = 1.00$	15.46	70.33	12.86	55.95	6.50	12.86

The second main result is the behavioral change in separations across scenarios. On one hand, they decline when temporary employment is not allowed. On the other hand, they rise in a labor market with flexibility at the margin due to the additional separations affecting temporary jobs.

The first response (in panel 1) is a well known result in the literature. The higher the firing costs, the more expensive becomes shedding workers. Firms, thus, tend to reduce their job destruction rate, in this particular case from 10.0% to 6.5% when the gap in firing costs rises from 0% to 75%. This response, however, changes dramatically when firms are allowed to have flexibility at the margin (panel 2), in which case the same rise in firing costs increases the job destruction probability from 10.0% to 14.1%. To avoid incurring in firing costs, firms make use of fixed-term contracts which will be more intensive the higher the separation tax on permanent workers. Notice that this response is entirely driven by endogenous job destruction in temporal contracts. Moreover, in case of having to face restrictions in terms of the duration and number of renewals of fixed-term contracts (panel 3), firms will find it optimal to further increase their temporary job destructions (as a way to avoid transitions to a permanent status, which entails future costs in case of adjustments. In particular, before converting fixed-term contracts, they will hire another temporary worker and start the process again. However, given the gap in firing costs, the average separation probability is reduced with higher levels of ι due to the observed reduction in the share of temporal workers $n^T/(1-u)$. In short, in response to higher firing costs, a situation of flexibility at the margin with restrictions generates a large job destruction rate in temporary jobs and, eventually, in the aggregate separation probability, s.

Third, it is also important to note that, for sufficiently high values of γ, firms will choose to retain their permanent workers to avoid incurring in those high separation costs. In this situation, new separations become exogenous to the firms' decisions.

Finally, the outcome in terms of unemployment depends on the relative strength of the finding and firing probabilities that may pull in opposite directions (a lower job finding probability $f(\theta)$ enhances unemployment, while a lower firing probability s decreases it). The direction and relative strength of these effects varies across scenarios. Without temporary employment (panel 1), the effect of the reduced job finding probability in response to higher γ overcomes the impact of the lower separation probability. In contrast, with flexibility at the margin (panel 2), both the lower $f(\theta)$ and the higher s enhance unemployment, the impact of the lower job finding probability being considerably larger. The more restricted is the use of temporary jobs (panel 3), the more this upward effect is reverted.

4.2 Business Cycle results

For each simulation we create 1000 sample paths of 1200 quarters, throw away the first 1000 and keep the 200 quarters corresponding to 1953-2003; detrend the generated data using the HP filter with the smoothing parameter equal to 1600; and calculate the standard deviations and correlation coefficients of the relevant variables. Table 5 compares the simulated results of our benchmark US economy with the data taken from Shimer (2005).

As in previous Section, when modifying the key parameters $(\iota, \gamma^P - \gamma^T)$, we hold all the other ones constant and compute the new equilibrium values of the endogenous variables in the steady state. We then solve and simulate the model around the new steady state, and compute the second moments of the relevant variables.

These exercises provide new insights on the effects of different EPL schemes, in particular of a situation with flexibility at the margin, on the cyclical behavior of the job finding probability $f(\theta)$, the separations in temporary and permanent jobs ($s^T$and s^P), and unemployment (u). Table 6 summarizes the results from the conducted simulations, again by distinguishing three analytical panels.

The first important result, in terms of Business cycle fluctuations, is the increased volatility of $f(\theta)$ in response to higher values of γ^P and ι. This holds within the three scenarios considered, as shown in the second column of Table 6. In the absence of temporary contracts (panel 1), when the firing tax is increased from 0% to 75%, the volatility of $f(\theta)$ is multiplied by 2.6 (from 5.3 to 13.7). With flexibility at the margin and the possibility of fixed-term contracts (panel 2), this volatility is increased by almost 74% (from 5.3 to 9.2). This scenario, however, assumes a low conversion probability of 10%. When the conversion probability is larger, for example 50%, then this volatility increases by an additional 20% and reaches 11.04 (panel 3).

Table 5. Data and simulated results for the US economy, 1953-2003.

Data	u	v	θ	$f(\theta)$	s	$A_t\bar{z}_t$
Std. deviation (%)	12.34	13.89	25.66	7.76	5.92	1.33
Autocorrelation	0.861	0.903	0.892	0.804	0.573	0.760
Correlation with θ	-0.976	0.981	1.000	0.929	-0.652	0.381
Simulated results	u	v	v/u	f	s	$A_t\bar{z}_t$
Std. deviation (%)	12.35	10.07	20.89	5.28	8.36	1.30
Autocorrelation	0.856	0.395	0.721	0.777	0.721	0.738
Correlation with θ	-0.944	0.915	1.000	0.786	-1.000	0.981

The main intuition behind this result is along the lines of Mortensen and Nagypal (2007) and Silva and Toledo (2007). The presence of firing costs makes firms' surplus more responsive to variations in the level of aggregate labor productivity. These authors develop search and matching models with constant separation rates, so that the behavior of the labor market is entirely driven by the job creation margin.

The fact that the job finding rate is relatively more volatile with a larger conversion probability implies that, the more restricted the duration of a temporary contract, the more sensitive is the job creation process to productivity shocks. In other words, a more stringent legislation on temporary jobs make firms perceive good times as even better times, so that they are more prone to adjust vacancies relative to the case of a labor market without these type of contracts.

The second main result is the reduced volatility of s in response to a more stringent legislation (i.e., higher values of γ^P and ι). Again this holds within the three scenarios considered, and note that it is valid for both separation rates (on temporary and permanent jobs). More in detail, with employment protection and no temporary contracts (panel

1), a rise in firing costs from 0% to 75% eliminates the volatility of the job destruction probability (from 8.4 to 0.0). Similarly, when firms are allowed to use fixed-term contracts (panel 2), it decreases by 38% (from 8.4 to 5.2). Further, when the conversion probability from a temporary to a permanent contract moves from 10% to 50%, the volatility of s has an additional fall of around 50% (panel 3).

This is a well-known result (Garibaldi, 1998; Thomas, 2007) whose essential intuition is that the higher the firing costs, the more expensive becomes shedding workers, in which case the firms' job destruction rate becomes less sensitive to shocks. It is also worth remarking that, as in the case of the steady state, it is natural to expect zero volatility of s^T when γ surpasses some threshold value for which separations on permanent jobs become exogenous.

Table 6. Simulated volatilities under different scenarios of employment protection (%)

	$\sigma(u)$	$\sigma(f(\theta))$	$\sigma(s)$	$\sigma(s^T)$	$\sigma(s^P)$
Panel 1: $\gamma^T = \gamma^P = \gamma, \iota = 0$					
$\gamma = 0.00$ (Baseline case)	12.35	5.28	8.36	8.36	8.36
$\gamma = 0.75$	6.63	13.70	0.00	0.00	0.00
$\gamma = 1.00$	5.75	15.13	0.00	0.00	0.00
Panel 2: $\gamma^T = 0.00, \iota = 0.10$					
$\gamma^P = 0.75$	11.03	9.17	5.21	6.28	0.00
$\gamma^P = 1.00$	10.91	9.96	4.54	4.54	0.00
$\gamma^P = 2.00$	9.69	10.50	2.98	2.98	0.00
Panel 3: $\gamma^T = 0.00, \gamma^P = 0.75$					
$\iota = 0.10$	11.03	9.17	5.21	6.28	0.00
$\iota = 0.50$	10.03	11.04	2.65	4.34	0.00
$\iota = 1.00$	9.74	11.37	3.35	3.48	0.00

A third result concerns the response of unemployment, which depends on whether or not the fall in the volatility of separations exceeds the increase in the volatility of the firing probability. Note that in our analysis it does; and therefore, the unemployment volatility declines in the three scenarios considered.

Given this third benchmark result, by comparing panels 1 and 2, we can also look at the change in unemployment volatility in response to changes in just the volatility of the separation rate. For example, departing from a scenario with strict employment protection (firing costs at 75% of labor productivity) and no segmentation (panel 1), when firms are allowed to use fixed-term contracts not subject to firing costs (panel 2), the unemployment volatility increases by 66% (from 6.6 to 11.0). This result contributes to the understanding of the actual rise experienced by countries that in the 1990s undertook partial labor market reforms introducing flexibility at the margin.

Finally, it is important to remark the intermediate position, in terms of Business Cycle volatilities, of the scenario with flexibility at the margin (panel 2). A natural place, it seems, between fully regulated and fully deregulated labor markets.

4.3 Employment protection and simulated correlations

Messina and Valanti (2007) have recently examined the impact of firing restrictions on job flow dynamics. They provide evidence that firms with tight firing restrictions smooth job destruction over the business cycle so that job turnover becomes less countercyclical. This is a result in line with previous studies that suggests an acyclical behavior of the labor flows in Continental Europe in contrast with their countercyclical pattern in the Anglo-Saxon countries (see Garibaldi, 1998). However, Messina and Valanti also find some empirical evidence suggesting that the presence of temporary contracts may revert the acyclical behavior on the job destruction rate.

This possibility is the one we explore next. In particular, we ask our model to what extent the coexistence of EPL in permanent contracts with flexibility at the margin has a relevant incidence on the average separation rate (s) as well as on the job finding probability $f(\theta)$. We measure this incidence with the correlation between these variables and the business cycle.

Table 7. Simulated correlations and the business cycle

	Deregulated market $\gamma^T = \gamma^P = 0.00$ $\iota = 0$	Regulated market with no temporality $\gamma^T = \gamma^P = 1.00$ $\iota = 0$	Regulated market with restrictions in temporality $\gamma^T = 0.00$, $\gamma^P = 1.00$ $\iota = 0.1$
$corr(y_t, f(\theta_t))$	0.889	0.848	0.942.
$corr(y_t, s_t)$	-0.981	0.000	-0.933

Note: Average labor productivity is equal to $y_t = A_t \overline{z}_t^T n_t^T + A_t \overline{z}_t^P n_t^P - cv_t$, where $\overline{z}_t^T$ and $\overline{z}_t^P$ are, respectively, the average idiosyncratic productivity shocks across temporary and regular jobs. As before, we detrend the generated data using the HP filter with the smoothing parameter is set equal to 1600.

The answer is provided in Table 7 where, again, we distinguish three stylized cases: (i) a pure deregulated market, where $\gamma^P = \gamma^T = \iota = 0$; (ii) a regulated market with no temporary contracts, where $\gamma^P = \gamma^T = 1.00$ and $\iota = 0$; and (iii) a regulated market with restricted flexibility at the margin, where $\gamma^T = 0$, $\gamma^P = 1.00$ and $\iota = 0.1$.

It is interesting to observe that in the first case, which we associate with the 'Anglo-Saxon type' labor market, there is an almost perfect negative correlation between the job separation rate and the business cycle (-0.98), which is similar to that observed in the US data (see Table 5). Further, it is also noteworthy the acyclical relationship (with a correlation of 0.00) obtained in a regulated market with no flexibility at the margin. This is traditionally associated with some Continental European labor markets, as in Garibaldi (1998). The value added of this exercise, however, lies in the third case, where the use of fixed-term contracts is restricted. We associate this case with the flexibility-at-the-margin type of labor market defined in the introduction. As shown in Table 7, the large negative correlation between the job destruction rate and the business cycle (-0.93) resembles very much the one of the pure deregulated labor market.

5 Conclusions

This paper argues that segmented labor markets with flexibility at the margin may achieve similar volatilities than fully deregulated labor markets. This is important because most OECD countries seem to conform to these two broadly defined type of markets. On the one hand, the liberalized or Anglo-Saxon type is characterized by low levels of EPL in regular contracts and no restrictions in the use of temporary employment. On the other hand, what we call the 'flexibility-at-the-margin type' features stringent EPL and limitations in the use of temporary contracts. The firms' response to these different institutional setups is in stark contrast: in the first case, there is an occasional use of temporary contracts whereas in the second one firms rely deeply on fixed-term employment. Irrespective of the firms' labor management strategies, the outcome in terms of the volatility of the labor market is similar.

We rationalize this outcome by developing a matching model with heterogenous workers. In the spirit of the insider-outsider theory, we distinguish between regular and fixed-term employees and focus the analysis on a twofold dimension of segmented labor markets. First, on the effects that the gap in firing costs among these two type of workers has on the volatility of the labor market. Second, on the additional effects that arise from restricting the use of fixed-term contracts in terms of their duration and maximum number of renewals.

Our analysis confirms the well-documented result that, other things equal, a rise in separation costs reduces the volatility of the labor market. Yet, this result is extended by considering a scenario with flexibility at the margin. In this scenario, firing costs on permanent jobs, and restrictions in the use of temporary contracts change the firm's workforce adjustment mechanism, and yield a boost in the volatility of the labor market. More precisely, this scenario provides an intermediate situation, in terms of labor market volatilities, between the one of full regulation (strict EPL and no temporary contracts) and another one of no regulation (loose EPL).

A final important result is the almost perfect negative correlation we find between job destruction and the business cycle both in the Anglo-Saxon and the flexibility-at-the-margin labor market types. This result clarifies the analogous finding for Spain in Messina and Valanti (2007), that could not be confirmed for the rest of the countries in the context of their analysis. Our paper, in fact, provides the rationale for such a finding.

Let us finish by stating that the achievement of similar flexibility/volatility than fully deregulated markets without fully deregulating the labor market is not synonymous of success. The study of the consequences of 'flexibility at the margin' by no means implies that this is a desirable feature. There are profound differences in these two types of labor market whose assessment lied beyond the scope of this paper but that, nevertheless, deserve utmost attention. Among them is the gap in productivity between temporary and permanent workers.[8] Any economic strategy relying excessively on fixed-term employment may end up biased towards low profile industries, low paid jobs and, generally, have a poor productivity performance. Spain is a paradigmatic case but this is left for future research.

References

[1] Autor, D.H., W.R. Kerr and A.D. Kugler (2007): "Does Employment Protection Reduce Productivity? Evidence from the US", *The Economic Journal*, vol. 117 (521), pp. F189-F217.

[2] Azariadis, C. and C.A. Pissarides (2007): "Unemployment dynamics with international capital mobility", *European Economic Review*, vol. 51, 1, pp. 27-48.

[3] Blanchard, O.J. and P. Diamond (1990): "The Cyclical Behavior of the Gross Flows of U.S. Workers", *Brookings Papers on Economic Activity*, vol. 2, pp. 85-155.

[4] Blanchard, O.J. and A. Landier (2000): "The Perverse Effects of Partial Labor Market Reform: Fixed Term Contracts in France", *The Economic Journal*, vol. 112, 480, pp. F214-F244.

[5] Boeri, T. and P. Garibaldi (2007): "Two Tier Reforms of Employment Protection: A Honeymoon Effect?", *The Economic Journal*, vol. 117 (521), pp. F357-F385.

[6] Cahuc, P. and F. Postel-Vinay (2002): "Temporary jobs, employment protection and labor market performance", *Labour Economics*, vol. 9, 1, pp. 63-91.

[7] Costain, J. S., and M. Reiter (2007): "Business Cycles, Unemployment Insurance, and the Calibration of Matching Models", *Journal of Economic Dynamics and Control*, forthcoming.

[8] Davis, S. J., R. J. Faberman, and J. Haltiwanger (2006): "The Flow Approach to Labor Markets: New Data Sources and Micro-Macro Links", *Working Paper No. 12167*, National Bureau of Economic Research.

[8] The impact of EPL on productivity has been recently studied in Autor *et al.* (2007) for the US. We believe this opens a new research avenue on the interaction of these two important determinants of the labor market performance.

[9] Dolado, J.J., C. García-Serrano and J.F. Jimeno (2002): “Drawing lessons from the boom of temporary jobs in Spain”, *The Economic Journal*, vol. 112, 480, pp. F270-F295.

[10] Garibaldi, P. (1998): “Job Flow Dynamics and Firing Restrictions”, *European Economic Review*, vol. 42, pp. 245-275.

[11] den Haan, W.J., G. Ramey and J. Watson, (2000): “Job Destruction and Propagation of Shocks”, *American Economic Review*, vol. 90, 3, pp. 482-498.

[12] Kugler, A., J.F. Jimeno and V. Hernanz (2002): “Employment consequences of restrictive permanent contracts: evidence from Spanish labor market reforms”, *IZA Discussion Paper Series* No. 657, IZA, Bonn.

[13] Lindbeck, A., and D.J. Snower (1989): *The Insider-Outsider Theory of Employment and Unemployment*, MIT Press.

[14] Malo, M.A. and L. Toharia (2000): “The Spanish experiment: pros and cons of flexibility at the margin”, in Regini, M. and G. Esping-Andersen (eds.), *De-regulation and Unemployment: the European Experience*, Oxford, Oxford University Press, pp. 307-335.

[15] Messina, J. and G. Valanti (2007): “Job Flow Dynamics and Firing Restrictions: Evidence from Europe”, *The Economic Journal*, vol. 117, 521, pp. 279-301.

[16] Meyer, B. D. (1990): “Unemployment Insurance and Unemployment Spells”, *Econometrica*, vol. 58, 4, pp. 757-782.

[17] Mortensen, D.T and C.A. Pissarides (1994): “Job Creation and Job Destruction in the Theory of Unemployment”, *Review of Economic Studies*, vol. 61, pp. 397-415.

[18] Mortensen, D.T. and C.A. Pissarides (1999) :“New Developments in Models of Search in the Labor Market”, in O. Ashenfelter and D. Card (eds.), *Handbook in Labor Economics*, Amsterdam: North Holland.

[19] Mortensen, D.T. and E. Nagypal (2007): “More on unemployment and vacancy fluctuations”, *Review of Economic Dynamics*, vol. 10, 3, pp. 327-347.

[20] Nagypal, E. (2004): “Worker Reallocation over the Business Cycle: The Importance of Job-to-Job Transitions”, *mimeo.*

[21] OECD (2002): “Taking the measure of temporary employment”, *OECD Employment Outlook 2002*, Paris, pp. 127-185.

[22] OECD (2004): “Employment Protection Regulation and Labour Market Performance”, *OECD Employment Outlook 2004*, Paris, pp. 61-123.

[23] OECD (2006): “Employment and Labour Market Statistics”, vol. 2006, release 01.

[24] Osuna, V. (2005): “The Effects of Reducing Firing Costs in Spain: A Lost Opportunity?”, *Contributions to Macroeconomics*, vol. 5, 1, Article 5.

[25] Shimer, R. (2005): “The Cyclical Behavior of Equilibrium Unemployment and Vacancies”, *American Economic Review*, vol. 95, 1, pp. 25-49.

[26] Silva, J.I. and M. Toledo (2007): “Labor Turnover Costs and the Cyclical Behavior of Vacancies and Unemployment”, *mimeo.*

[27] Thomas, C. (2006): “Firing costs, labor market search and the business cycle”, *mimeo.*

[28] Veracierto, M. (2007): “Firing costs and business cycle fluctuations”, *International Economic Review*, *forthcoming*.

[29] Wasmer, E. (1999): “Competition for jobs in a growing economy and the emergence of dualism in employment”, *The Economic Journal*, vol. 109, 457, pp. 349– 371.

[30] Zanetti, F. (2007): “Labor market institutions and aggregate fluctuations in a search and matching model”, *mimeo*.